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Central banking in the Americas: Lessons from two decades

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Foreword

Agustín Carstens

In October 2002, the Bank for International Settlements (BIS) opened its Representative Office for the Americas on the 17th floor of Torre Chapultepec in Mexico City. What started out as a rather small operation – one chief representative, two economists, one banking representative and one administrative officer – has grown in both size and scope. Twenty years after its founding, the Americas Office had 32 employees, covering all aspects of BIS activities from organising meetings of senior central bank officials and doing policy research to banking operations, contributing to the achievement of the BIS core objective of fostering monetary and financial stability.

A two-decade period is an auspicious milestone. It is half the length of a career for many of us. And it is a time in which not only the economic outlook and the structure of financial markets can change dramatically, but also the state of technology and level of economic development.

In the famous American short story by Washington Irving, "Rip Van Winkle", the protagonist falls asleep in New York's Catskill mountains just before the American Revolution in the 1770s. He awakens 20 years later to find the world completely changed. For instance, when he declares himself a loyal subject of King George III, this is no longer the socially acceptable response, and he finds that the shared values of the community have changed completely. Luckily, Rip Van Winkle is an adaptable type, and he soon finds himself able to settle into this new world – thanks in part to the support of his children and his extended family.

Indeed, Rip Van Winkle would find the Americas region quite different from how it was in 2002. Real GDP is about 50% higher across the region. Imports and exports have grown by 60%. Local capital markets have been further developed.

Central banking has also changed during the past 20 years. While the overarching objectives remain the same – price and financial stability – the means to achieve them have evolved in response to shocks such as the Great Financial Crisis and the Covid-19 pandemic, and slower-moving changes in the economic and financial structure. Old challenges remain or have re-appeared – such as the surge in inflation in the wake of Covid-19 – and new ones have appeared – just think of digitalisation.

This volume discusses the major developments of the last two decades and how they might affect the future. It presents a collection of chapters – one from each country represented on the BIS Consultative Council of the Americas (CCA). These contributions review the experience of the past 20 years to draw lessons that would help central banks to meet the challenges of the future. We complement this collection with two additional chapters. Alejandro Werner, founder of the Georgetown Americas Institute, Professor of Practice at Georgetown University and former Director of the IMF's Western Hemisphere Department, writes about the institutional successes of central banking in Latin America in the past 20 years, and the significant challenges in the next decade. Tobias Adrian, Financial Counsellor and Director of the Monetary and Capital Markets Department at the IMF and a former official of the Federal Reserve Bank of New York, discusses how a cross-border payments, exchange and contracting platform could drive economic integration and growth. Taken together, the papers give an excellent overview of what happened in

central banking in the Americas since the turn of the millennium and how central banks look at the challenges ahead.

I hope this volume will be an insightful read for central bank staff, researchers and a general audience in countries across the Americas and beyond. As central banks tackle the challenges of the coming decades, they can continue to count on the BIS to support them along the way. I would also like to take the opportunity to thank Governors from central banks in the Americas and their staff for the contributions to this volume.

Lessons from 20 years of central banking in the Americas

Alexandre Tombini, Ana Aguilar, Jon Frost, Christian Upper and Fabrizio Zampolli[1]

Abstract

Central banking in the Americas has evolved substantially in the last decades, with the adoption of inflation targeting and a sustained commitment to macroeconomic and financial stability. This evolution took place in a challenging environment, with the shocks of the Great Financial Crisis of 2008, the taper tantrum of 2013, the Covid pandemic of 2020 and a synchronised global inflationary shock in 2022. Yet central banks have risen to the challenge. Today, central banks in the Americas face new opportunities and challenges from digitalisation, with many new uncertainties. In the path ahead, as in the past two decades, the BIS Americas Office will be there to support the central banks of the region with policy dialogue and cooperative activities, cutting-edge research, a wide range of banking services and the activities of the BIS Innovation Hub.

Introduction

The past 20 years have been eventful for central banks in the Americas. While central banks have not materially changed their overarching objectives, they have substantially expanded their toolkit in response to a series of major economic and financial shocks – the Great Financial Crisis of 2008, the taper tantrum of 2013, the Covid pandemic in 2020 and, throughout this entire period, large swings in capital flows and commodity prices. Rapid advances in digital financial technologies have allowed central banks to improve payment systems and explore new ways of boosting financial inclusion. However, as central banks were meeting new challenges, old ones reappeared – in 2022, supply disruptions, the strong monetary and fiscal stimulus during Covid-19, the unexpectedly swift recovery from Covid-related shutdowns and the impact of the Russian invasion of Ukraine pushed up inflation to levels not seen in decades. While inflation peaked in the second half of that year, at the time of writing in 2023 it still remained well above target in most economies of the region.

This chapter explores these developments in more detail, complementing the country chapters that follow. It is divided into four sections. In Section 1, we begin by providing some longer-term history and context on the shifts in central banking mentioned above. Section 2 focuses on the very core of central banking – monetary policy and financial stability – and discusses the evolution of policy frameworks in the region over the past two decades. Section 3 takes a more forward-looking perspective and discusses how central banks can preserve the role of money in the future, taking into account the opportunities and challenges of financial technology (fintech) and

[1] With thanks to Cecilia Franco and Rafael Guerra for research support. The views expressed here are those of the authors and not necessarily the Bank for International Settlements (BIS).

innovations such as central bank digital currencies (CBDCs). Section 4 closes by discussing the role the Bank for International Settlements (BIS) is playing and will continue to play in helping central banks to meet the challenges of the past, present and future.

Central banking in the Americas: a long view

The history of central banking in the Americas is full of false starts and episodes of instability – but also of successes and important contributions to the public interest. Many countries of the region saw attempts to introduce a central bank or some other form of money-issuing institution in the 18th and 19th centuries, after gaining independence from European colonial powers. Some of these institutions operated for a number of years but ultimately did not succeed, often because they were not able to deliver stable money over an extended period of time.[2] The oldest of the existing central banks in the region date back to the early 20th century. Most countries had founded a national central bank by the 1930s,[3] although some came even later, such as the Central Bank of Brazil, which was founded in 1964, or the Central Bank of Uruguay (CBU), founded in 1967.

Unfortunately, the founding of modern central banks did not put an end to the monetary instability that had plagued the region for over a century. In the first years after central banks were founded in the Americas, monetary policy was constrained by the gold standard and central banks were tasked with ensuring an adequate supply of reserves – but little else. Macroeconomic stabilisation, in particular, did not feature among their tasks beyond those necessary to meet the obligations inherent in the gold standard that many countries were following. Central banks were quite independent from the government. While they generally were able to provide some financing to the government, this was within rather tight bounds (Jácome (2015) and Jácome and Pienknagura (2022)).

The Great Depression of the 1930s marked a watershed. As countries went off the gold standard, they needed to find new policy frameworks that would allow them to cope with the challenges of the time. In Latin America, central banks initially increased interest rates to stem the loss of reserves, but after leaving the gold standard, they moved to a more accommodative stance to stabilise the economy. With public revenues evaporating, central banks also became an important source of financing for the government. Many countries expanded their central bank's mandate – which had been rather narrow – to give the central bank an important role in funding the public and private sectors.

[2] In Brazil, the Banco do Brasil, founded in 1808, performed several central bank tasks prior to the foundation of the Central Bank of Brazil. In Uruguay, the state-owned Banco de la República Oriental del Uruguay played a similar role. In the United States, there was an intense debate as to whether the federal government had the right to get involved in monetary matters, and two national banks were founded and later closed. See below.

[3] The oldest current central bank – or rather, system of central banks – in the Americas is the Federal Reserve, which was set up in 1913–14 after a series of financial panics showed the need for a lender of last resort. The Bank of Canada began operations in 1935, in the aftermath of the Great Depression. In Latin America, the Reserve Bank of Peru was founded in 1922 (and in 1931 was reformed to become the Central Reserve Bank of Peru), the Central Bank of Colombia in 1923, the Central Bank of Chile and the Bank of Mexico in 1925, and the Central Bank of Argentina in 1935.

With the end of World War II came the introduction of the Bretton Woods system of fixed exchange rates.[4] This gave central banks across the region an important role in maintaining exchange rate targets and administering foreign exchange. Meanwhile, during the heyday of import substitution and active industrial policy, central banks' role in funding the public and private sectors was partly taken over by newly established specialised development banks or financing institutions. Yet pressure remained on central banks to help fund the government. The toolkit of central banks also expanded. Rather than controlling the supply of liquidity primarily or exclusively through discounting and rediscounting bills, several central banks started to trade securities, intervene in FX markets, and use reserve requirements and quantity restrictions on bank credit as policy instruments (Jácome (2015)).

Ultimately, the broad, "developmental" mandates of Latin American central banks were not successful. Central banks struggled with many – and often contradictory – objectives, such as ensuring price and exchange rate stability and providing monetary financing. This led to stop-and-go policies, which added to economic volatility and, ultimately, inflation.

Authorities responded to ever higher rates of inflation between the 1960s and the early 1990s with a sequence of stabilisation programmes. These generally relied on a fixed exchange or crawling peg as a nominal anchor, but often also contained income policies or price and wage control arrangements between the government and the private sector. While some managed to reduce inflation quite sharply in the short term, these gains were generally short-lived, and inflation soon soared to new record highs. Fiscal policy turned out to be an Achilles heel, as governments were unable to put fiscal accounts on a sustainable footing. All this eroded the confidence of society and investors in public policy.

Financial instability exacted its own toll, leaving a lasting impact. The 1980s and 1990s were especially marked by a series of disruptive balance of payments, banking and debt crises (Laeven and Valencia (2018)), which frequently followed in the wake of financial liberalisation. Central banks were not able to ensure the stability of the economy and the financial system given large external and fiscal imbalances and inadequate financial regulation and supervision, but they played a key role in managing these crises (Jácome (2015)).

The history of central bank policy in Canada and the United States shows many similarities with that in Latin America, though there are important differences. The origins of the two central banks were not that different from those of their peers in Latin America: in Canada, the Great Depression revealed the limitations of a monetary system based on note issuance by a small set of large private players, and the Bank of Canada was set up in 1935 to ensure the external and internal stability of the currency. In the United States, the foundation of the Federal Reserve System was actually the third time a national central bank had been established. The congressional mandates of earlier central banks, the First Bank of the United States (1791–1811) and the Second Bank of the United States (1816–36), had lapsed amid political opposition to a national bank. This changed after the banking panic of 1907 revealed the inadequacy of the existing framework to manage crises, resulting in wider acceptance of the need for a lender of last resort and an institution entrusted with protecting the national currency. The Federal Reserve System was founded in

[4] Countries in the Americas played an outsized role in the creation of the Bretton Woods system. At the conference in July 1944, at the Mount Washington Hotel in Bretton Woods, New Hampshire, 20 of the 44 countries represented were from North and South America or the Caribbean. This included Brazil, Canada, Chile, Colombia, Mexico, Peru and the United States.

1913 with a regional structure comprising 12 reserve banks and a Board of Governors. But it underwent substantial changes in the first decades of its existence, including the introduction of open market operations in 1922. With the ascent of the US dollar to global reserve currency in the 1930s, the Federal Reserve (Fed) became a key player in international finance, just as the United States played host to both the Bretton Woods conference and its new institutions – the International Monetary Fund (IMF) and World Bank – starting in 1944.

Canada and the United States also dealt with the problem of fiscal dominance, although with much less severity than in Latin America. For example, substantial fiscal stimulus during and after World War II, along with policies to keep interest rates low and reduce governments' financing costs and the removal of price controls, helped stoke a consumption boom that ultimately resulted in a surge in inflation in the late 1940s and early 1950s. This was then compounded by the stimulus provided by the Korean War. To bring inflation under control, institutional changes were needed. In a way, one can argue that the modern Fed was born out of a 1951 accord with the US Treasury that separated monetary policy from debt management.

Like in most of Latin America, the 1970s also marked a period of high and rising inflation in Canada and the United States, although at much lower levels. Two oil price shocks followed a long period of loose fiscal policy – and an arguably mistaken reading of the economy – to push up inflation.[5] This came at a time when central banks were searching for a new nominal anchor after the Bretton Woods system of fixed exchange rates ended in 1973. In subsequent years, both the Bank of Canada and the Federal Reserve experimented with monetary targeting in search of a nominal anchor, but this ultimately met with limited success, as monetary aggregates behaved too unpredictably to be useful in practice. In the early 1980s, both central banks were finally able to bring inflation down with huge interest rate increases. This in turn caused massive collateral damage in Latin America, including the sovereign debt crises of 1982.[6] After a long and gradual disinflation, Canada and the United States formally adopted inflation targeting in 1991 and 2012, respectively.

In Latin America, the 1990s marked a turning point in central bank history. Mindful of how the financial crises of the 1980s and early 1990s had wreaked havoc with their living standards, the public came to accept sweeping economic reforms (see eg Aguilar et al (2023)) and governments embraced economic orthodoxy as summarised by the so-called Washington Consensus. In this light, authorities enacted a series of reforms to reduce inflation and set their economies on a path towards higher and more sustainable growth. The reforms were based on four main pillars: (i) a clear central bank mandate with price stability at its heart; (ii) operational independence to execute monetary policy; and (iii) accountability (see eg Carstens and Jácome (2005)). Importantly, the new frameworks for central banks were embedded in a broader set of institutional and structural reforms that included fiscal consolidation, the opening of the economy to foreign trade and capital, and stronger prudential regulation and supervision to strengthen the banking sector. These changes created the conditions for dropping exchange rate pegs, a precondition for exchange rates playing a greater role as a shock absorber. At the same time, inflation

[5] US fiscal policy was expansive in the light of outlays for the Vietnam War and President Johnson's Great Society programmes.

[6] The debt crisis began with the default by the Mexican government in August 1982, and it would eventually involve 16 countries across Latin America. These debt crises were resolved through concerted actions by governments across the region as well as the IMF and World Bank, including the 1989 Brady Plan.

targeting replaced the exchange rate as the nominal anchor necessary to preserve price stability.

From the rich and diverse history of modern central banking in the Americas, one can draw at least five lessons.

First, central banks need mandates that put price stability at the core, along with the tools to fulfil these mandates. Imprecise mandates with multiple objectives blur responsibilities and sap credibility.

Second, unsustainable public finances undermine price stability. Fiscal imbalances were behind several bouts of inflation, the most recent and devastating of which were the hyperinflations of the late 1980s and early 1990s in several Latin American countries. Central banks took many actions to reduce inflation, but as long as the underlying problem – unsustainable fiscal positions – remained unresolved, these monetary measures had only a temporary impact on inflation.[7]

Third, central banks need to be independent to do their job. As mentioned before, central banks did try to tighten policy when faced with high inflation, but as soon as the next recession loomed, they were unable to resist calls for renewed advances to the government.

Fourth, independence must come with accountability. Central banks must explain, explain and explain to convince the public and the markets that they will do everything necessary to achieve their objectives. They must explain what they are doing and why they are doing it, and they must do so in a language that is understood by the public.

Fifth, exchange rates need to be flexible in order to serve as shock absorbers. For many decades, Latin American countries had exchange rates that were nominally fixed, only to be devalued once pressure became excessive. Betting against the currency became an almost riskless proposition – the direction of exchange rate moves was known; the only questions were the timing and size of the adjustment. Furthermore, only flexible exchange rates allow central banks to concentrate on their price stability objective. Flexible exchange rates also reduce incentives to borrow in foreign currency, thus contributing to financial resilience.

Addressing the challenges and synergies of price stability and financial stability

During most of the period covered in this volume – ie the past two decades – inflation in most of the larger economies of the Americas was low by historical standards and central banks followed some variant of inflation targeting. Output volatility was also low compared to history, not only in the United States, where observers referred to the "Great Moderation" (Stock and Watson (2002), Bernanke (2004)), but even more so in many Latin American countries. However, greater macroeconomic stability did not prevent financial instability, the 2008 Great Financial Crisis (GFC) being a case in point. In the United States and Canada, banks and financial markets saw acute stress, while large, volatile capital flows threatened both macroeconomic and financial stability in Latin America. While most central banks in the Americas maintained inflation targeting as their overarching objective, they regularly adjusted their policy

[7] See Kehoe and Nicolini (2021) and chapters therein.

frameworks to deal with the various challenges they were facing. This section provides a short overview of the main developments, complementing the country chapters that go into more detail.

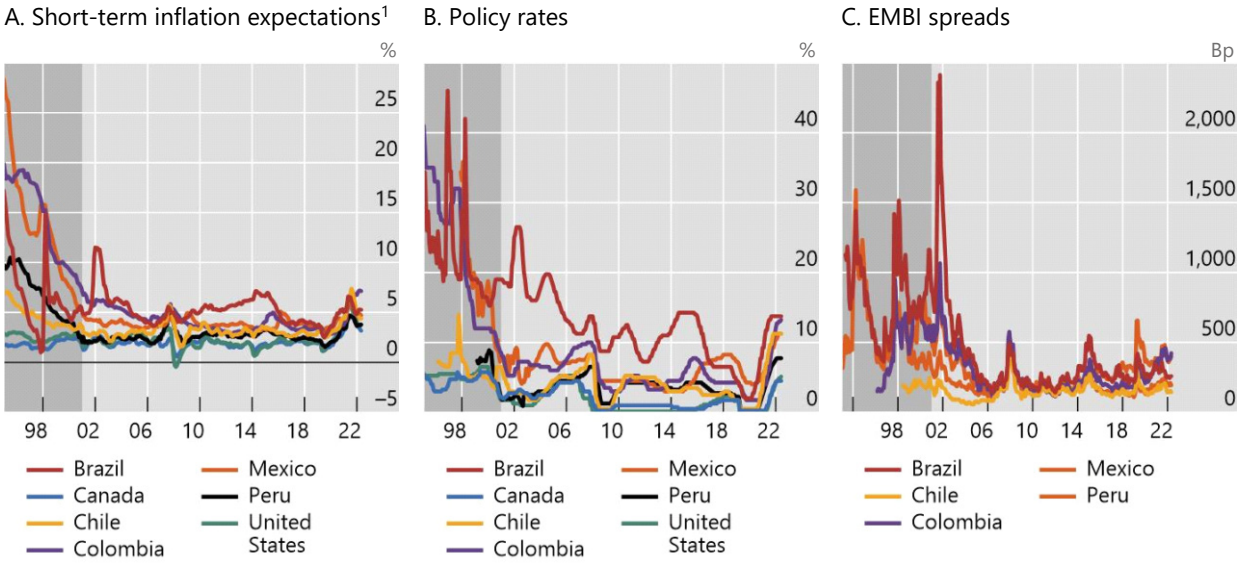
In the United States and other advanced economies (AEs), a key development was the increased sensitivity of the business cycle to financial factors. The combination of a more stable macroeconomic environment and regulatory gaps fostered greater risk-taking and easier financial conditions, leading to more prolonged business expansions and the emergence of credit and asset price booms (Borio and White (2004), BIS (2023)). Policymakers generally underestimated the risks from financial booms and increased financial complexity, and hence failed to adjust their prudential regulation and supervision. When interest rates went up in 2004–6, this exposed the weaknesses in the financial system which resulted in the GFC in 2008.

In response to the crisis, authorities tightened prudential and other regulations. In the United States, the 2010 Dodd-Frank Act required banks to hold more capital, increased oversight of derivatives trading and improved protection of consumer borrowers, among other things. At the global level, Basel III was agreed in 2013 and regulations were finalised in 2017, although long transition periods meant that they did not come fully into effect until later. Basel III required banks not only to hold higher levels of capital but also larger liquidity buffers. Tighter national and international regulations were complemented with stress tests to ensure that banks would continue to meet regulatory standards even in adverse scenarios. On the monetary front, the Federal Reserve and other AE central banks embarked on a programme of large-scale asset purchases to stimulate the economy. While these unconventional monetary policy measures contributed to the economic recovery, they also generated a search for yield and significantly increased global liquidity, posing new challenges for EMEs, including those in Latin America.

Inflation took longer to fall in Latin America than in the United States or Canada, but its decline ushered in a period of relative stability not seen in decades. Interest rates and risk premia fell as investors grew more comfortable (Graph 1). Undoubtedly, the reforms of the 1990s played an important role, but the region also benefited from the tailwinds of lower global inflation and higher commodity prices. One sign of success is that, in contrast to previous periods, Latin American countries have not experienced any major financial crises, sudden stops or dislocation in the past 20 years. This is not for a lack of shocks – unlike in the United States and Europe, the recession during the GFC was sharp but brief (except for in Mexico, whose economy is tightly linked to that of the United States). Latin American economies also proved resilient to the 2013 taper tantrum and the sharp drop in commodity prices in 2014–15.

A key to this success has been central banks' readiness to continuously adapt their policy frameworks to changing circumstances. While central banks (other than Argentina's) have remained inflation targeters, the tools and methods used have changed. The main challenge was to prevent financial vulnerabilities from building up in response to the large swings in exchange rates and capital flows during the last 20 years. The resulting macro financial stability frameworks aim to provide a nominal anchor for the economy while ensuring financial stability.

Macroeconomic stability was achieved across the Americas Graph 1



Note: Shaded area indicates the average period before Inflation Targeting regimes were implemented in the region.

[1] One-year-ahead inflation expectations.

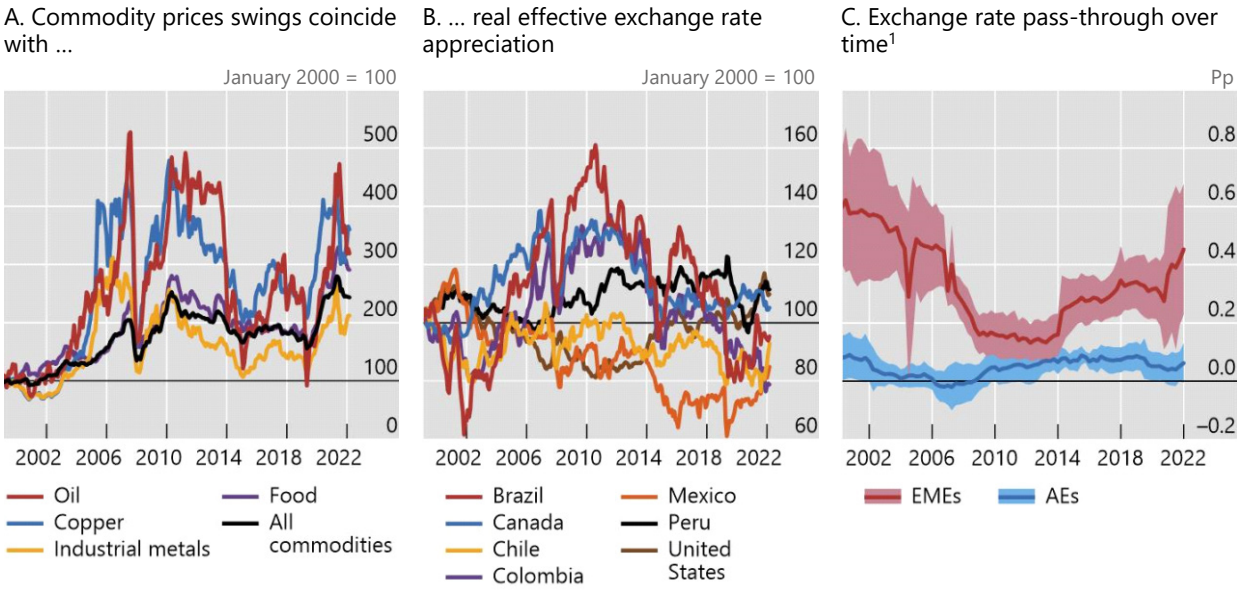
Sources: Consensus Economics; Goldman Sachs; national data; BIS.

In this respect, it is worth distinguishing two periods: the first is the pre-GFC period, which saw the start of a commodity super-cycle. The second is the post-GFC period, which is marked by major monetary and fiscal stimulus in China, the deployment of unconventional monetary policy in the United States and other major economies and the end of the commodity supercycle in 2014.

The pre-GFC period saw a booming Chinese economy joining the WTO in 2001. Most countries in Latin America benefited not only from improved terms of trade and stronger commodity exports (Graph 2.A, and 2.B), but also from a substantial increase in capital inflows due to higher growth prospects. A significant share of the latter took the form of highly volatile non-resident portfolio inflows. Swings in these flows put significant pressure on exchange rates and, since exchange rate pass-through is quite high in Latin America, inflation (Graph 2.C). And since these flows were also short-term, they increased the risk of sudden reversals.

In economies experiencing large inflows, stronger growth and appreciating currencies, interest rate policy on its own was generally not sufficient to mitigate the overheating of the economy and thus inflation, let alone build the buffers needed to withstand possible capital flow reversals (BIS (2019a)). Indeed, increasing interest rates could be counterproductive, leading to even more exchange rate appreciation, drawing in more capital and further loosening financial conditions. Central banks therefore resorted to tools other than interest rates, in particular FX intervention. These were aimed primarily at building foreign exchange buffers during large inflow episodes, to mitigate market disruptions and ensure an adequate amount of liquidity in case of depreciations. Limiting exchange rate volatility also helped ensure financial stability, especially in episodes of strong appreciation and domestic credit growth. Learning from experience, central banks in the region have refrained from using FX interventions to promote competitiveness or pursue an exchange rate target.

Commodity prices changes affect exchange rates, impacting inflation Graph 2



Note: Shaded areas represent the period after China's entrance to WTO (blue), the period after the GFC but before the Taper Tantrum (green) and the war in Ukraine (red).

[1] Coefficients are six-year rolling window long-run multipliers from the equation $Inflation_{it} = \alpha_i + \beta_t + \delta\, Inflation_{it-1} - \sum_{j=0}^{3} \gamma_j \Delta NEER_{it-j} + \phi Outputgap_{it} + \varepsilon_{it}$. Sample starts in Q1 1995. For details, see Jašová et al (2019). The ranges indicate the 90% confidence intervals. EMEs = BR, CL, CO, CZ, HU, ID, IN, KR, MX, PE, PH, PL, RU, TH, TR and ZA; AEs = AU, CA, GB, NO, NZ and SE.

Sources: DataStream; IMF; national data; BIS.

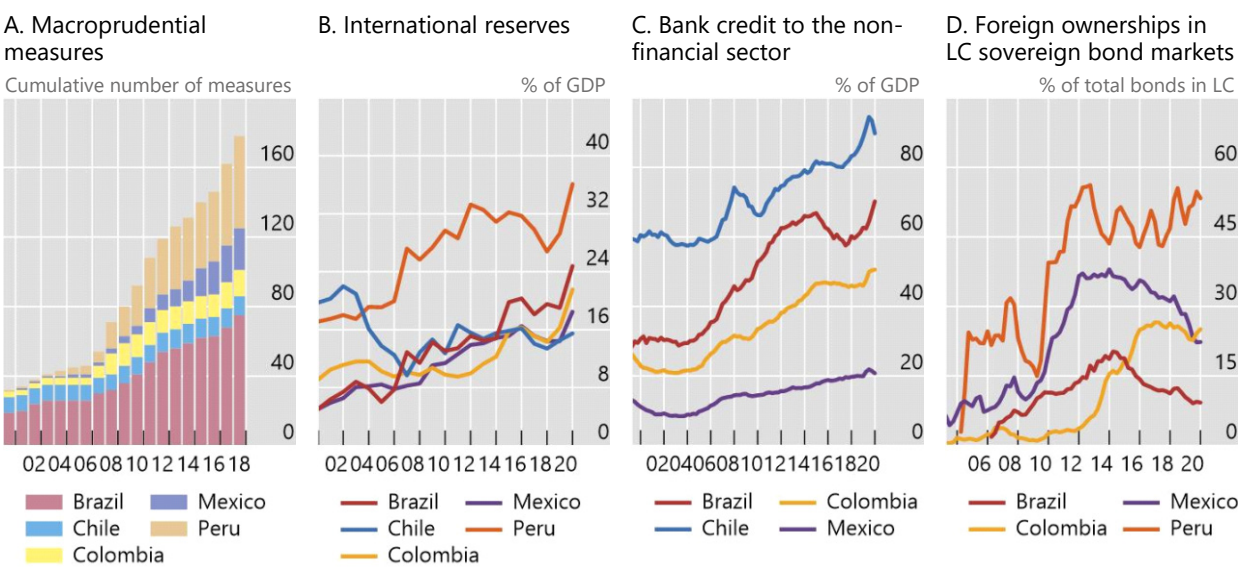
FX intervention was complemented by macroprudential measures to improve the resilience of the financial system and, in some cases, dampen financial booms. In particular, macroprudential policies generally aimed at reducing financial institutions' exposures to FX risk and fast-growing segments of the domestic credit market (Graph 3.A). The most frequently used tools were reserve requirements on deposits, often differentiated according to maturity and currency, limits to currency mismatches and loss provisioning. These tools were also convenient to central banks since most of them are not in charge of the prudential supervision.

The post-GFC period saw a new wave of capital inflows into Latin America driven by a renewed increase in commodity prices and unconventional monetary policy measures in AEs (IMF (2014)). Central banks and other authorities responded to the new challenges by acting on multiple fronts. First, the governance of central banks was adjusted to reflect their greater emphasis on monitoring and addressing financial stability risks. This involved the creation or strengthening of financial stability committees and divisions as well as the publication of more analytical financial stability reports (Aguilar, Tombini and Zampolli (2022)). Second, new prudential regulations strengthened the resilience of the financial sector, in some cases going beyond what was required by Basel III standards. For example, some countries introduced guidelines for reporting firms' derivative positions. Third, Latin American central banks continued to intervene in FX markets and made greater use of macroprudential policy. Reserve requirements remained an important tool, but the range and frequency of other tools increased compared to the pre-GFC period. Intervention in FX derivatives market also grew in importance in line with greater demand for hedges, especially by non-financial corporates.

During 2010–14, before commodity prices plummeted, and capital inflows were even larger and more diversified by type of investors and geographical origin than during the pre-GFC period. The share of banks in cross-border flows fell, while flows from asset managers, investment funds and other non-bank financial intermediaries gained relevance. Many central banks sterilised these inflows by acquiring reserves (Graph 3.B). Nevertheless, and despite active macroprudential policies, bank credit grew substantially (Graph 3.C). An increased share of foreign capital was invested in local currency markets, mostly in sovereign debt (Graph 3.D). Together with greater risk appetite by global investors, the removal of administrative barriers to foreign investment and the development of hedging markets played an important role.

The diversification of investment flows helped deepen local financial markets, especially local currency sovereign bond markets, but it also brought new risks (CGFS (2021)). Passive investment strategies and other practices could make capital more sensitive to international developments. Furthermore, while the issuance of local currency debt reduced risk by eliminating currency mismatches on side of the borrowers, it created mismatches on the balance sheet of lenders. Since the latter are often unhedged, there could be an adverse feedback loop between yields and exchange rates that exacerbates the transmission of global shocks ("original sin redux"; see BIS (2019a), Hofmann et al (2022) and Carstens and Shin (2019)).

Building buffers on the back of growing vulnerabilities Graph 3



Sources: Alam et al (2019); IIF; IMF; national data; BIS.

The Covid-19 pandemic posed yet another challenge to central banks. The lockdowns in early 2020 caused a precipitous fall in economic activity and the public began to fret about a liquidity and insolvency crisis. US bond markets froze in March 2020. The prompt injection of liquidity by the US Federal Reserve and other central banks was key to re-establishing confidence. In addition to establishing US dollar facilities for domestic and foreign counterparties, this included the renewal of US dollar swap lines with other central banks. Central banks of other AEs, including Canada, intervened with massive unconventional monetary intervention along with large fiscal packages, flooding the global economy with liquidity.

Alongside the Federal Reserve and Bank of Canada, other central banks in the region also played an important role in stabilising local market conditions. Several

aspects of their policies are noteworthy. First, most Latin American central banks managed to slash policy rates in the early stage of the crisis. This prompt response was made possible by the actions central banks took in the years before the pandemic, which helped reduce the vulnerability of their economies to currency depreciation, thus allowing exchange rates to act as shock absorbers (Aguilar and Cantú (2020)). Second, several central banks acted as "market makers of last resort" to restore market functioning, primarily in foreign exchange markets but also, in some cases, those for government and/or corporate bonds. But given their history of monetary financing and high inflation, and legal limits to this type of operations, the preferred tool of intervention for most Latin American central banks was lending operations to financial institutions in support to lending to the private sector. Finally, an innovation seen during this period was the use by several central banks of forward guidance once policy rates reached historical lows.

The economic policies implemented in response to the Covid-19 pandemic were successful in preventing widespread firm insolvencies and facilitating a rapid recovery of economic activity. However, as they emerged from the pandemic, the countries in the region, as in other parts of the world, were met with an unexpected challenge: the reappearance of high inflation. Some of the factors behind it are well known. The pandemic disrupted supply chains for manufactured goods. The lifting of the mobility restrictions then led to a sharp rebound in demand for those goods and their prices. Subsequently, Russia's invasion of Ukraine sent commodity prices soaring.

Initially, most observers believed that the increase in inflation would be transitory, receding once the supply chain disruptions would dissipate. Unfortunately, inflation turned out to be higher and more persistent than anticipated.

In addition to the unprecedented closing and reopening of economies, the lack of anticipation could reflect the long period of below-target inflation in the United States and Canada, despite very low interest rates and large-scale asset purchases. Similarly, earlier spikes in commodity prices were generally short-lived. The main worry of central banks was low inflation and inflation expectation drifting below target and their inability to use their conventional policy interest rate instrument to increase it. The Federal Reserve even changed its policy framework in August 2020 to target a 2 per cent average inflation over time rather than in a specific year. This adjustment allowed it overshoot the target moderately for some time if inflation had been below target in the previous years.

Most central banks in the Latin America increased rates in the first half of 2021, acting boldly to tame inflation. However, in doing so, they faced at least two challenges. The first concerns the interaction with the substantial fiscal stimulus in most countries (BIS (2023)), which continued to push up inflation even after central banks had started raising interest rates. In the long run, high public debt could undermine the ability of central banks to keep inflation contained. Since high public debt levels can drive up risk premia, central banks could come under pressure to keep interest rates lower so as to ease the burden on public finances and support growth (Aguilar, Cantú and Guerra (2023)). Political pressures to keep monetary policy easy may rise in the long run as many countries in the region face poor long-term growth prospects and increasing social demands. Central bank autonomy, which has been the outcome of a long and tumultuous journey, may come under threat. This is especially likely in jurisdictions where the debt-to-GDP ratio has increased considerably and thus the debt burden is large.

Another challenge for central banks is related to the financial vulnerabilities that may have accumulated during a long period of low interest rates. Today's financial

systems are very complex and fragile, as underscored again by the series of US bank failures in early 2023. The interaction between banks and non-bank financial institution has become more complex. Excess leverage and liquidity mismatches may be difficult to identify. This underlines the importance of continuously adjusting policy frameworks to ensure that financial stability issues are minimised.

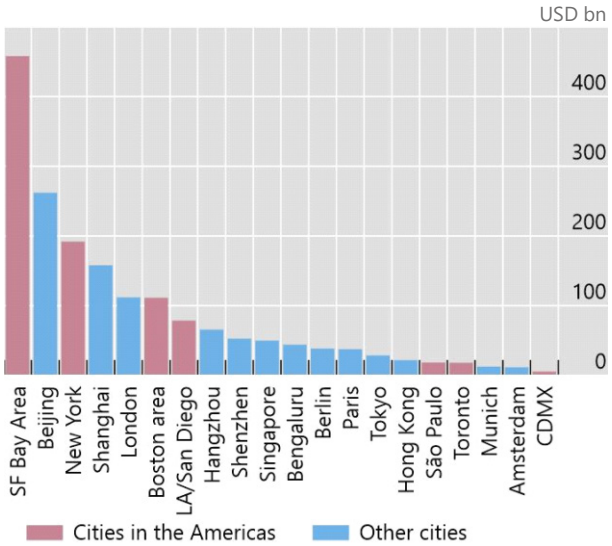
The promise and challenges of digitalisation

As countries in the Americas emerge from the major macro shocks of the past two decades and are facing renewed inflationary challenges, they now face a new set of opportunities: those related to disruptive digital innovations in finance and the real economy. These innovations hold both great promise and great challenges for their economies, financial systems and mandate to preserve the value of money in the future.

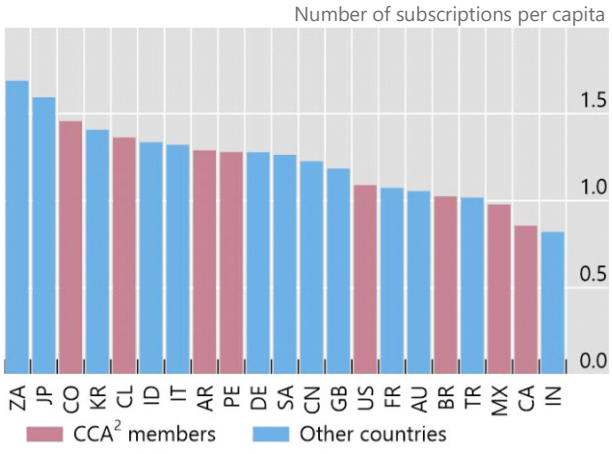
The countries of North and South America are not just passive bystanders when it comes to meeting these challenges – they are actively shaping the future of innovations whose impact reverberates around the world. In the last two decades, countries in the Americas have been active drivers of technological breakthroughs in areas like cloud computing, big data, artificial intelligence (AI) and distributed ledger technology (DLT). Indeed, Silicon Valley (and the broader San Francisco Bay Area) has been a hotbed of innovation in each of these areas and hosts the headquarters of some of the world's largest digital platform companies and cloud providers. Technology hubs in the San Francisco Bay Area, New York, Boston, Toronto, São Paulo and Mexico City have also become important locations for venture capital (VC) funding since 2002 (Graph 4.A). Meanwhile, households in the Americas have also

Countries in the Americas are major players in the global technology sector — Graph 4

A. Cities in the Americas lead the world in VC funding[1]



B. Countries in the Americas have high mobile adoption



AR = Argentina, AU = Australia, BR = Brazil, CA = Canada, CL = Chile, CN = China, CO = Colombia, DE = Germany, FR = France, GB = United Kingdom, ID = Indonesia, IN = India, IT = Italy, JP = Japan, KR = South Korea, MX = Mexico, PE = Peru, SA = Saudi Arabia. TR = Türkiye, US= United States, ZA = South Africa.

[1] Total capital invested in major tech hubs since 2002. [2] Consultative Council for the Americas.

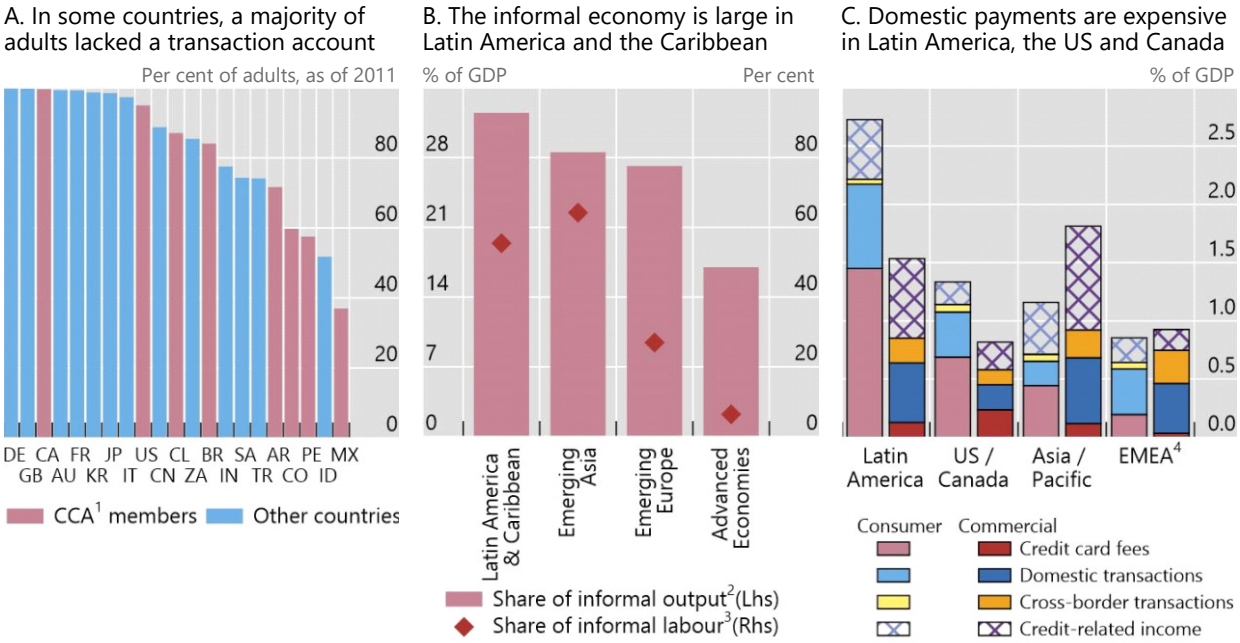
Sources: PitchBook; World Bank.

been particularly rapid adopters of new technological applications like mobile phones (Graph 4.B).

Technology-related changes are particularly apparent in the financial system, where some of the most striking examples of digital innovation are taking place. They provide an important opportunity to meet some pre-existing challenges – such as financial inclusion, informality, efficiency, etc. Indeed, in many countries in the Americas, access to financial services has shown considerable gaps, with a majority of adults having lacked access to a transaction account in 2011 (Graph 5.A). Meanwhile, countries in Latin America and the Caribbean show much higher rates of informal activity than in other regions of the world (Graph 5.B). Finally, both Latin American countries and the US and Canada show very high costs of domestic payments (Graph 5.C) and other financial services (like credit). This relates in part to a lack of competition in the financial system.

Countries in the Americas have faced particularly pressing challenges in payments

Graph 5



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[1] Consultative Council for the Americas. [2] As defined by Medina and Schneider (2020). [3] As per cent of total employment. [4] Emerging Europe, Middle East and Africa.

Sources: McKinsey & Company (2021); Medina and F Schneider (2020); World Bank, *Global Findex Database*; International Labour Organization.

In what follows, we discuss five examples of digital innovations in finance that can play a role in the mandates of central banks. In some cases, they can help to address these existing policy challenges – or, in some cases, introduce new challenges.

A first example concerns digital payments. Since the introduction of M-Pesa in Kenya in 2007, countries around the world have seen rapid adoption of mobile money. The ability to transact by phone (including feature phones, not just smartphones) in remote areas has helped hundreds of millions of users – including in the Americas – to gain access to a transaction account (Frost et al (2021)). Meanwhile,

payment apps on smartphones (eg Venmo, Google Pay, Apple Pay, Mercado Pago) have become very popular and helped drive greater use of digital payments. By some measures (eg Yang et al (2023)), countries like Brazil and the United States have the highest adoption of digital payment apps in the world.

A second, and related example, concerns public payment infrastructures that support digital payments. One prominent example is retail fast payment systems, which allow users to pay across different banks – and in some cases non-bank payment service providers (PSPs) – in real time or very close to real time, often at very low cost. Such systems can be operated by the central bank or by the private sector. In the Americas, a particularly prominent example is Brazil's Pix instant payments system (Alfonso, Tombini and Zampolli (2020); Duarte et al (2022)). Since its launch in November 2020, Pix has seen rapid growth and adoption, by over 70% of the adult population. By bringing banks and non-bank PSPs into a single, interoperable system, Pix has helped to foster competition, lower costs and dramatically increase the use of digital payments. Indeed, Pix payments between individuals are free, and costs to merchants of accepting Pix payments average just 22 basis points – as compared to 1.2% for debit cards and 2.1% for credit cards in Brazil. Similar examples exist in Mexico (with CoDi/SPEI) and Costa Rica (with SINPE Movil). In the United States, the launch by the Fed of the FedNow instant payment system in July 2023 will be a further example. Similarly, the launch in Canada of the Real-Time Rail (RTR) in 2024 is expected to expand access to instant payments.

A third example of innovation is in credit markets. New online lenders have emerged around the world in the past two decades, often using non-traditional (alternative) data sources to assess credit risk and price loans. Many such lenders began in the United States. Over time, they have spread across Latin America (Cantú and Ulloa (2020)). In some cases, this too has been shown to enhance financial inclusion. For example, using data from the e-commerce platform and lender Mercado Libre in Argentina, Frost et al (2019) show that alternative data and machine learning have allowed for much more accurate assessment of the credit risk of a portfolio of small firms – 30% of which would be excluded from lending by traditional banks given their "thin file" and perceived higher risk. For the United States, Jagtiani et al (2022) show that online platforms like Funding Circle and LendingClub were more likely to lend to small businesses in areas with higher bankruptcy and unemployment rates, thus filling gaps in lending by banks.

A fourth example concerns cryptocurrencies and other applications of DLT, eg in decentralised finance (DeFi). Cryptocurrencies are a type of private sector digital asset that depends primarily on cryptography and distributed ledgers or similar technology. Since the launch of Bitcoin in 2008 and of Ether in 2015, thousands of further cryptocurrencies have been launched, and hundreds of millions of users worldwide have bought or sold them. To date, the vast majority of the use of crypto is as an investment asset, ie for speculation. Partly due to the substantial volatility in prices, cryptocurrencies and DeFi have not been widely used for payments or financial services for the real economy. Moreover, research at the BIS shows that a majority of investors globally have likely lost money on crypto investments (Auer, Cornelli and Frost (2022)). In El Salvador, where Bitcoin was declared legal tender in 2021, use is low and concentrated among young, educated urban males, and it has been declining over time (Alvarez et al (2022)). In other countries, central banks generally worry about the impact of crypto on monetary sovereignty and financial stability.

A fifth example of innovation is in central bank digital currencies (CBDCs), which many central banks are researching and developing for a range of policy reasons.

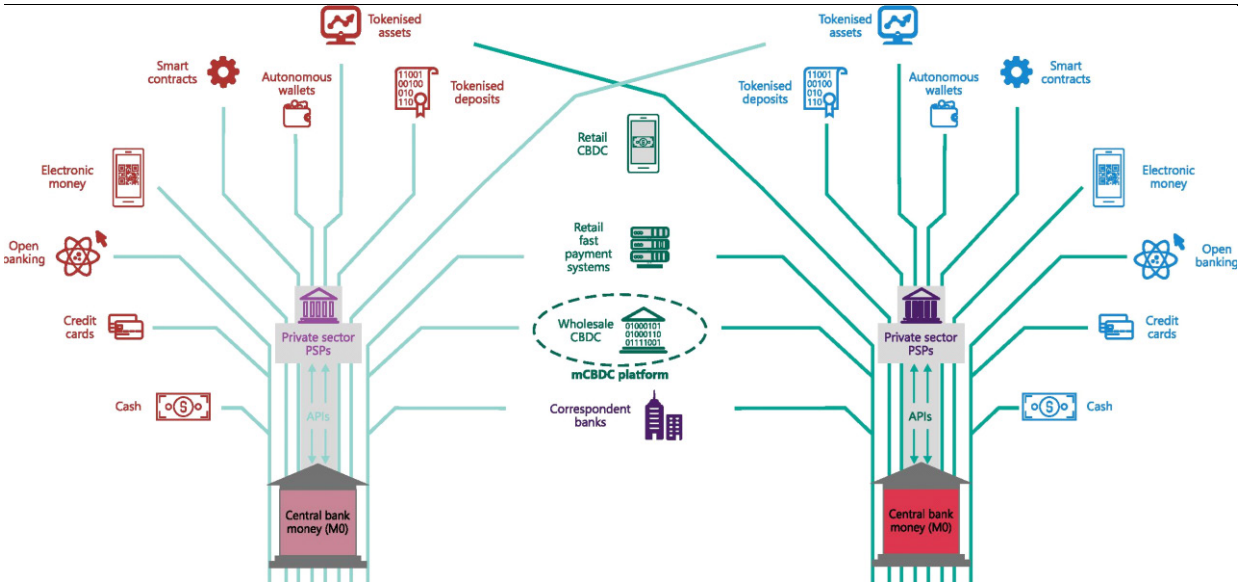
Central banks in the Americas have been particularly active in this area, with early experiments by the Bank of Canada, Central Bank of Uruguay and Central Bank of Ecuador (Alfonso, Kamin and Zampolli (2022)). Moreover, three of the four live CBDCs in the world at the time of writing are in the Caribbean – namely the Sand Dollar in the Bahamas, DCash in the Eastern Caribbean Currency Union and JAM-DEX in Jamaica. CBDCs can be intended for retail use, as in these examples, or for wholesale use by financial institutions, eg to support new programmability functions or cross-border payments.

This wide range of innovations has the potential to radically reshape the financial system. This raises the question: what should the financial system of the future look like? Given that many paths are now open, which one should central banks, with their public policy mandates, guide economies down?

BIS research has laid out one vision for the future. In this vision, the future monetary system should feature a diverse ecosystem of private sector services built on the strong foundation of central bank-issued sovereign currencies (BIS (2022)). Retail fast payment systems can support real-time, low-cost payments between users, both domestically and across borders. CBDCs, with their new functions like programmability, composability and tokenisation, can allow for a range of new financial services beyond payments, at lower cost and with less need for intermediaries. The ultimate goal is a diverse ecosystem, with a range of competing providers offering a broad array of efficient financial services for end users (Graph 6).

A strong canopy supports the global monetary (eco)system

Graph 6



API = application programming interface; CDBC = central bank digital currency; PSP = payment service provider.

Source: BIS.

This is one vision, and observers around the world continue to formulate further proposals based on the new possibilities that digital technologies have opened. How exactly the future financial system will look will depend crucially on decisions taken in the next few years. This puts a premium on international cooperation and research on these issues.

Role of the BIS's and the Americas Office

As the chapters in this volume detail, central banks in the Americas have faced – and continue to face – enormous challenges. At the time of writing, inflation in most member countries in the region is declining but still well above the respective central bank's target. Public debt levels are elevated by historical standards. Political uncertainty is high owing to trade tensions, geopolitical conflict, domestic polarisation and, in many countries, widespread discontent with the political system. Finally, the structure of the financial system is changing rapidly with the advent of new financial technologies and the arrival of new players.

Fortunately, central banks are not alone in meeting these challenges. Inflation above target or low growth in one country does not benefit other countries; if anything, it makes the lives of the others more difficult. This means that there is significant scope for cooperation. And this is where the BIS comes in. The BIS' mission is to support central banks' pursuit of monetary and financial stability through international cooperation, and to act as a bank for central banks. With the Americas Office, the BIS is physically present in the Americas region, which is a tangible marker of the BIS commitment. The Americas Office contributes to the shareholders and the broader central bank community in the region by:

- Supporting high-level policy dialogue and cooperative activities.
- Cutting-edge research and policy analysis.
- A range of high-quality banking services for central banks.
- Digital public goods for the central bank community through the BIS Innovation Hub.

The key element in all this is the Consultative Council for the Americas (CCA). The CCA was established in 2008 as an advisory committee to the BIS Board of Directors consisting of the Governors of the central banks of Argentina, Brazil, Canada, Colombia, Mexico, Peru and the United States. Over the years, the CCA has become much more than just an advisory body. A great part of the 5-6 meetings per year is devoted to the frank exchange of experiences and views among Governors, making the CCA the most important body of macroeconomic cooperation in the Americas.

Under the auspices of the CCA, there are five groups of senior central bankers from the region that meet regularly to exchange views in their areas of expertise:

- Scientific Committee: organises research conferences and networks in the area of macroeconomics and monetary policy;
- Consultative Group of Directors of Financial Stability (CGDFS): promotes collaboration on issues and research related to financial stability;
- Consultative Group of Directors of Operations (CGDO): fosters the exchange of views and analysis on financial market developments and central bank operations;
- Consultative Group on Innovation and the Digital Economy (CGIDE): promotes cooperation in developing technological solutions for improving the efficiency of payment systems and financial inclusion;
- Consultative Group on Risk Management (CGRM): promotes collaboration on central banks' risk management issues.

In addition, the Americas Office organises the *Working Party on Monetary Policy in the Americas*, which brings together the heads of the monetary policy departments of central banks in the region as well as selected peers from elsewhere to discuss current monetary policy issues.[8] Finally, it coordinates the CCA Heads of Communications Network, which brings together the heads of communications at CCA central banks for an annual dialogue.

Discussions in these groups are technical and focused. Members of these groups can also set up task forces that go into depth on specific topics of interest. Topics can be more operational, such as business continuity or the incorporation of ESG considerations into international reserve management frameworks (two recent task forces of the CGRM) or analytical, like studying the financial stability implications of cryptoassets (an ongoing task force of the CGDFS) or the implications of environmental degradation for central bank policy (a task force of the Scientific Committee). Reports on these topics are usually published and serve as references for central banks inside and outside the region.

Of course, central bank cooperation is not limited to the Americas but also takes place in other regions and at a global level. Central banks from the Americas play an active role on the global stage. The governors of the central banks of Brazil, Canada, Mexico and the United States – in the latter case represented by the Chair of the Federal Reserve Board and the President of the Federal Reserve Bank of New York – sit on the BIS's Board of Directors and many governors from the region participate in the various global meetings.

The Americas Office also plays a role at the global level. Staff from the Office regularly organise global meetings such as an annual meeting of Governors from major emerging market economies and an annual meeting of Deputy Governors from emerging market central banks, in rotation with the BIS offices in Basel and Hong Kong. They also contribute to BIS analysis and research to ensure that the experience of the Americas is adequately reflected at the global level.

International cooperation is a key role of the BIS and the Americas Office, providing banking services is another. In May of 2020 the BIS opened a new dealing room in the Americas Office. The purpose of this new banking facility was to offer central banks (members and non-members) and international organisations our full set of banking products and services during the whole trading session in the Americas. With the incorporation of this new dealing room, the BIS can now cover the three main trading regions in the world through its banking activities in Hong Kong, Basel and Mexico, becoming the only multilateral institution active trading operations in all three regions. Currently the Americas office covers 33 central banks of the region and 6 international financial institutions, in addition to trading with central banks from other regions during the Americas session.

The services provided by the BIS and the Americas Office are not restricted to shareholder central banks; many are also available to all central banks worldwide. For example, the Americas Office organises regular events that bring together shareholding and non-shareholding central banks. Working together with colleagues in Hong Kong and Basel, the trading desk in Mexico City allows the BIS to offer banking services around the clock to its central bank clients.

Through the BIS Americas Office, the BIS remains physically present in the Western Hemisphere, with a steadfast and tangible commitment to the region. With

[8] Similar working parties also exist in other regions.

its strong engagement with central banks, a strong analytical capacity and a range of banking services, the BIS Americas Office stands ready to serve central banks in the Americas to deal with whatever challenges arise on their path in the coming decades.

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Monetary policy challenges over two decades: a view from Argentina

Miguel Ángel Pesce and Germán Feldman[1]

Abstract

In Argentina, the quest for macroeconomic stability remains elusive. The experience provides a vivid depiction of how policymaking is shaped not only by policy goals but also by the particular constraints faced by a developing economy. In this chapter, we review Argentina's experience in the last two decades, from the point of view of monetary policy as conducted in an underdeveloped financial system. We first consider the succession of macroeconomic and monetary regimes. We then go on to review challenges such as dollarisation, inflation and shallow financial markets, as well as how they interact. We conclude with lessons from this experience that may be useful not only at the country level but for developing economies at large.

A tale of monetary and FX regimes

Given Argentina's history of macroeconomic volatility, changes in its monetary regime occur more frequently in Argentina than in other countries, and they show different degrees of institutionality (ranging from to changes in laws to merely policy decisions). Indeed, just a quick glance at the series of different monetary and foreign exchange regimes the country has had reveals that none of them succeeded in reducing inflation in a sustainable way.

One important factor in this is that the interaction of shallow financial markets and a high degree of currency substitution renders conventional monetary policy much less effective and compromises the sustainability of monetary and FX regimes. While the private sector uses local currency for transactions, it relies on the US dollar (USD) as a store of value. This puts pressure on external accounts – USD supply must not only cater to imports and financing needs, but also to residents' portfolio dollarisation.

This is first illustrated by the currency board or "convertibility" regime in place between 1991 and 2001, which was a response to the high inflation regime of the 1980s and hyperinflation episodes in 1989 and 1990. This arrangement set a fixed exchange rate with the US dollar and full backing of the monetary base with international reserves. It also imposed strict limitations on monetary financing of the public sector. This framework aimed to restore credibility, together with a number of reforms implemented at the same time (deregulation, privatisation and capital account liberalisation).

[1] Central Bank of Argentina (BCRA). For input and comments, we wish to thank Horacio Aguirre, Ariel Dvoskin and staff from the Multilateral Fora and Economic Studies areas at the BCRA. All views expressed are the authors' own.

The currency board was instrumental in drastically reducing inflation, but it left the country without a tool for coping with external shocks. These included the succession of crises that hit emerging market economies (EMEs) such as Mexico, from 1994 onwards, and Brazil in 1999. The latter was particularly relevant for Argentina given its geographic proximity and trade linkages. There is systematic evidence that foreign exchange-based stabilisation programmes are successful in bringing down inflation in the short term but deliver lower growth later on (Calvo and Végh (1999)). More generally, while the exchange rate is a focal point for consumers and businesses in their pricing decisions, fixing it typically leads to real exchange overvaluation and current account deterioration, ultimately harming growth (and fuelling bets against the peg).

On top of the external shocks of the second half of the 1990s, domestic factors also played a role. These included growing fiscal deficits and foreign indebtedness, as well as "hidden" currency mismatches in the financial sector. While financial regulation ruled out currency mismatches in bank's balance sheets, it did not prevent families and firms from borrowing in foreign currency while generating revenues in local currency (a behaviour prompted by perception of the currency board as "permanent").

As successive EME crises hit the economy, a period of recessionary adjustment took place from late 1998 onward, accompanied by higher unemployment and poverty. This resulted in the demise of the currency board in January 2002, which involved a currency, banking and debt crisis. In 2002, GDP plummeted by 11.1%, the exchange rate depreciated, with the USD gaining 249% over the local currency, and inflation hit 41%. (This was contained in part by depressed aggregate demand and an unemployment rate at 18%).

The exit from the convertibility regime was traumatic and complex. It involved breaking a majority of the contracts in the economy – most of them dollarised, either de jure or de facto. The ensuing devaluation generated massive negative balance sheet effects and the interruption of the payment chain. The latter was exacerbated by the recession and restrictions on bank deposit withdrawals (imposed in December 2001).

In this context, the monetary regime was changed in response to an emergency. The new central bank charter (passed by Congress) established that the central bank had to report quantitative monetary goals and permitted, albeit within certain limits, a margin for direct monetary financing to the Treasury.

The central bank adopted a managed exchange rate regime, later introducing capital flow management measures (CFMs), including a minimum investment period and a 30% mandatory deposit for portfolio inflows starting in 2005. Together with the impact of the debt default, this meant that Argentina recorded low levels of international portfolio flows in the first decade of the 21st century.

The early years of the century (2003–07) saw fiscal and current account surpluses (primary fiscal surplus of 3%, total fiscal surplus of 1.4% and current account surplus of 3.18% of GDP on average), together with strong growth (8.7% on average). This went hand in hand with burgeoning terms of trade (+30% from 2002 to 2007), international reserve accumulation and lower public indebtedness (the latter following debt restructuring in 2005).

From 2007 onwards, price pressures mounted, with year-on-year inflation once again passing the double-digit threshold to almost 21.5%, as aggregate demand continued to recover. Tensions between growth, inflation and external solvency

resurfaced. At that point, the Great Financial Crisis (GFC) broke out. While Argentina was not directly affected through the financial channel, it faced lower commodity prices and export volumes. In the third quarter of 2008 GDP had grown 6% year on year, but growth fell to 2% in the last quarter and 5.9% in 2009.

To mitigate the impact of the GFC, the government deployed an expansionary fiscal policy. With the deterioration in tax collection due to the recession, the primary fiscal surplus decreased from 2.8% of GDP to 1.4% in 2009 and 1.5% in 2010. After the worst of the GFC had passed, GDP recovered strongly and grew by 10.1% in 2010 and 6% in 2011, averaging 3.4% between 2008 and 2011. However, by 2011 both fiscal and external balances had eroded (with a current account balance of close to –1% of GDP, a primary fiscal balance at 0.2% of GDP and a total fiscal balance at –1.4% of GDP). Moreover, in 2009, after six years of nominal exchange rate stability, the peso began to devalue against the US dollar and cemented inflation in the range of 20–25%.

Portfolio dollarisation of the private sector had accelerated since 2007 (accounting for 4.1% of GDP, on average, for the period 2007–11). This put little pressure on reserves, as there was a current account surplus. In 2011, however, demand for foreign currency increased substantially, alongside a current account deficit. This led Argentina to tighten capital controls to reduce foreign exchange market pressures, while EMEs were validating currency depreciations.

In 2012 the monetary policy framework was changed again. The new charter passed by Congress re established a dual mandate for the central bank; removed the need to set quantitative monetary goals, providing greater flexibility to carry out monetary policy; and eased, to a certain extent, the limits on direct monetary financing to the Treasury, among other aspects. Since then, the central bank has been required to publish its objectives and plans regarding the development of monetary, financial, credit and exchange policies before the beginning of each financial year. If significant changes occur, the bank must disclose their causes and the measures adopted as a result.

During this period, economic policy focused on strengthening domestic demand as a driver of growth. Monetary policy kept, on average, negative real interest rates. In turn, fiscal policy was markedly expansionary, with a total deficit (primary deficit) of 2.6% (0.9%) of GDP on average, largely financed by assistance from Central Bank of Argentina (BCRA) to the National Treasury. The economy alternated between years of growth and years of recession, making it practically stagnant in the medium term (0.37% annual average growth in 2012–15), and inflation solidified in the range of 25–30% per year.

When a new government took office at the end of 2015 and central bank leadership changed, inflation targeting (IT) with a floating exchange rate was adopted. Designed to curb demand-pull inflation instead of the persistent cost-push inflation that was actually occurring, IT entailed aggressively raising domestic interest rates in a context of historically low international interest rates. Meanwhile, in 2016, the country reached an agreement with holdout creditors (creditors that have opted out of debt restructuring since 2005). Argentina regained access to international debt markets while eliminating all CFMs. This policy mix induced significant portfolio inflows in 2016–17.

The liberalisation of foreign exchange controls led to a 40% depreciation of the peso. This, on top of rising utility prices, pushed inflation in 2016 to 39.4%, far from

the initial 25% target (actually, a forecast for the transition towards full-fledged IT in 2017).

Both domestic and foreign market participants were able to buy central bank-issued bills and notes. The same instrument that the central bank used to regulate liquidity in the money market was traded by short-term investors. While this was useful for transmitting changes in policy rates to market interest rates, it increased the volatility in the monetary policy transmission channel and ultimately proved to be destabilising when capital flows reversed. This occurred in September 2018, when the central bank changed its operational procedure to trade liquidity bills only with financial institutions under BCRA regulation and supervision.

The consequences of full capital account openness with high interest rates were dramatic. The current account deficit rose from 2.7% of GDP in 2016 to 4.8% in 2017 and 5% in 2018. Demand for foreign assets accelerated and exceeded 4% of GDP in 2017. Debt in foreign currency increased by 54% between December 2015 and March 2018. Indeed, Argentina led the ranking of emerging countries with the highest volume of sovereign bonds issued in international markets between January 2016 and April 2018 (BCRA (2020a)).

In 2018, with increasing volatility in EMEs and growing concerns around the sustainability of Argentina's public debt, portfolio inflows suddenly reversed, with significant impact on the FX market. Argentina underwent a currency crisis, even after agreeing on a programme with the IMF in mid-2018.

As part of the Stand-By Agreement (SBA) with the IMF, IT was replaced with a monetary base growth control regime and a fiscal consolidation process was established. However, the programme failed to stabilise Argentina's macroeconomic situation, and the crisis deepened. Inflation accelerated to 47.6% in 2018 and 53.8% in 2019. From April 2018 to December 2019, USD gained 196% over the local currency. The GDP lost an accumulated 4.5% in 2018–19 (–3.92% in 2016–19). As a result of instability created by the combination of dollar-denominated debt, a fully open capital account and a flexible exchange rate, the monetary authority reintroduced CFMs (similar to those of 2011–15) in the second half of 2019.

In December 2019, as a new government took office, leadership of the central bank changed again. The money supply control regime was abandoned, and new guidelines for monetary, exchange rate and credit policy were adopted (BCRA (2020b)). Then, the Covid-19 crisis broke out.

The policy response to Covid-19 was heavily conditioned by the situation prior to the shock (an ongoing recession together with lack of access to both foreign private financing since the beginning of 2018 and domestic financing since July 2019). These initial conditions made the conventional trade-offs faced by monetary policy worse, limiting monetary policy space. Fiscal policy measures for dealing with the pandemic amounted to around 5% of GDP. In a very short time span, new direct transfers to households and companies were designed and implemented in order to sustain basic consumption and income flows. As a result, the primary fiscal deficit soared to 6.4% of GDP. [2]

[2] In 2017, changes were made to fiscal accounts. As a result, profits transferred by the BCRA to the Treasury and generated by the Sustainability Guarantee Fund (under the National Social Security Administration, or ANSES) cannot be booked as revenues, except for those generated by private assets. In turn, rents collected and paid within the public sector are netted. Therefore, the fiscal result worsened. In this chapter, all official figures in each moment are considered valid.

Limited fiscal space meant that the central bank had to increase financing to the Treasury in order to support household incomes and prevent firms from shutting down. It did so through direct lending and profit transfers to the national government, two channels set forth by its charter. Extraordinary financing reached 7.6% of GDP in 2020 but was transitory, and the central bank toolkit was used to manage liquidity in order to preserve monetary equilibrium. Base money increased in part due to advances and profit transfers from March through July 2020, while the central bank used its own bills and notes to mop up any excess liquidity.

In a context of capital outflows from emerging markets starting in March 2020, the Argentine economy experienced greater financial and exchange rate volatility. The central bank responded by intervening in the foreign exchange market to reduce volatility; CFMs helped to sustain the level of international reserves. The combination of foreign exchange intervention, regulation and interest rate caps was instrumental in enabling liquidity supply to the private sector while providing emergency financing to the Treasury. Without liquidity management and capital controls, short-term monetary policy space would have been much more limited, which would have prevented an effective countercyclical policy response (ie lending interest rates would have been higher and less liquidity would have been available). On the financial front, debt in foreign currency with private creditors (totalling about USD 107 billion) was restructured in 2020, while the local debt market was progressively normalised.

In 2020, GDP collapsed by 9.9%. However, as health measures were relaxed, the economy recovered very strongly, growing 10.4% in 2021. In addition, after having subsided in 2020 to 36.1%, inflation accelerated to 50.9%.

At the beginning of 2022, Argentina reached a new agreement with the IMF to refinance the 2018 SBA, extending the previous maturity schedule by 10 years. The current policy framework follows the guidelines set by the Central Bank of Argentina's Objectives and Plans for 2022. The framework aims to normalise policy following the extraordinary response to the pandemic in order to boost macroeconomic certainty and help consolidate foreign exchange and inflation expectations. It is also embedded in the new Extended Fund Facility (EFF) agreement with the IMF. The latter comprises a multi-year fiscal consolidation, with a path of gradual and sustainable reduction of the primary deficit based on economic recovery, and a monetary policy aimed at gradually reducing inflation through a comprehensive approach combining monetary instruments with fiscal and income policies, wage-price coordination, prudent management of monetary aggregates and sterilisation of any liquidity surpluses.

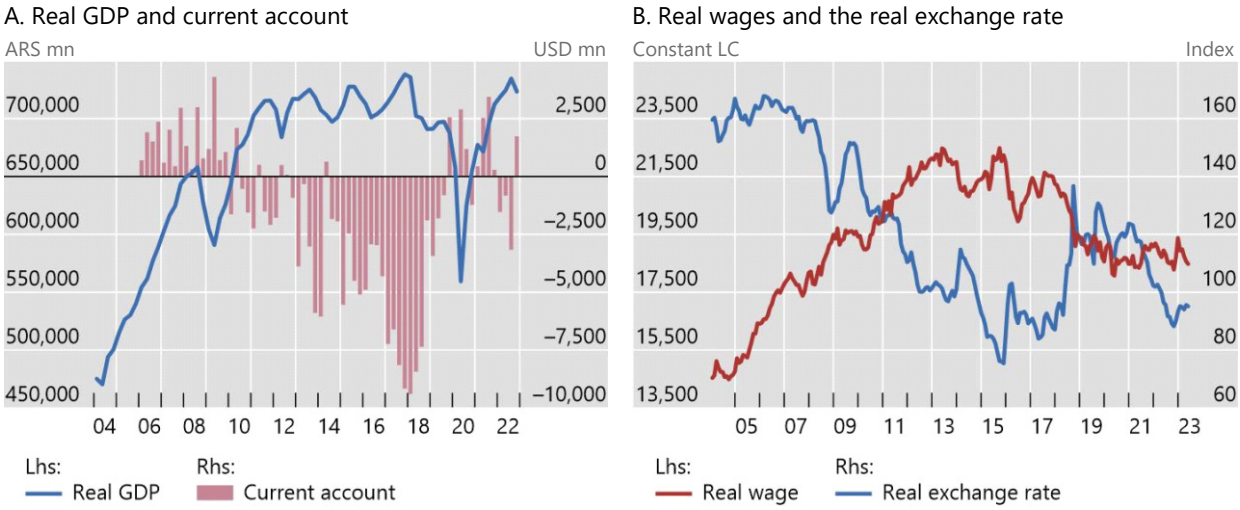
FX tensions, portfolio dollarisation and inflation

The preceding review shows that sustainable growth and low inflation remain challenges for the Argentine economy. Periods of robust growth and without turbulence have coincided with current account surpluses. However, as doubts about the sustainability of growth arise, the exchange rate appreciates; fiscal and financial tensions develop that end up materializing and weighing on activity and inflation.

Typically, periods of persistent current account deficits are corrected through sharp depreciation or devaluations. Under such circumstances, far from functioning as a shock absorber, devaluations tend to amplify external shocks (Dvoskin and Katz (2021)). Devaluations are inflationary and reduce real wages (Graph 1.A.). This has a negative impact on aggregate demand and therefore on economic activity. Thus, when devaluations correct external imbalances, they do so contractively.

Devaluations and economic growth are negatively correlated (Graph 1.B). In addition, except for the Global Financial Crisis of 2008-2009 and the Covid-19 Crisis, the contractions of the economy coincide with negative current account balances. In 2010–19, the current account deficit was due mainly to deficit in the category "Services, Income" and low or negative trade balances (especially from 2013). On top of the difficulty of accessing external financial markets, this illustrates the problem of structural scarcity of foreign currency in Argentina.

Macroeconomic performance over the past two decades — Graph 1



Source: Central Bank of Argentina.

In keeping with this, a study by the BCRA (2021) on foreign trade elasticities in Argentina finds (a) low price and income elasticities for the country's exports and (b) high income elasticity and low price elasticity for its imports. In other words, economic growth drives imports, and both exports and imports are relatively less sensitive to changes in the real exchange rate than to growth.

Financial channels of FX depreciation are also very relevant, especially in recent decades. Indeed, these same cycles of growth, devaluation and inflation have tended to encourage the financial dollarisation of the private sector and, therefore, to erode the role of the peso as a store of value (Corso (2021)). Fiscal and monetary interactions play a role, but this should be put in the broader context of growth and current account sustainability. In what follows, we analyse the negative feedback loop between portfolio dollarisation and FX dynamics; and how the latter weigh on inflation performance.

FX disruptions and portfolio dollarisation[3]

Disruptive FX depreciations are linked to portfolio dollarisation in Argentina. Exchange rate "jumps" associated with local currency depreciation have led the domestic private sector to implement adaptive mechanisms, shaping portfolio decisions. Even when short-term vulnerabilities in the monetary-FX regime are not evident, a fraction of the demand for store-of-value assets will be biased towards USD-denominated instruments. This can occur even when expected real returns on

[3] This section draws on Corso (2021) and Corso and Sangiácomo (2023).

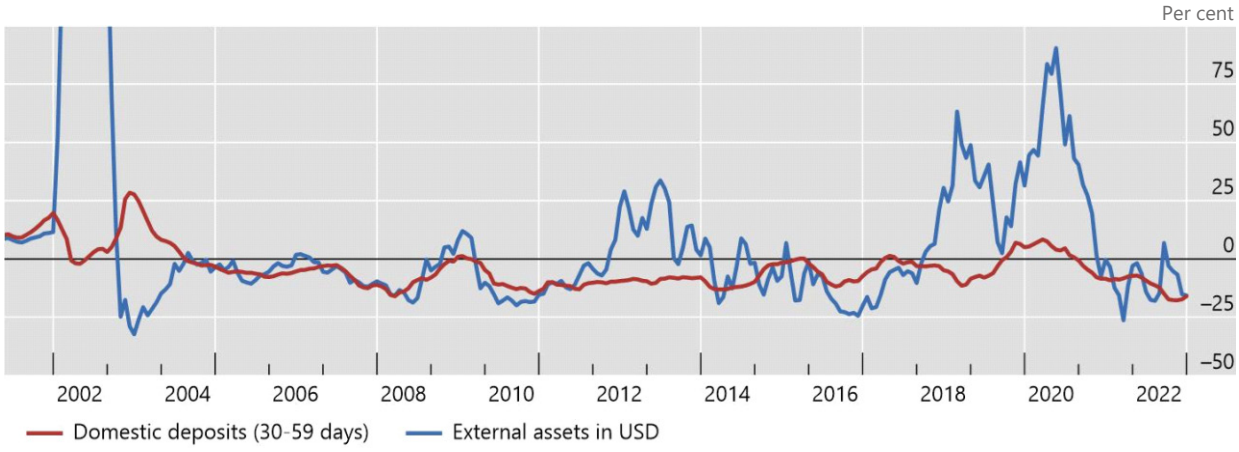
assets in pesos are higher than those on USD assets in the short term. In other words, the demand for foreign assets has also become "structural". Behind these private sector decisions, there are medium- and long-term investment holding horizons in which agents face uncertainty regarding the characteristics of the monetary-exchange regime. This means, among other things, that they will tend to assign a non-zero probability to an episode of exchange rate disruption (Corso and Sangiácomo (2023)).

Assuming that real ex post returns are a relevant element of agents' information set when forming expectations on returns, recurring exchange rate disruptions could bias positively the perceived probability distribution for dollar-denominated assets. In other words, higher exchange rate volatility could be associated with a bias "to the right" of the real returns of foreign assets. High devaluation pass-through resulting from the presence of real dollarisation implies that exchange rate jumps are associated with negative average real returns for peso-denominated assets.

Evidence from the last 20 years

The evolution of real returns on dollar-denominated assets and fixed-term deposits in pesos in the last 20 years is representative of Argentina's monetary history. Graph 2 shows the evolution for the period 2001–22 of the annual accumulated ex post real returns (in local currency) of a fixed-term deposit of 30–59 days and of a foreign asset denominated in US dollars.

Real effective returns: peso time deposits versus external assets — Graph 2



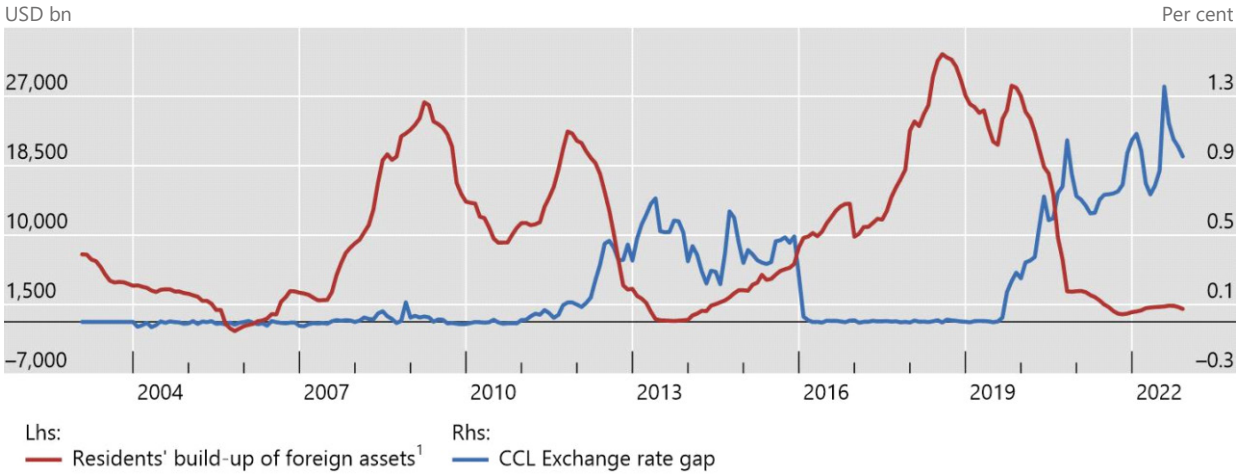
Source: Central Bank of Argentina.

Real returns on USD assets feature "volatility clusters" associated with exchange rate jumps. Five such clusters can be identified. The first episode that stands out is the currency crisis of 2001–02. The second is the currency devaluation and interest rate increase associated with the impact of the Global Financial Crisis. The third is the period of restrictions on capital flows that runs from the end of 2011 to December 2015. The fourth is the period of exchange rate disruptions in 2018–19, and the fifth is the recent period of restrictions on flows.

Such perceptions of risk are reflected in portfolio dollarisation (ie the accumulation of net foreign assets by the private sector; see Graph 3). Except for in a couple of periods (eg during re-intermediation following the 2001–02 crisis and when tight CFMs have been in place), the annual accumulated net flow of FX assets has

been positive throughout virtually the entire sample, reaching an average of around USD 10 billion.

Net foreign asset accumulation by the private sector and FX rate gap — Graph 3



[1] 12-month cum sum.

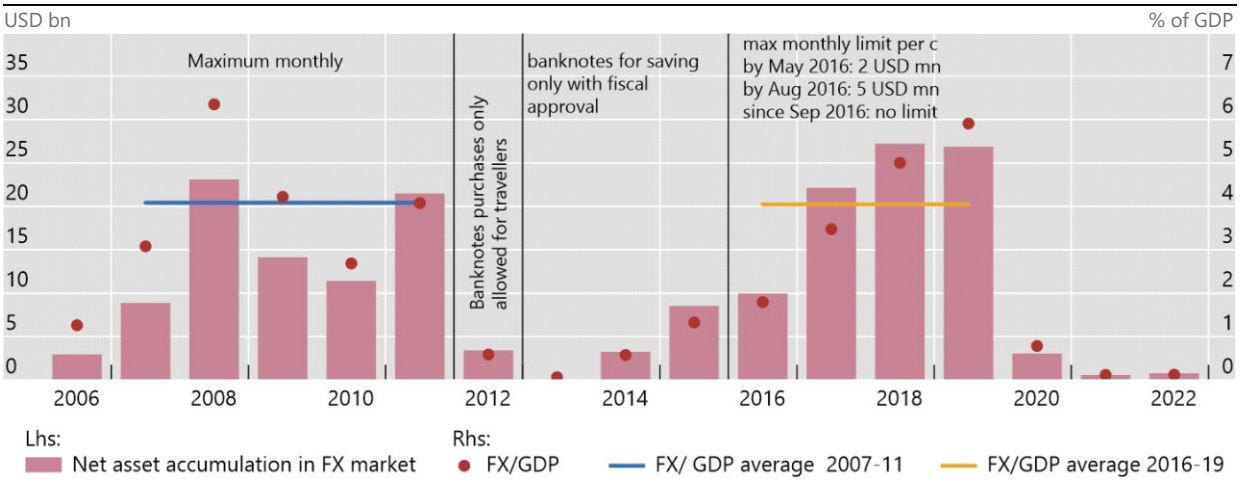
Source: Central Bank of Argentina.

In economies where monetary and FX regime changes are frequent, agents face greater difficulties in identifying the right signals on which to base portfolio choices. In such circumstances, under a specific monetary regime, they may even interpret certain "news" as indicating a greater probability of regime change, even when authorities believe no fundamental condition for the stability of the regime has changed. In volatile macro-financial contexts, this identification becomes even more difficult, and expectations will be closely linked to agents' conjectures (based on experience).

Indeed, if positive returns on domestic currency assets are not perceived as sustainable, they alone are not enough to encourage de-dollarisation. An example of this is the experience of 2016–19. The establishment of an IT scheme with real interest rates that were, in principle, positive was far from promoting a reduction in the demand for foreign currency. As described in Section 1, non-compliance with targets, exchange rate appreciation, and the growing and significant current account deficit and external debt contributed to agents' perception that the regime was not sustainable and led them to take advantage of the accumulation of foreign assets within the framework of full liberalisation of the capital account. In contrast, with twin current account and fiscal surpluses in 2003–07, dollarisation actually decreased.

In turn, the experience of 2012–15 shows that merely implementing tight CFMs does not solve the dollarisation problem, and it may generate additional tensions: CFMs must go together with a set of policies to restore external sector soundness and positive real returns in local currency. Indeed, during that period, the controls were effective in causing foreign asset demand to collapse, but this was accompanied by a growing gap between the official and "parallel" exchange rates (Graph 4).

Net accumulation of external assets by the non-financial private sector and CFMs Graph 4



Source: Central Bank of Argentina.

Inflation and exchange rates

Several econometric exercises show that exchange rates and inflation are highly correlated. In other words, the pass-through of the exchange rate to prices is very high. Recent estimates by the central bank (see BCRA (2020b)) suggest it is close to 36%, much higher than the average for the region. This reflects the role of the exchange rate as a determinant of domestic prices, firstly because it increases the costs of imported inputs and secondly because it rapidly increases the sales price – and therefore the profitability – of tradable goods and services produced by our country, whose international prices are set on the world market (Remember that Argentina is a small economy, ie it takes international prices as exogenous.). Finally, through competition, higher profitability in the tradable sector eventually also has an impact on the prices of non-tradable goods and services. Thus, in Argentina, the exchange rate has a positive impact on average profitability and a negative impact on real wages (Dvoskin and Feldman (2018) and Dvoskin et al (2020)). In other words, in a small and open economy like Argentina, distributional conflict generates a spiral among the nominal exchange rate and money wages. This will be more intense, ceteris paribus, the greater the capacity of workers to defend real wages and firms to prevent profit margins from falling (García Cicco et al (2022)).

All of these mechanisms help to explain inflation inertia, which, as we will see below, is a very important driver of inflation in Argentina. Inertia refers to those formal and informal mechanisms for adjusting nominal contracts to past inflation in order to prevent inflation from falling (or not falling fast enough), even when the shock that generated the inflationary acceleration (for instance, a devaluation or a rise in international commodity prices) has disappeared. Indeed, behind these indexing mechanisms (which are, in general, incomplete) are the attempts of different social actors to protect themselves from the negative redistributive effects of inflation. This price-wage spiral once again shows the capacity of workers to defend themselves against the initial increase in general prices[4] and the subsequent increase in prices

[4] Argentina's constitutional and legal regime establishes the free negotiation of wages between business chambers and labour unions. This gives workers an institutional tool for preventing the deterioration of their salaries under inflationary conditions.

by employers to avoid a decrease in average profitability once nominal wages have reacted.

In summary, it is not surprising that inflationary expectations are fundamentally anchored to exchange rate expectations and that FX depreciations generate inflationary shocks that tend to spiral. This is not to deny, of course, the role of monetary policy in helping to determine such expectations – the point here is that a key dimension through which it operates is through the FX-expectations-wages link.

Inflation over two decades: an econometric analysis[5]

We now turn to an analysis of long- and short-run decomposition of inflation in Argentina between 2004 and 2022. The variables involved are the consumer price index in its core or underlying version, nominal exchange rate, wages, activity, amount of money, interest rate for deposits in domestic currency, international energy prices, international food prices and foreign producer price index (for details, see the Annex).

In the long run, almost 80% of price behaviour is associated with nominal wages, while the remaining 20% depends on the nominal exchange rate (see equation [1] in the Annex). This long-run influence of money wages on prices is somewhat higher than that in other Latin American countries: it is 72% in Brazil, 70% in Colombia and Uruguay, 60% in Mexico and 48% in Chile (García Cicco et al (2022)). There is also a negative relationship between the real wage and the real exchange rate: persistent real depreciations have been associated with lower real wage levels on average, and vice versa.[6] This is not found in other Latin American countries, and it may help explain why devaluations feed the persistence of inflation in Argentina, because they lead to high nominal wage demands to protect the real wage, which in turn end up feeding back into inflation. [7]

The other long-run relationship links real money balances, economic activity, the interest rate and the exchange rate, and can be interpreted as the long-run transactional money demand (see equation [2] in the Annex). The influence of monetary aggregates on inflation through this channel is less direct. If the general price level were to rise in order to eliminate a potential excess of money supply, this rise could be the result of "excess demand" in the goods market, due, for instance, to tighter labour market conditions. Since the economy during the sample period usually worked under conditions of less-than-full employment, excess-demand inflation may not seem to be a plausible direct mechanism for Argentina; still, money may have an indirect effect on inflation through FX depreciation.

We go on to examine the short run, decomposing 12-month core inflation rate into a persistence and a contemporary component (see the Annex). In turn, inflation persistence is disaggregated into its own persistence and the persistence of the other determinants, and the contemporary component is also disaggregated into a "news" and a residual component. The different terms of the decomposition include the nominal exchange rate, wages, activity, monetary factors (money balances and interest rate), external factors (international energy and food prices and the foreign producer price index), the nominal exchange rate gap (the difference between the

[5] This section draws on BCRA (2023).

[6] Since the estimated coefficients sum to one, the long-run relationship shows a necessary negative relationship between real wage and real exchange rate.

[7] Historically, wage earners faced negative distributive shocks every time there was a discrete jump in the exchange rate. Between 1930 and 2018, strong external crises occurred in 1931, 1948, 1971, 1975, 1981–82, 1989, 2002 and 2018.

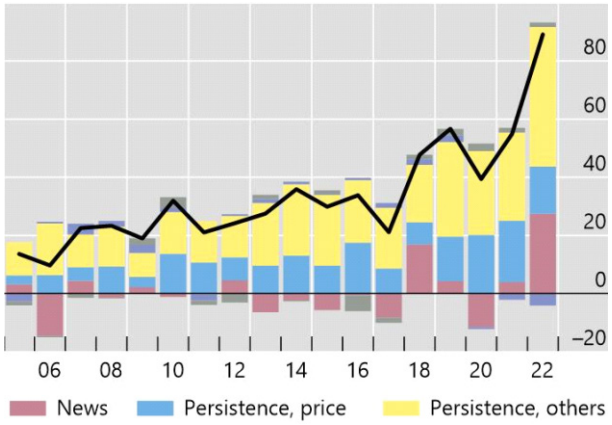
official exchange rate and the exchange rate that emerges in financial markets through the sale and purchase of bonds denominated in foreign currency) and, finally, deviations from the long-run relationship previously described.

As anticipated, the exercise shows that persistence (or inertia) has been a very significant determinant of core inflation since 2005. Moreover, relative to own persistence, the persistence of the rest of the explanatory variables has increased over time, reaching a contribution of 48 percentage points by the end of 2022 (Graph 5). On the other hand, news about inflation (exchange rate, wages, external factors, among others) played a relatively minor role during the period under analysis. However, in 2022, news on inflation gained momentum, accounting for 27.4 percentage points of accumulated inflation for 12 months (Graphs 5.A and 5.B).

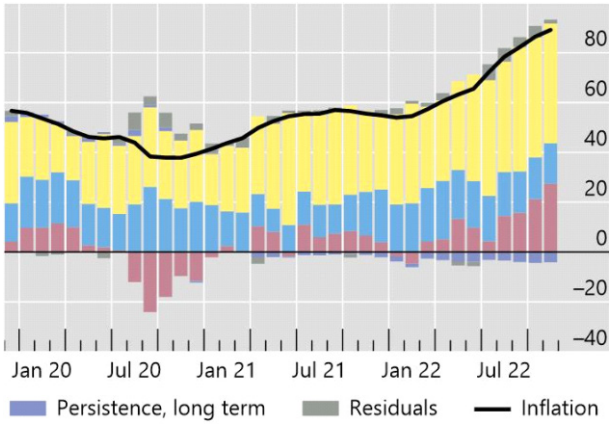
Inflation: year on year decomposition

In per cent — Graph 5

A. Period: 2005-22[1]



B. Period: Dec 2019-Nov 2022[2]



[1] Annual data. [2] Monthly data.

Source: Central Bank of Argentina

Given the relevance of persistence in the inflationary process, we additionally decompose the component into its constituting factors. During the last three years, inflation persistence itself (lagged inflation) and the persistence of wages and of the exchange rate gap are the most relevant factors in overall inflation persistence (Graph 6). Persistence due to money growth is relatively low (except in 2019 and certain months in 2020), and the role played by activity in explaining inflation persistence is subdued. Recently, wages played a growing role in inflation persistence (18.5 percentage points). The persistence of the exchange rate gap has gained traction since mid-2021 (19.8 percentage points; see Graph 6.B), while "own" inflation persistence has lost some share (16.2 percentage points) since June 2022.

Finally, a brief comment about the role played by news on external factors: in 2021–22 it added to inflation, including higher international prices after the outbreak of the war in Ukraine. Moreover, international prices are likely to have played a non-trivial role in domestic inflation indirectly, through their effect on both wages and the residuals, given their possible link to higher inflationary expectations ("forward-looking elements") not captured explicitly in the econometric exercise. As mentioned in the previous section, in a context of high inflation, expectations tend to be linked more strongly to exchange rate dynamics and the risks of a discrete devaluation. For that reason, post-pandemic monetary policy is committed to

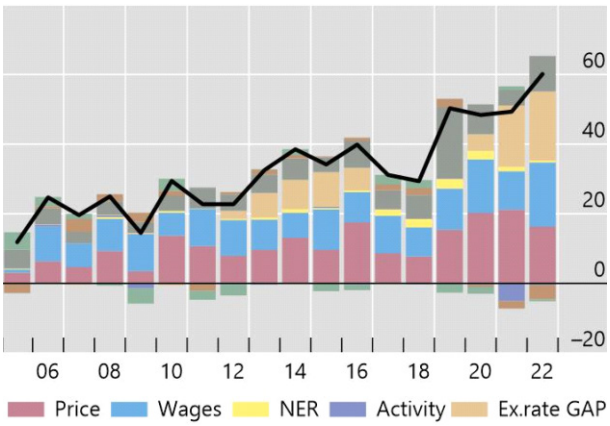
creating conditions that ensure positive real returns on domestic assets in order to anchor expectations and limit portfolio dollarisation.

Inflation: persistence decomposition

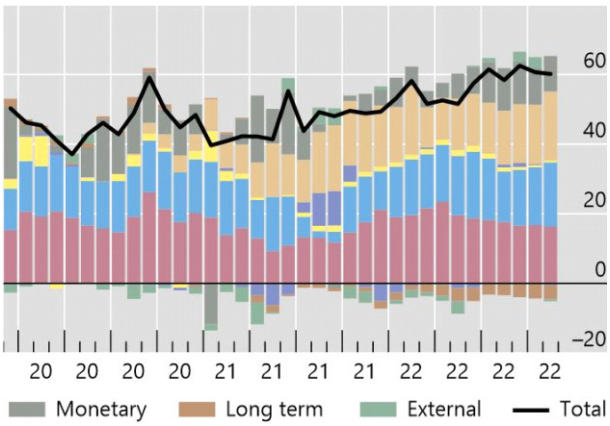
In per cent

Graph 6

A. Period: 2005-22[1]



B. Period: Dec 2019-Nov 2022[2]



[1] Annual data. [2] Monthly data.

Source: Central Bank of Argentina

FX disruption, volatility and low financial market development[8]

The mirror image of portfolio dollarisation is an underdeveloped domestic financial market that is basically bank-based and mostly transactional in nature. The degree of financial market development has an impact on the design and implementation of monetary policy in Argentina. Low financial market development means that maturity transformation is carried out to a very limited extent.

In its conventional form, monetary policy influences private sector decisions through intertemporal substitution. This allows policymakers to regulate aggregate demand and, through the impact on the output gap, inflation dynamics. Inflation expectations are formed based on this monetary policy impact, so interest rate announcements influence inflation expectations.

However, under low financial intermediation, interest rate changes have a subdued impact on consumption. In shallow financial markets, maturity decisions may be compressed to, say, less than a year, with scarce long-term credit to speak of. In Argentina, the average maturity of the most representative lines of loans to companies ranges from less than two months to one year. This in turn lessens the influence that monetary policy may have on aggregate demand through credit. Short bond maturities also constrain the transmission from short-term to long-term interest rates. Finally, the menu of instruments available for open market operations is limited as well. Episodes of debt default by the Treasury have led to the use of central bank-issued securities to carry out such operations.

[8] This section and the following one draw on Carrera et al (2020).

Rather than intertemporal substitution through financial intermediation, private sector decisions are about currency substitution. In other words, consumers and companies are making decisions not so much about whether to save or lend at shorter or longer terms (and in which instruments) as about saving in either the local or a foreign currency. Financial decisions about the currency used tend to dominate those about the tenor.

Under these conditions, the exchange rate channel of monetary policy becomes more important. Changes in monetary policy rates may have an impact on inflation expectations, but this is exerted through their effect on exchange rate dynamics. The role of the exchange rate in expectation formation stands out in estimated Phillips curves for Argentina in different periods (D'Amato and Garegnani (2009), Krysa and Lanteri (2018)), where the coefficient for the exchange rate is systematically higher than that of the output gap. DSGE models of the Argentine economy also reveal the fundamental role of the exchange rate in inflation dynamics. While pass-through is endogenous and dependent on the monetary policy stance, ERPT coefficients in Argentina continue to be four to eight times higher than in other Latin American countries. These results are in line with the econometric evidence provided in Section 2.1, where the role of the exchange rate in inflationary processes also stands out.

Currency factors also have a financial stability dimension. As savings decisions are not so much about how to smooth intertemporal consumption over time, but about how to allocate wealth in local or foreign currency, exchange rate swings may have a much greater impact on financial stability than could be expected. The relationship between savings in local currency and FX volatility provides a clear illustration. For instance, the sum of time deposits and private non-financial sector holdings of central bank bills shows a negative correlation of 72% with nominal exchange rate volatility during 2016–19 (a period when the public could hold CB bills, so they reflected private sector savings decisions, in addition to time deposits).

For the reasons just outlined, FX intervention policy becomes a relevant monetary policy tool. In a relatively small foreign exchange market like that of Argentina, very small movements can become easily amplified. This reinforces the motivation for central bank intervention when such movements are unrelated to economic fundamentals.

Recent experience also indicates that the use of the interest rate as the only policy tool, together with full capital mobility, leaves the economy exposed to sudden stops of capital flows, with adverse consequences for price and financial stability. This is compounded by the high portfolio dollarisation in the Argentine private sector as a consequence of a history of macroeconomic crises. In this light, capital flow management measures have become part of the macroprudential policy package, as they can prevent excessive risk-taking in the currency market and limit negative spillovers from the financial system to the economy at large.

More generally, an integrated monetary policy approach (Agénor and Pereira da Silva (2019)) contemplates the use of standard tools (such as interest rates) with foreign exchange intervention and macroprudential policy, including capital flow management measures. Such an approach may be called for given one or more of the following conditions: nominal exchange rate movements have a strong impact on inflation or inflation expectations, real exchange rate variability distorts consumption and investment decisions, portfolio shifts between local and foreign currency-denominated assets have an impact on financial stability, and financial and foreign exchange markets are underdeveloped. Indeed, models estimated and calibrated for

the Argentine economy suggest that the optimal policy mix includes interest rate policy, foreign exchange intervention and capital flow management measures (Escudé (2015)).

Lessons and concluding remarks

This chapter has analysed how the interaction of external restrictions and monetary and fiscal policies has entailed disruptive exchange rate episodes that play a crucial role in inflationary dynamics. FX disruptions lead to defensive behaviours that involve financial dollarisation and prevent the consolidation of the peso as a store of value, undermining the development of the domestic financial market. For its part, the low depth of this market reduces the effectiveness of monetary and exchange policy instruments, exacerbating the nominal instability that feeds back into the vicious circle.

Thus, the creation of lasting conditions that make it possible to ensure sustainable price stability remains a key challenge.

To achieve this goal, policies can be identified to address real economy factors on one hand and financial aspects on the other. The former aim to deal with the structural causes of external constraints in Argentina. Basically, the conditions necessary to avoid a chronic current account deficit without depending on luck regarding the terms of trade require a transformation of the economy'sproductive structure and advancement of public policies that promote sectors with the capacity to export more complex goods and services and substitute imports. Obviously, developing and consolidating this type of policy is an arduous, long-term process which transcends a government term and therefore requires broader political consensus regarding the development of the country.

In the next few years, energy, mining and knowledge-based services are expected to contribute to export growth by over 70%; they currently amount to around 20% of foreign sales. According to prospects from the Plan for Productive, Industrial and Technological Development 2030, energy and mining exports have the potential to rise from less than 10% of exports in 2021 to around 30% in 2030, thus adding to almost half of export growth by that date (accounting for over USD 46 billion). This is expected to be boosted by shale oil and gas exports (mainly related to the Vaca Muerta site and the construction of pipelines to connect it with seaports) and the deployment of lithium, copper and green hydrogen projects. In turn, it is projected that service sectors will add an additional 24% to export growth based on tourism recovery after the pandemic and the growing dynamism of knowledge-based services. Indeed, Argentina has positioned itself as a major regional player in software and information technology services, audio-visual products and professional services. This can be leveraged by specific incentives for investment and exports implemented by law (*Ley de promoción de la economía del conocimiento)* in the global context of growing demand for digitalisation.

When it comes to financial aspects, monetary, exchange rate and financial policies play a leading role. Based on the review of the different macroeconomic regimes that have been implemented one after another since the 1990s in Section 1 and the analysis in Sections 2 and 3, there are certain policy lessons we can learn. A first lesson is to avoid fast and disruptive deregulation of capital flows; this is much like navigating in uncharted waters. Liberalisation, sectoral allocation of inflows

through the financial system and the subsequently destabilising role of short-term inflows are but a few issues associated with a sudden opening-up of the capital account (McKinnon and Pill (1996), Montiel (1998), IMF (2012)).

A second insight has to do with exchange rate regimes. "Corner" systems, such as hard pegs or full flexibility, always tend to start off promisingly, appearing to be the perfect match for a liberalising shock. However, as imbalances mount, they bring on specific problems that are hard to correct. This is especially the case when these regimes are combined with fully fledged capital account liberalisation that opens the way for carry trades and, ultimately, sudden stops.

A third lesson concerns financial system regulation and "hidden" currency mismatches. In the 1990s, banks in Argentina treated local and foreign currency deposits and credit almost exactly the same, based on the implementation of a one-to-one peg with the US dollar. Meanwhile, the banking system tripled, in terms of GDP, in only five years. Apparently, banks were not exposed to currency mismatches; they accepted US dollar deposits and lent in the same currency. Borrowers, however, were heavily exposed to currency mismatches, which proved disastrous in the 2001–02 crisis. Once an adverse shock to competitiveness occurred, devaluation was unavoidable. A growing current account deficit, with growing foreign indebtedness as its counterpart, became unsustainable. In turn, banks realised that most borrowers had income in local currency only. This produced a large-scale and costly financial crisis.

In fact, a key difference between the currency board regime and the 2016–19 experience was the regulation of the banking system. In the most recent episode, the central bank kept strict limits on currency mismatches and government financing, and also restricted differential liquidity requirements by currency. Thus, the banking sector was basically unaffected by the crisis. When the current account deficit proved unsustainable in 2018 and capital flows suddenly reversed, the ensuing devaluation affected asset markets but not the banking system.

Fourthly, the development of the domestic capital market and local currency bond markets is fundamental in order to channel domestic savings and finance real investment. However, it is not a silver bullet for financial stability and financial sector development. In the episode starting in 2016, significant development of local currency bond markets was undertaken in order to diversify currency risk. A key novelty was the heavy involvement of international hedge funds in this market. In a context of extremely demanding inflation targets, the central bank used high interest rates as its main instrument for curbing inflation expectations, attracting hot money funds.

Short-term foreign investors such as hedge funds conducted carry trades using peso-denominated central bank bills and notes. But after April 2018, financial conditions worsened globally, and they sold off their positions in peso instruments and, subsequently, foreign currency bonds. The magnitude of the sudden outflow of foreign funds was such that it could only be processed in a disruptive way by the small domestic market.

Although the involvement of foreign hedge funds in local currency bond markets was useful in diversifying currency risk, it also introduced a direct channel of transmission from the global financial cycle to domestic policy conditions. EME governments and central banks have the same counterparties in both local and foreign currency markets. Thus, decisions made at hedge fund head offices based on exogenous shocks or internal preferences are channelled to both markets. In other

words, the participation of these actors in local currency bond markets increases interconnectedness and ultimately lessens the autonomy of monetary policy.

Finally, if the experiences of complete liberalisation of the capital account have shown that it can aggravate macroeconomic volatility, exchange controls and the regulation of capital flows alone are not enough to reduce nominal instability. These measures should be considered complementary to policies whose objective is to restore the robustness of the external sector, develop the local capital market and foster positive real returns on assets in pesos, so as to make positions in local currency attractive.

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Annex: Econometric methodology

To document the long-run relationship, we perform a cointegration analysis using the system-based procedure of Johansen (1988), Johansen and Juselius (1990) and Juselius (2006). In addition to identifying these cointegrating relationships, an assessment of exogeneity or weak endogeneity is performed, analysing which of the system variables respond to deviations from the long-term relationship(s) (see Johansen (1992), Urbain (1992), Ericsson (1995) and Juselius (2006)).

The variables involved are the consumer price index in its core or underlying (*IPC*) version, nominal exchange rate (*E*), wages (*W*), activity (*Y*), amount of money (*M*), interest rate for deposits in domestic currency (*i*), international energy prices (energy), international food prices (food) and foreign producer price index (PPI). The long-run relationships found for Argentina between 2004 and 2022 are:

$$IPC = 0.80 \text{ x } W + 0.20 \text{ x } E \quad [1]$$

$$M - IPC = 1.+19 \text{ x } Y - 1.53 \text{ x } i + 0.31 \text{ x } E \quad [2]$$

The "weak exogeneity" tests indicate that *IPC* and *W* respond to deviations from the long-run relationship of equation [1] and *M* – *IPC* and *E* respond in the case of equation [2].

To examine the short-run regularities, we decompose the cumulative inflation rate (π) over *h* periods (in this case 12 months) into persistence (*P*) and a contemporary (*C*) component (see García-Cicco et al (2022) for a detailed methodological description).

$$\pi = P + C \quad [3]$$

Persistence (*P*) of inflation can be disaggregated into its own persistence (*Pp*) and the persistence of the rest of the determinants (*Po*).

$$P = Pp + Po \quad [4]$$

The contemporary component (*C*) is also disaggregated into the news (*N*) and residual (*R*) components.

$$C = N + R \quad [5]$$

The news refers to the part of the observed contemporary change in a variable that cannot be explained either by its own past or by the effect of the rest of the determinants considered. This would be the case when wages rise due to a change in labour market legislation. The residual component includes the effect of possible omitted variables (for example, assumptions about inflationary dynamics not explained by the past and present) and measurement errors, among others.

Again, we focus on core inflation, and the different terms of the decomposition include the nominal exchange rate, wages, activity, monetary (money balances and interest rate), external (international energy and food prices and the foreign producer price index), the nominal exchange rate gap (the difference between the official exchange rate and the exchange rate that emerges in financial markets through the sale and purchase of bonds denominated in foreign currency) and, finally, deviations from the long-term relationship described by equation [1].[9]

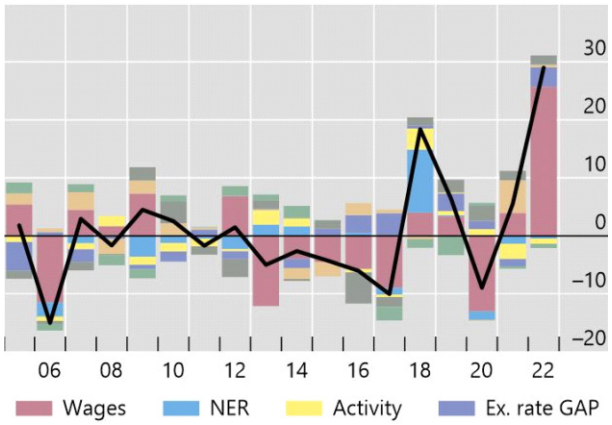
[9] The deviations from the long-run relationship described in equation [2] are not included in the exercise because, according to weak exogeneity tests, core inflation does not respond to correct

The exercise is based on the analysis of three groups of graphs. The first one shows a black line with the dynamics of inflation and a set of bars that indicate the contribution of each of the three components – persistence, news and residuals – for the whole sample from 2005 to 2022 (Graph 5.A) and for the subperiod initiated by the pandemic (December 2019–November 2022) (Graph 5.B). The second group of graphs examines the role exerted by the persistence of the different variables involved (Graphs 6.A and 6.B), while the third group measures the weights of news and residuals (Graphs 7.A and 7.B).

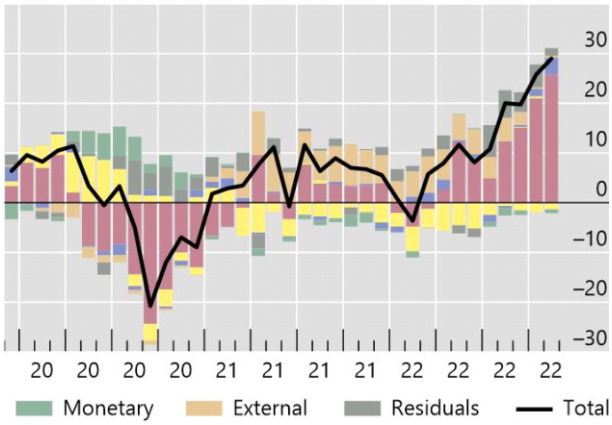
Inflation: contemporary component decomposition

In per cent — Graph 7

A. Period: 2005-22[1]



B. Period: Dec 2019-Nov 2022[2]



[1] Annual data. [2] Monthly data.

Source: Central Bank of Argentina

those deviations (the adjustment coefficient of the corresponding equilibrium correction term is not significant).

The BIS and Banco Central do Brasil relationship: lessons learned and challenges ahead[1]

Roberto de Oliveira Campos Neto

Abstract

The BIS has significantly bolstered its ties with central banks in the Americas since the establishment of the Representative Office for the Americas in Mexico City in 2002. We delve into the historical evolution of the BIS's collaboration with the Banco Central do Brasil (BCB), spanning two decades, highlighting the valuable lessons garnered during their interactions. These insights serve as building blocks for addressing the upcoming challenges in the next two decades. Looking ahead, we explore the evolving landscape post-recent shocks, emphasising structural changes that bring both uncertainty and opportunities to the macroeconomic arena. This article deliberates on the BIS's role in addressing these dynamics and sheds light on BCB's technological agenda, underscoring the BIS's role in advancing global and regional technological innovation.

Introduction

In 2002, the Bank for International Settlements (BIS) made an important contribution to strengthening its relationship with central banks in the Americas region with the opening of the Representative Office for the Americas in Mexico City.

This chapter begins by reviewing the history of the BIS's relationship with the Banco Central do Brasil (BCB) and presenting lessons learned over the last 20 years of interactions between the two institutions. Furthermore, the chapter shows how these lessons are important in helping to address the challenges of the next 20 years.

Section 2 begins by recalling the history of the BCB's relationship with the BIS. Although interactions with the BIS began in the late 1940s, it was only in 1996 that the BIS invited the BCB to become a BIS shareholder. This section presents the BCB's participation in discussions coordinated by the BIS on both macroeconomic and financial stability issues. Regionally, the exchange of experiences produced by the BIS Americas forums and committees, combined with the growing independence of central banks, has provided learning opportunities and examples for central banks to improve their institutional framework and governance. This section ends with a list of lessons learned from this exchange of experiences.

Section 3 looks to the future. After the recent successive shocks, important structural changes have been underway. While these changes have made the macroeconomic environment more uncertain and challenging, they have also provided some opportunities for the years ahead. This section discusses these

[1] I thank Arnildo Correa, Alexandre de Carvalho, Cristiano Duarte and Marcelo Xerez for their valuable collaboration and discussion on the drafting of this chapter.

challenges and opportunities and the role of the BIS in helping to address them. Finally, it presents the BCB's technological agenda and discusses the role of the BIS in promoting technological innovation both globally and regionally.

The BIS in the Americas and the policy debate

The BCB-BIS relationship

In 2022, we celebrated the 20th anniversary of the BIS Americas Office. In addition, the BCB completed 25 years of membership in the BIS. However, the BCB's relationship with the BIS began much earlier.[2] Contact between the institutions began in the late 1940s, when the BIS asked the predecessor of the BCB to organise a deposit of gold on behalf of the Bank of France. Fourteen years later, the BCB would ask the BIS to take custody of a deposit of gold in New York, which had been pledged as collateral for a loan that international banks were granting to Brazil.

From the 1970s onwards, the BCB's relationship with the BIS began to deepen, with the BCB becoming a regular customer of the banking operations offered by the BIS to central banks. The sovereign debt crisis of the 1980s further strengthened this relationship. In 1982, for example, the BIS was responsible for arranging a bridge loan of US$ 1.5 billion, in anticipation of an International Monetary Fund (IMF) programme that would be approved only in 1983.

However, Brazil's membership in the BIS would not be discussed until 1994. At the time, the BIS sought to increase the participation of emerging market economies (EMEs). The idea was to establish a gradual process of joining the BIS over the years, with countries chosen based on a set of criteria that included the size of a country's GDP and financial sector, good financial governance and the history of its relationship with the BIS, mainly as a customer of the financial services provided by the institution. In this context, in September 1996, the BIS decided to invite the BCB, together with the monetary authorities of eight other countries,[3] to subscribe to BIS shares. Due to the need for approval by the Brazilian National Congress, the accession of the BCB as an associate member of the BIS did not take effect until March 1997.

In the following years, the BCB became a member of the BIS's Markets Committee (MC) and the Committee on the Global Financial System (CGFS), increasing its participation and contributing regularly to the global debate on relevant economic and financial sector issues. Between 2006 and 2009, Brazil became a member of all major BIS committees, including the Basel Committee on Banking Supervision (BCBS) and the Committee on Payments and Market Infrastructures (CPMI).

In 2002, with the opening of the BIS Representative Office for the Americas in Mexico City, the BIS made an important contribution to strengthening its relationship with the central banks of the region, including the BCB. The regional office became a hub for promoting cooperation between central banks, carrying out research and

[2] See Pereira da Silva (forthcoming) for a historical perspective on the initial relationship between the BCB and the BIS.

[3] The People's Bank of China, Hong Kong Monetary Authority, Reserve Bank of India, Bank of Korea, Bank of Mexico, Central Bank of the Russian Federation, Saudi Central Bank and Monetary Authority of Singapore.

organising meetings and debates to discuss key issues in the region. Finally, we must point out the importance of the creation of the Consultative Council for the Americas (CCA) in 2008. The CCA brings together the central banks of Argentina, Brazil, Canada, Chile, Colombia, Mexico, Peru and the United States and has become an important forum for sharing experiences and debating key issues of policy importance for central banks in the Americas.

Starting in the 2010s, following the Great Financial Crisis, Brazil became part of the most important decision-making bodies of the BIS. The governor of the BCB at that time, Henrique Meirelles, became a member of the Board of Directors and the Economic Consultative Committee (ECC). He also chaired the CCA. Since then, the BIS-BCB relationship has become even stronger and the governors of the BCB have been members of the Board of Directors and of many other BIS committees, actively participating in debates and bringing to the BIS the perspective of an important emerging market economy such as Brazil. In January 2023, it was my pleasure to take over, from my colleague John Williams of the Federal Reserve Bank of New York, as chair of the CCA.

The macro and financial stability debate

The BCB's accession to the BIS in 1997 was important for Brazil from the beginning.[4] At that time, monetary stabilisation in Brazil was still a recent outcome of the Real Plan, which was implemented in 1994 and brought a long period of high inflation to an end. The monetary policy framework from 1994 to 1999 was mostly based on a crawling peg exchange rate regime. Taking part in Basel discussions enriched the debate regarding the problems associated with implementing monetary policy based on a currency peg as a nominal anchor. Furthermore, in the international economy, there were already signs of macro-financial imbalances in some Asian economies, which pointed to the emergence of a financial and exchange rate crisis that would affect EMEs.

After the January 1999 devaluation crisis, Brazil announced the forthcoming adoption of an inflation targeting regime. During the implementation process, the country benefited from the debate and interaction with other central banks and international organisations, including the BIS. Topics related to operationalising inflation targeting regimes were at the heart of the BIS's concerns in the field of monetary policy, including, for example, issues related to the importance of transparency and communication, managing a floating exchange rate regime, and the accumulation of international reserves.

The BCB also benefited from BIS membership in the financial stability arena.[5] The Basel Committee was created in 1974, reflecting the need for central bankers to discuss issues related to the supervision of institutions operating in different countries, as well as issues related to international financial stability. The discussions within the Basel Committee resulted in the 1988 Basel Accord on capital adequacy. In Brazil, the principles of the Basel Accord were formally adopted in 1994 through Resolution nº 2.099 issued by the National Monetary Council (CMN), so when Brazil joined the BIS in 1997, the country's prudential regulation was already aligned with the Basel Committee's international standards.

[4] See Loyola (forthcoming).

[5] See Damaso and Moura (forthcoming).

By that time, the Basel Committee was working on the Core Principles for Effective Banking Supervision, published in September 1997. The BCB contributed to this work through its participation in the Core Principles Liaison Group (CPLG). In fact, participation in the CPLG was the beginning of Brazil's formal involvement with the Basel Committee, although Brazil's actual entry into the Committee did not take place until 2009.

Since then, Brazil has participated in discussions on financial stability at the BIS and in working groups to address technical issues. More recently, the BCB actively participated in the design of the Basel III framework, influencing the discussions to adapt some of the framework's provisions to the reality of EMEs. Participating in the drafting of the rules allowed the BCB to share with the Committee concerns that are typical of EMEs.

The BCB's heavy involvement in the Basel Committee discussions was beneficial to the country's financial stability. The BIS is a privileged forum for discussing issues related to the financial system. It is responsible for working groups that include representatives of many central banks, which allows for the coordination of discussions and implementation of policies at the international level. The BCB's membership in the BIS also allowed numerous BCB employees to start receiving training through their interaction with the BIS.

Interaction with BIS in the Americas and the consultative groups

Regionally, the exchange of experiences in the BIS Americas forums, combined with the growing independence of central banks, has provided learning opportunities and examples for central banks to improve their institutional framework and governance. Regular interactions between CCA Governors have contributed to a greater convergence of monetary policies in the Americas region, so that one central bank benefits from the experience and credibility of others.

Through the CCA and the BIS Americas Office, productive interactions among central banks' representatives have taken place through five CCA consultative groups. These groups provide technical support to the Governors' meetings at the CCA and produce analytical output with real value for central banks in the region and around the world. The longest-standing groups are the Consultative Group of Directors of Operations (CGDO), which discusses conjunctural issues and the implementation of monetary policy; the Consultative Group of Directors of Financial Stability (CGDFS), which addresses risks to the stability of the financial system; and the Scientific Committee (SC), which brings together heads of research and organises the annual CCA research conference. Since 2020, the newest groups are the Consultative Group on Innovation and the Digital Economy (CGIDE), which coordinates hands-on work on issues of digital innovation, and the Consultative Group on Risk Management (CGRM), which brings together chief risk officers to discuss central banks' key risk management issues.

These consultative groups have benefited members by promoting debates and the exchange of experiences regarding central bank activities. The discussions and, in many cases, public reports have covered a wide set of strategic issues for policymaking, mainly on macroeconomics, financial stability, innovation and financial system development.

The CGDO held its first meeting in March 2014, with the aim of discussing issues related to market operations of common interest to the central banks participating in

the CCA. This group has been an important forum for analysing the evolution of domestic financial markets, global market risks and the operations of central banks. Debates have been based on changes in global monetary conditions and their impact on the policies adopted by central banks in the region.

The BCB has been an active participant in the CGDO's activities, represented by the Deputy Governor on Monetary Policy. Regular teleconferences and meetings have been valuable in following more closely policymakers' perceptions of current developments affecting regional financial markets, as well as the strategic solutions that have been implemented by central banks to deal with new challenges. At these meetings, central bank authorities exchange views on the main macroeconomic developments, addressing issues related to the derivatives market, financial market volatility, liquidity provision, operating targets, monetary policy, inflation and FX markets. Interactions have involved not only top-level policymakers, but also specialised staff dedicated to central bank operations, including strategists, traders, analysts and researchers.

The importance of the CGDO and the other consultative groups for discussions of coordinated actions was highlighted during the Covid-19 pandemic in 2020–22. Throughout this crisis, central banks and governments had to act in a timely manner amid great uncertainty, implementing measures to alleviate the impacts of the pandemic on the economy, ensuring the proper functioning of financial markets and safeguarding market stability.

In the case of Brazil, the set of measures implemented by the government and the BCB was divided into four groups: (i) monetary and macro-financial measures, including liquidity and capital relief; (ii) credit lines; (iii) direct transfers of resources; and (iv) tax relief and tax deferrals. The liquidity and credit support measures adopted by the BCB in response to the crisis, which amounted to 17.5% and 20% of GDP in 2020, respectively, were the largest among EMEs. They had a positive impact on the credit market, propelling Brazil's economic recovery.

In this crisis context, economic authorities reacted using similar instruments, and coordination among policymakers was crucial to the success of policy responses. Such coordinated action made it possible to turn an expected severe recession into a moderate one. The discussions within the BIS and the BIS Americas contributed to this favourable result, although countries still need to deal with the consequences of large fiscal expansion, which is crucial for macroeconomic stability.

The CGDFS is another important forum that allows the BCB to share its vision on financial stability and to hear other jurisdictions' views, enriching analyses and broadening perspectives. Many of the participants of the CCA share similar characteristics, which contributes to the comparability of analyses and common interests. As a result, the lessons learned through CGDFS meetings are important in facing both present and future challenges in financial stability.

The topics discussed are also very diverse. Most recently, meeting discussions involved the impacts on financial stability of: (i) the war in Ukraine; (ii) cyber risks and heightened uncertainty; (iii) high inflation and higher domestic rates; (iv) persistent effects of the pandemic; (v) spillovers from the strong US dollar and tighter global financial conditions; (vi) higher commodity prices; and (vii) climate shocks and environmental degradation.

The BCB also participates in the Scientific Committee (SC), a consultative group comprising the heads of research from the CCA's central banks and the Head of the BIS Monetary and Economic Department. The SC is responsible for selecting papers

from regional central banks and outstanding academics for the CCA's annual research conference. In 2021 and 2022, the themes of the annual conference were "The economics of the Covid-19 pandemic" and "Structural changes in inflation and output dynamics after Covid and other shocks", respectively. At the end of 2022, the SC launched a research network to study the macro-financial impact of climate change and environmental degradation.

The creation of the CGIDE in 2019 marked the introduction of a technological agenda to the BIS Americas Office's scope of activities. Since 2010, we have seen continuous growth in the BIS's publications and committees of discussions related to the use of new technologies in the provision of financial services and new business models in the financial industry. Issues such as fast payments, fintechs and big techs, cryptoassets and distributed ledger technology (DLT), decentralised finance (DeFi) and central bank digital currencies (CBDCs) have been increasingly debated by regulators and central banks, along with conventional topics such as monetary policy and prudential regulation.

This consultative group aims to promote discussion and cooperation among participants on topics linked to the digital economy and the use of new technologies in financial and payment systems. Over the past three years, the CGIDE has provided relevant discussions on topics related to the models and technical features of application programming interfaces (APIs) used in open finance models, as well as the technical requirements for CBDC projects. In addition, dozens of technical seminars have been held with representatives of monetary authorities and financial regulators from countries outside the region, the BIS's researchers, and the private sector. The focus is always on aspects related to the impact of the intensive use of technology in finance and payments.

Finally, the CGRM, established in 2021, facilitates collaboration on risk management issues. Techniques and policies for risk management may differ across central banks depending on several factors. As a leader among its peers in developing risk technologies and implementation procedures, the BCB became a member of the CGRM immediately after its creation.

The BCB actively participated in two of the CGRM's thematic studies, which took a task force format: (i) Business continuity planning at central banks during and after the pandemic, whose final report was published in 2021; and (ii) Incorporating climate-related risks into international reserves risk management framework, led by the BCB, whose final report was circulated among members and discussed at high-level conferences ahead of publication in 2022.

Both task forces were productive, and the work necessary to prepare these reports reinforces the importance of frequent interactions between central banks. Indeed, central banks usually face similar challenges and often operate at the frontier of knowledge regarding good practices and technical solutions to emerging problems. Within the CGRM, task forces change with time and depending on the chosen theme, which also brings the possibility of embracing new topics quickly.

In summary, the interaction between the BCB and the BIS Americas Office over the years has been very fruitful. Discussions with the BIS and peers have also yielded the following lessons:

(i) Coordination among central banks increases the effectiveness of their measures, as the pandemic has made clear;

(ii) a robust macroeconomic framework is a key element in achieving both price stability and economic growth;

(iii) a sound fiscal framework is crucial to macroeconomic stability; and

(iv) a macroprudential framework is conductive to financial stability.

Vision for the future

This section looks to the future, exploring structural changes in the global economy and the challenges that economies will have to face. We also present the agenda for innovation in the financial system that the BCB has been implementing and some transformations ahead. Finally, we explore the role of the BIS in such a scenario of intense transformation.

Macroeconomic outlook

After the successive shocks that hit the global economy, important structural changes have been made or accelerated. The shocks left the global macroeconomic scenario more uncertain, presenting many challenges but also some opportunities for the years ahead. Some of these structural changes are triggered by: (i) mismatches in the supply and demand of goods and services and their impact on energy markets and the green transition; (ii) geopolitical events and changes in trade and global value chains; (iii) the adoption of technology and its impact on labour markets; (iv) the significant increase in indebtedness; and (v) a time window with lower growth and higher inflation.

The Covid-19 shock caused a huge dislocation in the supply-demand balance of goods and services. Higher household income following government transfers and mobility restrictions drove households to consume more goods and fewer services. It was expected that, upon lifting restrictions, households would return to their previous consumption patterns, but this prediction was not entirely realised. Goods consumption has stayed above pre-pandemic levels, while services have recovered to pre-pandemic levels more gradually, despite some differences across jurisdictions.

Importantly, the rise in demand for energy to produce goods was not accompanied by an increase in energy supply. Capital expenditures in the energy and mineral commodities sectors have been limited for several reasons, such as increased uncertainty about future prices and demand, as well as countries' commitments to achieve reductions in carbon emissions. Accordingly, there has been an increase in prices in these industries without a corresponding increase in investments. The decrease in investments in these sectors may represent a more persistent bottleneck and an important source of risks for inflation and the supply of energy in the near future.

Moreover, investments in green energy have not increased at the scale and speed necessary to overcome the current imbalance in energy markets or the even broader challenge of achieving carbon neutrality. While there has been some shift back towards the use of fossil fuel sources in the short term, it is paramount that we keep sight of the green investments needed to address climate change and environmental risks. These risks could bring significant long-term consequences for the whole planet, requiring decisive actions from all stakeholders.

International trade is also undergoing significant structural changes. Especially after the 2000s, international trade was increasingly organised through global value

chains (GVCs). GVCs improve efficiency in inventory management and maximise countries' comparative advantages. However, during the pandemic, this organisation of world trade did not work well. The disruptions in supply chains during this period raised new challenges to the GVC model. On the one hand, the problem of production of key products such as medical equipment being highly concentrated in a few countries became evident. On the other hand, there was a large and coordinated increase in global demand concentrated in these sectors. As a result, countries are once again producing goods in sectors where they do not have comparative advantages. In Brazil, for instance, there is already a discussion about the need to increase the production of fertilisers.

Furthermore, the war in Ukraine and higher geopolitical tension highlighted the importance of secure sourcing and large buffer stocks, reinforcing countries' trend toward producing more domestically or trading with specific partners to make production more resistant to external turmoil. In the case of US multinationals, for example, the relocation of production plants from China to Vietnam or Mexico ("near-shoring" and "friend-shoring") is noticeable.

These alternatives could redefine trade flows and convert GVCs to regional value chains based more on countries' geographical and political affinity than on an efficient allocation of resources. This redesign will probably result in lower global growth. It might also reduce technological innovation and diffusion, which had been key factors helping to keep inflation low in recent decades.

Another important dimension of structural change going forward is the shift to new technologies. The Covid-19 pandemic accelerated this path. Social distancing measures adopted during the most severe period of the pandemic made it necessary to adapt business and services for hybrid or remote working, adopt new digital technologies and rearrange the productive sector. Many of these changes are expected to become permanent and should affect labour markets and the structure of the economy in the next few years. As usual, there could be winners and losers in this process.

There are ongoing structural changes affecting the labour market. During the pandemic, several groups were hit particularly hard. Young workers who entered the job market during a recession might see their future income adversely affected, and long school closures could have an impact on students' long-term levels of schooling, qualification and productivity.

In addition, while activities that required greater qualification and used more technology with remote work were less affected, face-to-face activities felt a major impact from the pandemic. Numerous non-remote workers had to leave their jobs because they got sick, retired early, had to take care of relatives or were fired. Hence, while participation rates decreased, unemployment rates increased. After activities resumed, there was a rebalancing in such trends in many jurisdictions. However, in countries such as the United States, many workers have opted not to return to their previous jobs for several reasons (such as health, economic or personal conditions). As such, participation rates might not return to their pre-pandemic levels. This labour force shortage will probably continue to put pressure on wages and make it difficult to bring inflation towards targets.

There have also been shifts in demographic trends. The slowed pace of population growth in several countries means a lower population of adults available to join the labour force. Absent other alternatives, such as migration and automation, this demographic trend could reinforce labour shortages and pressure on wages. At

the same time, increasing aging of the population could raise costs linked to these aging groups, such as health and personal care and pensions, also putting upward pressures on inflation for a more prolonged period.

Another crucial aspect of the structural changes produced by the recent crisis is the rise in public debt levels. During the pandemic, governments implemented sizeable fiscal measures to support economic activity, and there are still many social demands that need to be met. As a result, concerns about countries' long-term fiscal sustainability are becoming more pronounced. This aspect is particularly relevant for EMEs, since these countries are more vulnerable to macroeconomic instability. Recently, financial markets have started to show little appetite for expansionary fiscal measures, even in advanced economies (AEs), as observed in the United Kingdom in late 2022. In this context, Brazil, like other countries in the region, faces the challenge of implementing policy assistance while keeping the public debt sustainable. This leads to the next challenge, namely the continued implementation of growth-enhancing structural reforms, which is essential for fiscal sustainability and sustained growth.

Importantly, high levels of sovereign indebtedness interact with the adoption of technology and the socioeconomic displacement of people, creating a vicious circle that may have accelerated during the pandemic. The growth of technology naturally creates winners and losers. The displacement of people, which is generally not temporary, increases the need for policy assistance to soften the negative impact of these changes. However, during the Covid-19 crisis, this process became even faster and more disruptive. The speed and scale of these changes have increased. This will create demand for more resources for social policy and put additional pressure on public spending and sovereign debt.

That said, the current global macroeconomic circumstances add still more challenges to this situation. Countries may experience a stronger deceleration in economic activity, with inflation remaining at high levels for a longer time. This means that central banks will need to raise interest rates more, or keep them higher for a longer period, tightening financial conditions in order to control inflation.

A period of lower growth, higher and more persistent inflation, and tighter global financial conditions raises the risk of abrupt repricing in asset prices. This combination poses significant trade-offs for policymakers and central banks worldwide. EMEs are usually hit harder by inflationary pressures, as the weight of food prices in the consumption basket is greater in these countries. Furthermore, they are more vulnerable to changes in global financial conditions and tend to have more limited policy space to counteract these shocks.

Going forward, the BIS will be a relevant forum for discussions on all these topics and for sharing experiences across countries in its meetings and publications. The debate may shed light not only on the best ways to tackle these challenges, but also on the policies to be adopted in order to seize some of the opportunities that come with these changes. Certainly, the lessons learned over the last 20 years, mentioned in the previous section, will be valuable in facing these challenges.

Technological innovation and the Agenda BC#

The financial system has experienced a period of unprecedented technological innovation. In the wake of these developments, central banks of the region are advancing their innovation agendas. In this section, we discuss the main ongoing

efforts of the BCB's technological agenda, and the role we see for the BIS Americas Office in promoting the positive impact of technological innovation in the region's financial and payment systems. As discussed below, the BIS Americas Office can be especially important in coordinating efforts aimed at integrating countries' payment systems and digital currency frameworks.

First, it is worth mentioning some elements of the technological innovation process that we are witnessing. In today's digital world, people are looking for ways to represent anything that might have value in a digital format. To this end, encrypted assets have been distributed on a ledger so that they become verifiable, transferable and divisible. This process of asset tokenisation allows us to extract value, in digital form, from different types of assets such as photos, art, properties, ideas and money. Even assets in virtual reality (VR) worlds are being tokenised.

This innovation process suggests that we are moving towards an increasingly tokenised economy, in which the negotiation of tokenised assets is the main transformation. In the financial system, this process tends to lead to a growing dichotomy between account-based and token-based entries on banks' balance sheets. Ultimately, these developments may lead to the creation of global, regulated, token-based and multi-asset networks.[6]

It is within this context of innovation that the BCB has sought to promote its financial innovation agenda. Over the last few years, the BCB has implemented several innovation projects in its agenda of structural reforms for the financial system, the Agenda BC#. These include the instant payment scheme (Pix) [7] in 2020 and Open Finance in 2021. There are also other projects underway, such as the modernisation of foreign exchange (FX) legislation and the implementation of the Brazilian CBDC, the Digital Real. All these actions are different parts of an integrated agenda for developing the financial system of the future, the goal of which is to make the Brazilian national financial system (SFN) more efficient and modern and to promote the democratisation of financial services through technology.

To date, Pix, the BCB's instant payment scheme, has far exceeded our expectations, and its use continues to increase month after month. Since 2020, many new features have been added to Pix, eg the ability to make payments on due dates or on a scheduled basis. It is also possible to withdraw cash from a retailer, which enormously increases the accessibility of withdrawal services. Furthermore, new accessibility and safety mechanisms are already in operation.

Various other innovations in Pix will come along. Customers will be able to acquire some financial services currently available from banks, such as credit, using Pix. Programmable operations with Pix will also be possible. These changes will bring substantial efficiency gains for customers. We also expect interconnections between Pix and other instant payment systems to be developed in Latin American countries, enabling Pix for international payments.

Another relevant initiative of the Agenda BC# is the Brazilian Open Finance, which is defined as the regulated environment for the sharing of data, products and services between regulated entities – financial institutions, payment institutions and other entities licensed by the BCB – at the customer's discretion. This initiative aims

[6] See Citibank (2021).

[7] See Duarte et al (2022).

to enhance the efficiency of Brazil's credit and payment markets by promoting a more inclusive and competitive financial system.

The Open Finance model implemented by the BCB is a global benchmark, the largest in scope and number of institutions involved. This project has been implemented in phases. After two years, we have achieved more than 800 participating institutions, more than 22 million customer data-sharing consents, an average of more than 350 million API calls per week and more than eight billion API calls in total.

The modernisation of foreign exchange legislation, in turn, will improve the business environment in Brazil as the result of the passage of a new law by the National Congress of Brazil in late 2021. The new regulatory framework, enacted by the BCB at the end of 2022, will facilitate the integration of Brazilian companies into international markets and increase the attractiveness of the Brazilian economy to foreign capital.

In the coming months and years, this process of innovation will lead to a financial system in which there is competition not only between products but also between channels. This process will bring together the four major initiatives of the Agenda BC#: Pix, Open Finance, the internationalisation of our currency and the Digital Real. We envision these four building blocks giving rise to financial aggregators, allowing customers to access information and services from different banks using the same applications. Ultimately, we will move towards a new, interoperable system, with all our initiatives interconnected on a single track.

This integration will serve as the basis for establishing our digital currency, the Digital Real. As a matter of fact, we believe that the benefits of a CBDC go far beyond improvements in wholesale and cross-border payments or enabling instant payments, some of the main motivations behind central banks' interest in CBDCs. Our view is that a CBDC is an important driver of new business models and innovation in the financial system. The challenge for the Digital Real is to enable uses beyond the payment solutions available today, taking advantage of this new financial ecosystem that is about to emerge.

The Digital Real will promote the provision of financial services based on tokenised deposits. The principle will be to transform deposits into tokens (akin to stablecoins) for the use by the public. These tokens will have the same value as a CBDC held by financial institutions and issued by the BCB. The fact that banks and payment institutions will be the issuers of the tokenised deposits will prevent financial disintermediation and problems on their balance sheets. As the Digital Real will not be interest-bearing, it will not interfere directly in monetary policy transmission or the macroeconomic framework, avoiding some of the concerns of other jurisdictions implementing CBDCs. At the same time, tokenised deposits will have the same regulatory principles as conventional deposits, ensuring the security of the financial system.

Furthermore, the Digital Real is expected to enable a more efficient trading chain of tokenised assets, strengthening the migration to a token-based world. Indeed, the same technology developed by banks and payment institutions to tokenise deposits can be used to tokenise a number of other assets. Other positive outcomes include using new technologies to enhance banks' internal controls and settlement processes.

We are currently assessing, through a BCB initiative called the LIFT Challenge Real Digital, the execution of projects on CBDC use cases proposed by banks, payment institutions and other market participants. These involve solutions for delivery versus

payment (DvP), payment versus payment (PvP), the Internet of things (IoT) and decentralised finance (DeFi), among others. Our idea is to conduct a pilot project starting in March 2023. If everything goes as planned, the Brazilian CBDC could be up and running by late 2024 or the beginning of 2025.

Data monetisation is another important issue in our technology agenda. Today, it is very difficult for users of the financial system to monetise their data. As owners of their information, they should be able to do that. We are working to create ways to allow them to monetise their information. In this sense, the financial aggregator, within the Open Finance environment, could also be used as a data wallet, where the user could store data and choose the best way to monetise it. For this purpose, we need to track which data can flow in an organised and secure way.

In our view of the future, it is unreasonable to expect people to have to use different applications to access information and services from different financial institutions. Our concept is to have an integrated process that allows people to choose a single application that integrates information and services from various players. In addition to serving as a digital wallet, this app will make it possible to make payments, investments, transfers and asset purchases; conduct cash management; and acquire many other financial services from different institutions. It would allow both online and offline transactions.

The process of integration is divided into phases. First, we intend to combine Pix and Open Finance. After that, users will be able access other banking services, such as credit, using Pix. The next step will be the integration of Pix and the currency internationalisation, allowing customers to make instant international payments. Finally, the Digital Real will be included in this framework. Customers will be able to experience the integration of the four blocks using the financial aggregator and digital wallet holding tokenised deposits and other assets provided by banks and other providers. This process of integration is already underway, but we will work to advance it even further in the coming years.

The BIS's role in the development of technology

The BIS Americas Office, with the co-participation of other BIS committees and the newly announced BIS Innovation Hub in Toronto, can help further develop central banks' innovation agendas in the region and globally. An area where there is high potential for contributions is in the integration of CBDC frameworks and the interconnection of countries' payment systems.

Today, several central banks in the region intend to issue, either on an experimental or commercial scale, their sovereign currency in digital format in the coming years. Globally, the main challenge is coordination among central banks. Central banks must increase their coordination in the process of defining their CBDC technologies, and the BIS Americas Office can work to achieve this among central banks in the region.

As indicated by international experiments, the use of smart contracts seems to be key to allowing integration between potential CBDC solutions in different countries. Without coordination on cross-border payments, which can be promoted through CBDCs, cryptocurrencies will remain an attractive alternative option. Nevertheless, even if CBDC technologies are not yet ready to solve problems with cross-border payments, other technologies, such as those supporting domestic instant payment systems, can be used to fill in the gaps.

By promoting the use and standardisation of such payment solutions, the BIS Americas Office has the potential to coordinate efforts aimed at the interoperability of countries' payment systems and to make cross-border payment flows cheaper, more agile and more accessible – particularly for retail transactions. Moreover, given the position of the United States as the largest payment counterparty for international payments, a solution for the Americas would need to envision its global reach.

The development of instant payment ecosystems in jurisdictions of the region (CoDi in Mexico, Pix in Brazil and FedNow in the United States) represents a sizeable opportunity for the construction of a multilateral solution. This integration would be capable of addressing, if not all, several of the historical shortcomings of this payment modality in a relatively short time horizon.

Alternatively, a multilateral solution can be achieved through the participation of countries' payment systems in the Nexus project, an initiative led by the Innovation Hub that intends to interconnect fast payment systems in a global network. In this arrangement, smaller payment systems can be interconnected to the network through direct participation in one of the regional systems and indirect participation in the Nexus network.

Both options will require a high degree of coordination among countries and compliance with common regulatory and technological standards. Initially, the BIS Americas Office can work as a hub for discussing these and other viable alternatives, and, later, the Innovation Hub can work as an instigator and coordinator for the integration of payment systems.

The first moves towards greater integration will certainly depend on the jurisdictions that have more developed retail payment systems, such as Brazil, Mexico, the United States and Canada. In the case of Brazil, in addition to a modern exchange rate framework, the country also has an instant payment scheme, Pix, that is an international reference and widely adopted by Brazilian individuals and companies. The engagement of the BCB and the main jurisdictions in the region around an integration project can generate a broader movement in the same direction.

Finally, in addition to promoting coordination in the adoption of new technological standards, the exchange of experiences and knowledge between central banks can significantly increase the likelihood of success for each jurisdiction's projects and thus their positive impact on domestic financial and payment systems. In this sense, we see the BIS Americas Office as a knowledge hub for experiences in the region and for exchanging experiences and impressions regarding ongoing projects in Europe and Asia.

Conclusions

This chapter shows the importance of the BCB's relationship with the BIS, and the learning that this relationship has brought to our institution. Major issues for the BCB have been the subject of fruitful discussions at the BIS, including the role of central banks' coordination in increasing the effectiveness of their measures, and the key elements for price, macro and financial stability, as well as for economic growth.

Looking ahead, the BIS and the BIS Americas Office could fulfil a very important role in helping countries with technology-related issues. The financial system is experiencing a period of unprecedented technological innovation. In the wake of

these developments, central banks in the Americas are moving forward with their innovation agendas. The BIS can contribute to their endeavours by promoting the coordination of central banks in the adoption of new technological standards, as well as the related exchange of experiences and knowledge.

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20 years of central bank communications, and lessons for the future

Tiff Macklem and Jill Vardy

Abstract

Central bank communications have undergone profound changes over the past two decades as central banks greatly enhanced their transparency and openness in order to support their monetary policy objectives. It has become widely accepted that clear communication by central banks is important in order to enhance credibility, improve monetary policy effectiveness and reinforce accountability. Some key lessons have emerged, notably the following seven: (i) public support of inflation targeting objectives and means is essential; (ii) central bank mandates must be focused and achievable; (iii) credibility is enhanced when central banks acknowledge uncertainty; (iv) crises require a different style of communicating; (v) public demand for information has increased; (vi) central banks must deploy new ways of reaching audiences; and (vii) central banks need to listen to a wide range of stakeholders. Central bank performance is judged by results and economic outcomes, but success is more likely if central banks clearly communicate to help citizens navigate the broader economic forces at work and understand how policies affect them. These efforts improve policy decisions, reinforce legitimacy and cement public trust.

Introduction

Over the past two decades, we have witnessed a sea change in central bank communications. The adoption of inflation targeting regimes by central banks and governments – including Canada's – in the early 1990s served as the catalyst for enhanced transparency and communication. Clarity about the monetary policy objective put the onus on central banks to provide clear and accessible communication about what they were doing to achieve their objective. It also made central banks more accountable by giving them a clear mechanism for explaining the effectiveness of their policy actions. Inflation-targeting central banks were at the vanguard of this shift in communication, but it spread beyond those with formal inflation targets.

The benefits of transparency

Over the past 20 years, it has become widely accepted that clear communication by central banks is important for several reasons (BIS (2021)). First, it can help to build credibility and trust in the central bank and its actions. If the public understands why the central bank is making certain policy decisions, they are more likely to trust that those decisions are in the best interest of the economy. Second, clear communication can help manage expectations. If the central bank effectively communicates that its

primary objective is price stability, it can help to anchor inflation expectations around the target inflation rate (Blinder et al (2022)). Effective communication can also promote independence and accountability. Clear objectives and transparent actions help hold a central bank accountable for its performance. This can reinforce the idea that the central bank is working in the public interest.

Making a history of mystery

To fully appreciate the sea change in central bank communications in recent decades, we must recall that, for the better part of the 20th century, central bank goals and actions were cloaked in secrecy. Central banks, including the Bank of Canada, said little publicly to explain what they were up to and why.

With multiple and often unclear monetary policy objectives and instruments, policy actions were hard to predict. The view among central banks was that it was best not to talk about policy actions – let alone future policy intentions – and instead let these actions speak for themselves. Furthermore, the conventional wisdom was that financial markets needed to be surprised if monetary policy was to be effective. Without a clear monetary policy framework and a well-defined basis for evaluating their performance, central banks were less open to scrutiny and public accountability. But with increased public expectations for openness, this opacity regarding monetary policy decisions was viewed to be at odds with the transparency expected of public sector institutions.

Through the 1980s, academic literature accumulated on the merits of making a credible commitment to a clear, sound monetary policy objective (rather than chasing multiple goals). There was also increased recognition of the merits of working with the markets rather than against them. These developments motivated central banks to look for a clearer policy framework that would focus on the single goal of controlling inflation through a primary instrument – the policy rate – and provide scope for choosing a suitable horizon for returning inflation to target after a shock, thus minimising fluctuations in economic output. An important and related development was the increase in central bank independence and, by extension, accountability in many emerging market economies, particularly in Latin America, in the 1990s and 2000s. Central banks across the region adopted clear mandates for inflation targeting and moved to flexible exchange rates. These new policy regimes, along with enhanced independence, necessitated more transparency and clear and regular communications.

The adoption of inflation targeting, flexible exchange rates and central bank independence have all contributed to making central banks more accountable and credible. This has in turn helped to improve confidence in many countries' economies and financial systems.

The information transformation

The last two decades have also seen a profound change in how information more generally is shared, consumed and debated. The internet slashed the cost of communication. This disrupted traditional media and led a growing segment of the public to get their news from alternative channels and social media. Many had hoped

that the democratisation of information would make us all better informed. While the internet and social media have vastly broadened access to information, they are also awash with misinformation, echo chambers and conspiracy theories. So, it has become more important – yet more difficult – for central banks to serve as trusted sources of information and analysis. The imperative is to step boldly beyond market transparency and engage with the public to explain how our actions serve our economy-wide objectives. This means listening to more people; understanding their perceptions, accurate or not; factoring broader public views into central bank policy decisions and communicating with people on their terms.

The post-crisis era

Since the 2007–09 Great Financial Crisis (GFC), expectations for good governance and transparency in public institutions have increased. This has led to greater public demand for more comprehensible information and messaging and more opportunities for central banks to engage with more diverse audiences. At the same time, faced with extremely low interest rates and weak economic growth, central banks expanded their monetary policy and financial stability toolkit to encompass new tools like exceptional forward guidance and quantitative easing (QE). These exceptional tools have brought their own communications challenges. Just as central banks are trying to become more understandable and relatable, increased reliance on more complex exceptional tools has made the task both more difficult and more important.

The Covid-19 pandemic and the associated massive policy response magnified these challenges, forcing central banks to find new ways to convey their economic outlook and explain their exceptional tools during a period of extreme uncertainty. As in the case of other central banks, the Bank of Canada's credibility was put to the test. In 2022, inflation reached its highest level in four decades, and the Bank forcefully raised interest rates by 425 basis points – the fastest tightening cycle in its 88-year history. The combination of past QE and rising interest rates also meant that the Bank incurred losses on its balance sheet for the first time ever, which presented a very different kind of communications challenge.

Through this journey to increased transparency and accountability, some important truths and lessons have emerged that will serve central banks in the years to come.

Broad acceptance of the inflation target and the means to achieve it is essential

While monetary policy works through markets, market understanding alone is not enough to ensure its success. Without public acceptance of the inflation target, achieving it will be difficult.

Nothing works well when inflation is high. Elevated inflation erodes the value of money. It distorts and confuses the information and incentives that consumers, businesses, entrepreneurs, savers and investors rely on to make their economic decisions. It feeds frustration, social tensions and a sense of unfairness. But decades

of low inflation in many countries, including Canada, mean that many citizens have no experience with the damaging effects of high inflation. In some ways, central banks are victims of our own policy success – inflation had not been a problem for years, so people were not accustomed to even thinking about it, much less worrying about it.

With inflation fluctuating close to the 2% target for a few decades, most people came to expect inflation to stay around the target, and adjusted their price expectations and wage demands accordingly. However, a resurgence of inflation can start to shift people's expectations away from the target. If people start to base their expectations for inflation on the recently-high inflation they see rather than on the target itself, they begin to expect prices and wages to rise more frequently, causing high inflation to become more self-perpetuating. Without a sufficiently strong policy response, a drift in expectations away from a central bank's inflation target can open the door to persistently high and volatile inflation.

The rapid rise in inflation during late 2021 and early 2022, as well as its persistence, caught central banks by surprise. As inflation increased, so did scrutiny and criticism of central banks' failure to anticipate and respond to it in a timely way. The response to this inflation shock required a combination of rapid, forceful policy actions and clear, frequent communications.

The rapid policy response appears to be yielding positive outcomes, and inflation in many countries, including Canada, is coming down. In Latin America, the central banks that began raising their interest rates in 2021 ahead of advanced economies – including Brazil, Mexico, Chile, Colombia and Peru – saw less severe gross outflows and stronger net inflows than in past global tightening cycles. While strong commodity prices supported flows in these countries, early tightening could also have played an important role by boosting the credibility of these central banks. Even as commodity prices fell in the second half of 2022 and the Federal Reserve began hiking rates aggressively, the central banks that hiked early showed sustained currency strength and lower risk spreads over the entirety of 2022.

More than 20 years of experience in improving our transparency and communications have made central banks better equipped to meet the heightened scrutiny we face in this period of high inflation. For the Bank of Canada, the communications response has been twofold; first, to remind citizens of the detrimental impact of high and unpredictable inflation, and second, to keep inflation expectations anchored by acting forcefully to return inflation to the target of 2%. A third and related message is that low, stable and predictable inflation goes hand in hand with strong, sustainable economic growth. One cannot be maintained without the other.

The Bank of Canada's messages have emphasised that low inflation will help restore solid, sustainable economic growth and avoid the distortions that come with high and volatile inflation. This is good for everyone – households, workers, businesses and the economy. Messages have also emphasised the Bank's commitment to returning inflation all the way back to the 2% target. This resolution in pursuit of the target is important: the Bank's resolve – and people's awareness of it – will help Canada's economy to reach the target faster and with less pain than if the Bank is perceived to be acting half-heartedly.

The Bank of Canada's communications efforts over this period of high inflation have succeeded in maintaining relatively stable levels of trust in the Bank, as measured by public opinion surveys. Increased use of social media, educational content and focused speeches and media appearances have highlighted the key

messages above and yielded results. Knowledge of the Bank of Canada's role in the economy has increased, as has awareness of the inflation target and the Bank's use of interest rates as a tool for controlling inflation.[1]

Central banks must focus on what they can achieve

One of the many benefits of inflation target mandates is that they focus central bank policy actions on one clear objective that they can ultimately control – inflation. Central banks are equipped with policy tools to influence demand in order to keep inflation on target over time.

Three decades of success in inflation targeting have delivered positive macroeconomic outcomes with relative stability, economic growth and low inflation. As central banks' policy success grew, expectations of what central banks could do grew as well. During the GFC, central bank efforts to restore financial stability were largely regarded as successful. In the aftermath, flaws and weaknesses in financial markets and banking systems were, in many cases, handed over to central banks to fix and oversee.

More recently, some have called for central banks to take on additional mandates, such as helping to address climate change or inequality.[2] Others argue that adding new mandates could dilute central banks' focus and make it more difficult for them to achieve their primary goals. When inflation dramatically increased in the aftermath of the pandemic, those criticisms sharpened.

Central banks, with their narrow policy toolkits, are not equipped to address many societal issues. Climate change, for example, requires a coordinated effort across various government agencies, industries and international organisations. Still, central banks do have a role to play. Some central banks, such as the Bank of England, have been given a secondary climate change mandate, while many others, like the Bank of Canada and the US Federal Reserve, see climate change through the prism of their existing mandates. Central banks' early focus has been largely on the financial stability risks posed by climate change, including assessing risks posed to the financial system by climate events and helping the financial system prepare for the climate transition. Some central banks, like the Central Bank of Brazil, use sustainability criteria in reserve management to manage climate risk and catalyse the transition (BIS (2022)). Others, like the Bank of Japan, have directly supported the financing of sustainable investments. More recently, many central banks, including the Bank of Canada, are beginning to increase their focus on the implications of more frequent weather events and associated supply shocks, as well as on the uncertainties associated with the climate transition for their primary price stability mandates. Communicating how the central bank's role in climate change is anchored in its mandate and how climate change interacts with its primary objective will be an evolving challenge.

[1] See Bank of Canada, "Public awareness surveys", www.bankofcanada.ca/about/governance-documents/public-awareness-surveys/#results.

[2] See, for instance, Bartholomew and Diggle (2021) and Chang (2022).

Maintaining credibility requires acknowledging uncertainty

Given the forces buffeting global economies over the past 20 years, central bank communicators have had to become experts in explaining uncertainty. We have all walked the fine line between being straightforward about what we do not know (and what we cannot possibly know) and maintaining the air of assurance and credibility that central banks need in order to do their jobs effectively. Finding this balance has led to considerable focus in recent years on how central banks incorporate and communicate uncertainty in their monetary policy frameworks.

A risk management approach to monetary policy acknowledges and accepts the uncertainties inherent in policymaking and identifies the most important risks around the outlook. Policymakers examine the probabilities that these risks will be realised, consider alternative futures and think about the potential consequences of making a policy error. They then choose a policy course that accounts for these risks, staying mindful of the possible policy errors.

During periods of Knightian uncertainty[3] such as the Covid-19 pandemic, a risk management approach is not sufficient because the range of possible outcomes becomes too wide and there is little basis on which to assess probabilities. For example, at the outset of the pandemic, it was impossible to anticipate the course of the pandemic or the timeline for development of treatments, cures or vaccines for the virus. Instead of forecasts with confidence bands, policymakers began using scenarios with widely varying assumptions about the severity of public health outcomes and the restrictiveness of containment measures.

The historic global policy response to Covid-19 was echoed in Canada, with unprecedented government spending to support individuals and businesses and bridge the economy through a series of lockdowns. The Bank of Canada moved quickly and decisively to support the economy and keep credit flowing. The policy interest rate was slashed to the effective lower bound of 0.25%, and a range of facilities and programmes were introduced to restore market functioning and keep credit available. The Bank of Canada engaged in quantitative easing for the first time, buying billions of dollars of Government of Canada bonds. The scope of market operations expanded the Bank of Canada's balance sheet from about CAD 125 billion (USD 93 billion) to more than CAD 500 billion (USD 370 billion) over the course of a few months.

Covid-19 changed how central banks communicated their economic projections, as point forecasts were temporarily abandoned. In April 2020, at the height of the pandemic's first wave in Canada, the Bank of Canada's normal quarterly projection was replaced by "illustrative scenarios" covering a range of possible outcomes. In July, the Bank of Canada published a more precise "central scenario" that was conditional on assumptions about the course of the pandemic and still featured a wide band of possible outcomes. To avoid providing false precision, details on the composition of GDP were not included. By October 2020, the Bank had reverted to providing a projection, including details of the contributions of different GDP components to growth.

[3] American economist Frank Knight used the term "risk" to describe situations in which one cannot know the outcome of a given situation but can accurately measure the odds of each possible outcome. He used "uncertainty" to describe situations where so little information is known that it is impossible to calculate odds. See Knight (1921).

With so much uncertainty, extraordinary monetary policy tools were used to shift some of the burden of uncertainty away from markets. For the second time in its history, Canada's central bank began to use exceptional forward guidance on the path of interest rates. The guidance was outcomes-based, promising that "the Governing Council will hold the policy interest rate at the effective lower bound until economic slack is absorbed so that the 2% inflation target is sustainably achieved". The Bank also began providing an estimate of when slack would be absorbed – an estimate that shifted forward as demand recovered and supply chain disruptions curbed the economy's productive capacity. This separation of the commitment (which was outcomes-based) from the estimate of when the condition would be met (which was evolving) allowed the projection to be revised while keeping the commitment intact. However, maintaining a clear distinction in the minds of the public between policy rate commitment and policy path conditional on the forecast proved difficult.

The last three years have taught central banks a great deal about communicating amid uncertainty. These skills will be needed as we move to a future where change is accelerating and uncertainty abounds.

Crises require a different style of communication

Central banks began to focus more on plain language communication to the public prior to the pandemic, but the outbreak accelerated this trend. Just as British Prime Minister Winston Churchill spoke directly and plainly to the citizens of Great Britain during the Blitz of the Second World War, central banks stepped up their use of plain language and reassuring messages during the pandemic. Public communication became more focused, with an emphasis on reminding the public that the central bank would do whatever necessary to support the economy through the long and fitful recovery. Explainers on central bank websites used plain language to talk about the extraordinary operations carried out during the pandemic and their intended effects. Sites such as that of the Bank of England offered readers a message of reassurance up front: "Whatever the future brings we will do all we can to support UK businesses and households at this difficult time."[4]

During the pandemic, central bank governors became prominent explainers of the impact of the pandemic on their economies and how monetary policy was responding. The US Federal Reserve, for example, showed a marked increase in its communications targeted at the public. Between the beginning of April 2020 and December 2021, Fed Chair Jerome Powell delivered 13 public speeches about Covid-19 and the economy targeted at broad public audiences, including speaking at several "Fed Listens" events on how the pandemic was affecting communities. In October 2021, Bank of Canada Governor Macklem (a co-author of this chapter) reaffirmed the central bank's commitment to controlling inflation in the plainest terms: "It is our job to bring inflation back to target, and I can assure you we will do that."

Clear and focused communications also serve to link monetary policy actions to monetary policy objectives at a time when that link is less clear. The pandemic prompted governments to spend massively (and issue debt in order to do so) while, at the same time, central banks were buying unprecedented amounts of debt as part of their QE programmes. This opened central banks up to the accusation that they were funding government spending and putting aside their mandated objectives.

[4] Bank of England, "Our response to coronavirus (Covid)", www.bankofengland.co.uk/coronavirus.

Thus, clearly explaining how monetary policy actions contribute to the achievement of central bank mandates became even more important.

Finally, it is important to have a clear exit strategy during crisis times. This includes explaining the motivation behind extraordinary measures taken and the circumstances under which these measures will wind down. For example, in January 2022, the Bank of Canada gave notice that it would remove its extraordinary forward guidance on the policy rate: "While Covid-19 continues to affect economic activity unevenly across sectors, the Governing Council judges that overall slack in the economy is absorbed, thus satisfying the condition outlined in the Bank's forward guidance on its policy interest rate. The Governing Council therefore decided to end its extraordinary commitment to hold its policy rate at the effective lower bound. Looking ahead, the Governing Council expects interest rates will need to increase, with the timing and pace of those increases guided by the Bank's commitment to achieving the 2% inflation target."

The public has higher expectations and wants more information

As described above, public expectations of institutions have increased. Long gone are the days when central banks and other public institutions worked in relative obscurity. Over the past 20 years, there has been a convergence of central bank communication initiatives. Virtually all central banks now make clear their monetary policy framework and objectives and provide explanations of their policy decisions. Most also regularly publish their analysis and projections of economic conditions, including the outlook for output and inflation as well as the risks to that outlook. The main differences in communication strategy concern how much information is revealed about differences of opinion among decision makers on monetary policy councils and how much explicit or implicit guidance is given on the future stance of policy.

The challenge for central banks lies in crafting messages that communicate as clearly as possible to a variety of audiences. Members of the public, understandably, pay attention to broad issues that affect their day-to-day decision-making, eg inflation, the cost of borrowing, the external value of the currency and the cost of their mortgage. Financial markets, on the other hand, are highly sensitive to the nuances of central banks' words and actions. Markets constantly dissect central bank talk for clues and shades of meaning about where monetary policy may be heading.

Traditional news media serve as both an audience and a communication channel that is declining in direct reach but is still important in determining the success of central bank communications. Most central banks still rely on traditional media to get their key messages out to the public, even as direct communication through social media channels becomes more prevalent. The media also act as a filter, deciding which central bank statements they will feature. Part of their job, too, is to interpret policy.

In speaking to the public, central banks have focused on simplifying their messages. To achieve this, many central banks, including the Bank of Canada, use tools to measure the use of plain language and eliminate economic jargon from public-facing communications products. Layered communications – adding plain-language synopses of inflation reports and speeches – are also helpful.

Part of enhancing a central bank's credibility is making the institution not just understandable, but also relatable to the people it serves. Central banks do this by talking about what concerns citizens most – the high cost of living, the cost of rent and groceries, and the interest rate on their mortgage. In 2022, the Bank of Canada publicly estimated that a rate of inflation three percentage points above the target costs the average Canadian an additional CAD 2,000 a year. Public speeches by the Governor and other members of the Bank's monetary policy-setting council regularly include messages of empathy to show Canadians that the Bank's leaders understand the impact of inflation and higher interest rates on their daily lives.

Increasing the central bank's public profile adds another important job requirement for its Governor. The emphasis on the role of chief spokesperson and public face of the Bank means that the Governor must be a skilled communicator and open and responsive to public scrutiny.

The International Monetary Fund (IMF) has initiated a new programme to conduct reviews of central bank transparency using its Central Bank Transparency Code, in which the central banks of Chile, Uruguay and Canada have participated. In its review of the Bank of Canada, the IMF concluded that the Bank "…sets a high benchmark for transparency" and recommended that the Bank could further improve its transparency by providing more information on its monetary policy deliberations. In response to the IMF review and internal discussions, the Bank of Canada publicly committed to providing a summary of its policy deliberations beginning in January 2023. These summaries of deliberations are published two weeks after each policy interest rate decision and supplement the information provided in the policy decision press release and other monetary policy communication materials.

Central banks need to reach audiences where they want to receive information

In the last two decades, two important things have changed for central bank communications teams – their understanding of their diverse and distinct audiences, and the tools at their disposal to reach those audiences.

According to Andy Haldane, a former Chief Economist at the Bank of England, central banks for too long focused on audiences that were almost exclusively "M.E.N." – markets, economists and news organisations (Haldane (2017)). Central bank audiences range from highly sophisticated bank watchers and market participants to those with little to no interest in economic matters. Among the public, there are distinct audience segments whose interests, engagement and means of obtaining information can vary greatly. The Bank of Canada, like other central banks, has devoted considerable effort to understanding its different audiences and the best way to reach them.

In 2018, the Bank of Canada's Communications Department introduced an annual public opinion and audience research programme. This aimed to assess the public's awareness and knowledge of the Bank, attitudes toward the Bank and views on the economy. Among the insights gained was the finding that knowledge of the Bank, and economic literacy more broadly, play a key role in influencing opinions about the Bank itself. Results indicated that the higher an individual's economic literacy, the more likely that person is to have greater awareness of and trust in the

Bank of Canada. This public opinion research is supplemented by work to segment and target different audiences.

Central banks have typically engaged with the media, maintained their own detailed websites and used social media platforms to communicate their messages to the public. However, reliance on traditional channels to reach audiences is no longer sufficient. Central banks need to customise messages to the social media channels where different segments of their target audiences get their news. At the Bank of Canada, a new social media strategy will see the Bank expand beyond its traditional use of Twitter and LinkedIn and create more bespoke content for these and other social media channels. While this content is customised to the channel for which it is produced, it is all based on a core set of key messages about the Bank and its policies.

Central banks are increasingly following the advice of research showing that more visual communication can boost people's comprehension of central banks' messages. Animated explainers and short videos deployed across social media channels are increasingly effective tools for conveying central bank messages. These tools, which have been used for years by central banks to promote banknotes and financial literacy initiatives, are increasingly being deployed to communicate monetary policy and economic analysis and to support economic education objectives.

While the Governor remains the principal spokesperson for the central bank, new social media channels allow for more opportunity to use different spokespeople. The European Central Bank frequently showcases its young economists on its Instagram channel. The banks of the Federal Reserve System in the United States use similar techniques and different voices on their social media channels. All these initiatives recognise the fact that citizens relate to individuals, not to institutions.

Central Banks need to be better listeners

Over the past two decades, central banks have become more alive to the reality that economic shocks affect different groups of society differently. A key to enhancing trust during periods of uncertainty is listening – engaging the public in conversations. This is particularly key when monetary policies are directly affecting people's lives, such as when inflation is above target and interest rates are rising.

Central banks have been moving toward more direct, two-way public engagement. The "Fed Listens" [5] programme, as well as the Bank of England's citizens' panels and community forums, [6] are inspiring examples of such engagement. Around the world, central banks are using museums, social media, podcasts and even reggae songs[7] to tell their stories to their citizens and to invite conversations with the people they serve.

[5] See Board of Governors of the Federal Reserve System, "Fed Listens", www.federalreserve.gov/fedlistens.htm.

[6] See Bank of England, "Citizens' Forum", www.bankofengland.co.uk/about/get-involved/citizens-panels.

[7] See Bank of Jamaica, "Inflation targeting communication campaign", https://boj.org.jm/core-functions/monetary-policy/what-is-inflation/inflation-targeting-campaign/.

The pandemic precluded public forums, bank museum visits, in-person speeches and other events where these conversations can happen. The Bank of Canada, like others, had to be nimble with technology in order to engage stakeholders and the public. It held an online public consultation called "Let's Talk Inflation" before the Bank renewed its agreement with the Canadian government on the monetary policy framework in 2021.

Recently, the Bank of Canada has expanded its stakeholder engagement programme, reaching out to groups of society that have not traditionally been targets for outreach. This includes Indigenous peoples. The Bank of Canada, along with the Reserve Bank of New Zealand, the Reserve Bank of Australia and some of the US Federal Reserve banks, has founded a Central Bank Network for Indigenous Inclusion to advance efforts to promote economic reconciliation with indigenous peoples in their respective countries.[8] The Bank of Canada has also increased its outreach to civil society organisations, labour and charitable groups, climate change stakeholders, and financial technology and other innovation communities.

Central banks continue to seek out ways to better understand what is preoccupying the public, including the perspectives of communities and groups they have not traditionally been very good at reaching. Addressing the preoccupations of those communities and groups is important. As we face new policy challenges such as climate change, central bank digital currencies and new supervisory responsibilities, central banks will increasingly need to deepen their stakeholder engagement activities.

This will require a better ability to measure the impact of central bank communications and engagement. This is difficult for several reasons:

- The public is a vastly broad audience with varying degrees of knowledge of, interest in and engagement with economics and central banking.
- Some communications goals – such as building trust – take a significant amount of time.
- Results from communications efforts are often intangible and difficult to measure.
- Many communications outcomes are influenced by broader social factors that are beyond a central bank's control.

The Bank of Canada's Communications Department has developed a sophisticated framework for quantifying and qualifying the Bank's communications efforts and their results. Using data-based measurement and evaluation, the department assesses the impact and effectiveness of the Bank's communications activities and gauges their contribution to the Bank's overall goals.

[8] See Bank of Canada, Central Bank Network for Indigenous Inclusion memorandum of understanding, www.bankofcanada.ca/wp-content/uploads/2021/04/memorandum-understanding.pdf and Reserve Bank of New Zealand, "Central Bank Network for Indigenous Inclusion", www.rbnz.govt.nz/regulation-and-supervision/cross-sector-oversight/our-relationship-with-other-financial-regulators/central-bank-network-for-indigenous-inclusion.

Conclusion: Using all we have learned

Central banks have learned a great deal about transparency and communication over the past 20 years. During that time, central banks' relationships with the public have changed. Central banks have moved beyond just being transparent with markets to more active, relatable engagement with the people they serve.

This matters for several reasons. First, the public has a right to understand what their central banks are doing. Indeed, as central bankers we need to be accountable for our actions. Second, monetary policy works better when people understand it. Third, it is more essential than ever that household inflation expectations remain anchored to our inflation targets, so that low and sustainable inflation can be restored. A final, more existential reason is that without public understanding and support for independent central banks, we risk losing the public trust that is so core to our mission.

Finding the appropriate balance between relatability and the traditional gravitas of central banks is both difficult and important to maintaining public trust. Too complex a message could be missed or ignored by the public; too simple a message could undermine credibility with markets and bank watchers and, ultimately, the general public. There will always be a trade-off between telling a simple but incomplete story and overwhelming the narrative with nuance and precision. As new social media channels rise and older communications media decline, central banks must be nimble in their efforts to reach and engage audiences.

Good communication improves central banks' capacity to make better policy decisions and enhances their legitimacy as public institutions. This will become even more critical in the future as we tackle the global forces ahead. The failure to adequately share the benefits of economic growth is fuelling populism and prompting countries to turn inward, unwinding the benefits of decades of open markets and increased trade. Rising geopolitical tensions have underscored the fragility of some relationships, among both businesses and nations. Global supply chains are becoming more resilient but less efficient, increasing the cost of production. As globalisation retreats and workforces age, wage growth is rising and productivity growth is trending down. All of this suggests that, over the long term, the disinflationary forces of the last three decades may diminish. All of these factors are likely to make the conduct of monetary policy more challenging in the years ahead.

Central bank performance will always be judged by results and economic outcomes. But we improve the likelihood of better outcomes by clearly communicating our monetary policy, helping our citizens understand the broader forces at work in our economy, and listening and understanding how our policies affect everyone. These efforts will help us make better policy decisions, reinforce our legitimacy and cement trust with our citizens. At the end of the day, that is what central banking is all about – trust in the value of money, trust in our financial institutions and trust in our economic system.

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Monetary policy in Chile: combining theory, evidence and experience[1]

Rosanna Costa

Abstract

This chapter provides an overview of the experience of the Central Bank of Chile (CBC) over the last 20 years. It describes the main elements of its current policy framework, and the reasoning behind them. It also discusses Chile's coordinated policy responses to the pandemic and the challenges to the CBC posed by the current upsurge in inflation. The experience of recent decades yields three key lessons: the need for flexibility and innovation in a changing and uncertain environment; the importance of coordination and the role of complementarities between monetary policy and other components of the macroeconomic environment; and the key role of transparency and communication in the anchoring of inflation expectations.

Introduction

This chapter presents a brief description of some features of and lessons derived from the experience of the Central Bank of Chile (CBC) over the last 20 years, as well as the design and rationale behind its current policy framework. It also provides insights into the policy responses to the events of recent years and the current upsurge in inflation.

Section 2 provides some context of Chile's inflationary history over the last century and describes how the last 20 years were, for the most part, a period of exceptional macroeconomic stability. Section 3 presents a description of the institutional arrangements governing the CBC during the last two decades, as well as the main characteristics and reasoning behind its policy framework. Section 4 discusses the challenges experienced by the CBC in the last three years, beginning with the social crisis in October 2019, following with the Covid crisis, and ending with current efforts to return inflation to its target over the next two years. Section 5 discusses some lessons for the future.

For the sake of brevity, this chapter gives special attention to the behaviour of inflation and the CBC's mandate for price stability. Therefore, other important topics that are an explicit part of the CBC's current research agenda are not discussed here. One of these topics is the development of new technologies in the financial sector, reflected in the growing importance of fintech and the evolution of digital means of payment. The importance given by the CBC to these issues has been reflected in its contribution to the discussion of the Financial Innovation Bill, as well as in the recent creation of a high-level working group within the CBC, tasked with generating a medium-term strategy on digital means of payment in the country and studying the potential development of a digital currency issued by the CBC.

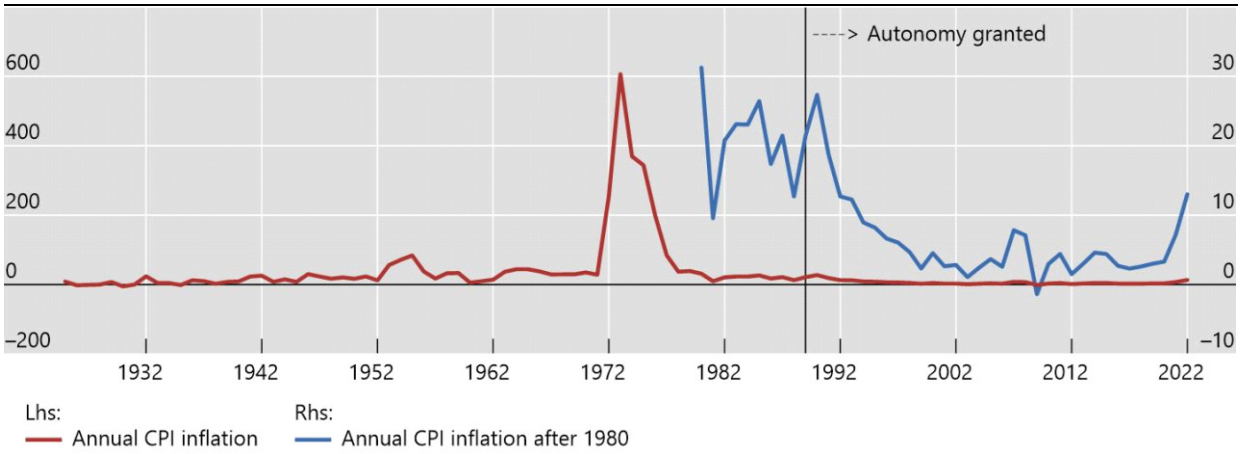
[1] I thank Matías Tapia for his valuable collaboration and discussion on the drafting of this chapter.

An overview of Chile's history of inflation[2]

During most of the 20th century, Chile frequently experienced periods of high and volatile inflation. In fact, the average annual inflation between 1925 (the year the CBC was created) and 2000 was 43%, with a standard deviation of 93%. The inflationary problem became increasingly acute starting in the 1950s, reaching an all-time peak in the first half of the 1970s. At the time, annual inflation averaged almost 300%, and reached a whopping 600% in 1973 (Graph 1).[3] From the second half of the 1970s onwards, inflation persisted, although at more moderate levels. Inflation started to abate systematically during the 1990s, reaching 3% by the end of the century and remaining low for the next 20 years. Despite the recent spike in inflation in 2021–22, associated with the aftermath of the pandemic and its macroeconomic implications both domestically and abroad, the last 20 years have been a period of low and stable inflation, an anomaly in the broader context of the country's historical record.

CPI inflation, 1925 - 2022

Year on year changes, in per cent — Graph 1



Sources: EH-Cliolab; National Statistics Institute.

As in many countries, the dynamics of inflation up until the mid-1970s were largely explained by the dominance of fiscal needs over monetary policy and the intensive use of money issuance as a source of fiscal financing. Following the mid-1970s, fiscal pressures on monetary policy were mostly absent due to an effort to achieve fiscal balance throughout most of the period, but inflation remained moderately high. The persistence of inflation for almost 15 years can be explained by several forces. One factor was a high degree of inertia, reflected in the widespread use of automatic indexation mechanisms set up as a defence against inflation. Also, with the exception of the 1979–82 fixed exchange rate period that ended in a severe financial crisis, monetary policy lacked a clear nominal anchor for inflation expectations. This problem was especially severe given the country's inflationary history and the associated lack of credibility in the conduct of monetary policy.

[2] For a more detailed discussion of the history of inflation in Chile, see Central Bank of Chile (2020b), as well as the references therein.

[3] As discussed below, although the inflation peak coincided with the first oil crisis, it largely reflected the state of domestic macroeconomic policies at the time, with an extremely large fiscal deficit throughout the first years of the decade.

The legal autonomy conferred to the CBC in 1989 laid the institutional foundation for a framework that, over the last 30 years, has allowed for independent monetary policy aimed at price stability, isolated from the risk of fiscal dominance. A process of gradual but consistent inflation reduction began in 1990 with the publication of inflation forecasts. Over time, and as they were validated by actual inflation, these evolved into a partial inflation targeting regime with annually decreasing targets. This conservative approach to disinflation reflected concerns over the potential real costs of faster inflation reduction in an economy with high inflationary inertia, as well as the CBC's need to build up credibility in order to anchor expectations. Through this process, inflation fell steadily during the 1990s from 27% to 3%, the long-term inflation target. Full-fledged inflation targeting was formally adopted in 2000, with a permanent target of 3% over a two-year horizon and the establishment of a floating exchange rate regime.[4] From the fiscal side, this policy framework is complemented by an acyclical fiscal policy rule. This implies that monetary policy plays the countercyclical role within the institutional macroeconomic framework, as discussed in further detail below.

Convergence to a low level of inflation and the anchoring of inflation expectations was aided by the growth and deepening of the local financial market and a balanced fiscal policy, leading to the adoption of a fiscal rule in 2001. Even in an institutional framework which prevents fiscal dominance over monetary policy decisions, an unbalanced fiscal path would have made inflation control and credibility very difficult due to its effects on aggregate demand, financial markets and agents' expectations.

Under the inflation targeting scheme, and prior to the recent upsurge in inflation which we discuss in more detail in Section 3, average annual inflation between 2000 and 2020 was 3.2%, with a standard deviation of 1.9%. In addition, two-year inflation expectations remained anchored to the 3% target throughout almost the entire period. In the light of the historical experience of decades of high and volatile inflation, attaining stability has been an important achievement of Chile's macroeconomic institutional framework, associated not only with monetary institutions but also with the operational framework of fiscal policy, and it has had a significant impact on households' welfare.

Moreover, this period of macroeconomic stability has also been a period of high economic growth in the context of Chilean history, with consistent and significant improvements in most socioeconomic indicators. Since 1990, average GDP growth has been 4.5%, with the period of initial disinflation in the 1990s coinciding with Chile's "golden decade" of economic growth. Additionally, the institutional macroeconomic framework has significantly enhanced the Chilean economy's capacity to face adverse cyclical conditions, as seen in the relatively dampened impact of the 2008–09 global financial crisis, the ability to accommodate the end of commodity boom in 2013–14 and the rapid recovery from the Covid shock in 2020. In the past, comparable events had severe and lasting negative consequences for the financial system, the balance of payments and real activity, yet over the last two decades, factors such as exchange rate flexibility, monetary and fiscal policy credibility, the use of countercyclical macro policies, and the robustness of the banking sector have greatly enhanced the resilience of the economy.

[4] Until 2020, the target also considered an explicit 2–4% range for inflation. Although, as discussed below, the 2–4% range can still provide a reference, keeping inflation within that range at all times is no longer an explicit goal.

The Central Bank of Chile's policy framework[5]

a) Legal and institutional framework

In 1989 the Central Bank of Chile became an autonomous institution of constitutional rank, mandated to guarantee the stability of the currency and the normal functioning of internal and external payments. Its autonomy is reinforced by the constitutional prohibition of acquiring securities issued by the state or public agencies or companies and financing public expenditures or loans with direct or indirect credits, therefore eliminating the risk of fiscal dominance. To attain its objectives, the CBC has been granted the management of monetary and exchange rate policy instruments, as well as some aspects of the macroprudential regulation of financial and capital markets in order to attain financial stability. With full autonomy in policy management and decision-making, the CBC communicates its actions to the President of the Republic and the Senate.

In practice, the mandate of currency stability implies keeping inflation low, stable and predictable over time. Meanwhile, the normal functioning of the payments system implies working to guarantee financial stability, preserving financial markets' primary functions of credit intermediation, the provision of payment services and risk allocation.

This institutional framework is completed by a fiscal rule aimed at developing credible fiscal policy; a regulatory and supervisory structure that promotes the stability, efficiency and solvency of the financial system; and a large degree of trade and financial integration with the rest of the world.

As discussed earlier and shown throughout history, the success of monetary policy relies on the strength of the other components of the policy framework. Price stability cannot be achieved in a context of unsustainable fiscal policy, and high and volatile inflation severely harms fiscal management. More generally, coordination can enhance the effectiveness of both fiscal and monetary policy. Monetary and fiscal coordination is generated through various mechanisms. Institutionally, the CBC is mandated to "bear in mind the general orientation of the Government's economic policy", and the minister of finance can participate in Board meetings. In practice, regular coordination between institutions takes place all the time. Coordination is naturally facilitated by the existence of the fiscal rule and the inflation target.

b) Monetary policy and inflation targeting

Given the large costs imposed by inflation and the direct relationship it has with monetary policy, theory, evidence and experience have shown that the greatest contribution central banks can make to society is to ensure low, stable inflation. To attain this objective, since 1999 the CBC has adopted an inflation targeting regime with exchange rate flexibility. The inflation target is the operational implementation of the price stability objective and states that projected inflation at a two-year horizon must always be at 3%. The commitment to inflation convergence at a two-year horizon provides guidance for agents' expectations, making it the nominal anchor of the economy.

[5] For a thorough discussion of the Central Bank's policy framework, see Central Bank of Chile (2020a).

While the primary objective of monetary policy is always price stability, the relationship between the output gap and medium-term inflation directly connects inflation stabilisation to output stabilisation in the presence of shocks which move output and inflation in the same direction. For this reason, under most circumstances monetary policy naturally plays a countercyclical role, helping to reduce both inflation and output volatility. This countercyclical role can be especially important in a small, open economy like Chile's, as it facilitates the adjustment of relative prices to different types of shock. More generally, the ability to conduct countercyclical policy rests critically on the credibility of the inflation target. In the face of shocks that move inflation and output in opposite directions, the space for countercyclical policy only exists if inflation expectations remain anchored, guaranteeing the primary inflation objective. As we discuss below, this enhances the importance of credibility and communication in managing expectations.

The inflation targeting regime is defined by three main parameters: (i) the price index associated with the target; (ii) the target level of inflation; and (iii) the policy horizon. The choice of these parameters was guided by analytical insights from the academic literature, international evidence and the policy lessons learned in previous decades.

The inflation target is set as the annual change in the consumer price index (CPI), as estimated by the National Statistics Institute (INE). The CPI is the country's most used price index, including its application as a benchmark unit for the revision of prices, wages and financial contracts, as well as for the calculation of the so-called *unidad de fomento* (UF), a nominal daily unit indexed to the CPI of the previous month. The choice of the CPI as the target, instead of some core inflation indicator that can provide a better measure of medium-term inflationary pressures, comes from its advantages in terms of representativeness and reliability, and the fact that it provides a measure of the cost of the relevant consumption basket of households. These advantages facilitate communication and more than offset the disadvantage of short-term volatility.

As mentioned, the inflation target level is set at 3% annually. The choice of this level is informed by several considerations. On the one hand, a target above 3% can be seen as less consistent with the concept of price stability, and can cause distortions in relative prices and exacerbate volatility. This can generate inflationary costs that have a negative effect on growth and welfare. On the other hand, a lower level of inflation can also be costly. First, in the presence of downward price rigidities, a positive rate of inflation can facilitate the adjustment of relative prices in the event of an adverse shock, minimising the impact on output and prices. Second, CPI inflation is likely to overestimate actual consumer inflation due to advances in product qualities and substitution effects in the presence of relative price changes. Third, the zero lower bound on nominal interest rates reduces the degree of freedom for monetary policy when inflation is near or below 0%. In the face of an adverse shock on activity and inflation, if nominal rates are near 0% and deflation is expected, the implicit positive real interest rates may put further strain on activity and employment. Targeting inflation away from 0% reduces the risk of falling into that scenario.

Defining the target over a longer horizon, instead of an annual end-of-year target as during the 1990s, is crucial to the design of the monetary policy framework. The choice of the two-year horizon as the maximum period over which the CBC drives expected inflation to 3% reflects both the theoretical insights of the academic literature and the practical considerations and lessons derived from the actual conduct of monetary policy over the last three decades. A first consideration comes

from the empirical analysis of the effects of monetary policy on output and prices, which can occur with a lag of up to two years. A second consideration is that, conceptually, monetary policy should not respond to temporary fluctuations in inflation, which can be generated by idiosyncratic shocks to particular CPI components and which do not threaten the relevant definition of aggregate price stability associated with the CBC's mandate. Third, and as a consequence of the previous two arguments, targeting inflation at shorter horizons can lead to excessive volatility of interest rates, activity and employment, without additional gains in terms of the benefits of price stabilisation.

More generally, the optimal convergence horizon of inflation will depend on the shock, and in many cases will be less than two years. The two-year horizon represents the longest tolerable period, and provides a clear and effective nominal anchor. Persistent deviations from 3% over the two-year horizon are not tolerable, as they can affect expectations and the credibility of the target, increasing inflationary persistence and the potential costs of disinflation.

This does not imply that inflation at shorter horizons is irrelevant. Current inflation and the inflation outlook at other horizons are also crucial inputs for monetary policy decisions. Indeed, they provide insights on the expected trajectory of monetary policy to attain inflation convergence, and can affect inflation expectations.

Given the shocks typically faced by the Chilean economy over the business cycle, experience has shown that the two-year target implies that inflation should fluctuate most of the time between 2% and 4%. This reflects the tolerance to transitory deviations of inflation from the 3% target, which are inevitable given the exposure to shocks and the arguments about the inconvenience of targeting 3% at every point in time. Greater deviations outside this range will occur occasionally, as seen over the last 20 years, and in principle are not problematic unless they threaten the convergence of inflation to 3% within the two-year horizon.

c) Exchange rate policy

Like many other open economies, Chile has a floating exchange rate regime, which was introduced in 1999. This regime has several advantages, and its adoption came as a result of the lessons derived from the experience of the 1998–99 Asian crisis. At the time, inflation targeting coexisted with an exchange rate band that defined a second policy objective. Tensions between both objectives became problematic due to a few different factors.

First, in a context of financial integration, exchange rate flexibility has allowed for independent monetary policy, which has given more room for inflation and output stabilisation in the face of external shocks. This was important, for example, during the significant drop in commodity prices in 2014–15. During that episode, unlike many other central banks, the CBC was able to adopt a countercyclical monetary policy stance, even in the face of a significant depreciation of the peso. As discussed earlier, the credibility of the inflation target played a key role, reducing the pass-through from the exchange rate to inflation and allowing for a faster recovery of output without affecting price stability.

Second, in the face of price and wage rigidities, exchange rate flexibility facilitates the adjustment of relative prices to real shocks, preventing persistent real exchange rate misalignments that can lead to larger adjustment costs in the future. Third,

having a sole inflationary objective, instead of dual inflation and exchange rate goals, reduces the risk of conflict between both targets, as experienced in 1998–99. The policy lesson in the aftermath of that event was that having dual goals with one policy instrument (the monetary policy rate) was not optimal, and that the economy could better brace itself against adverse shocks without a commitment to an exchange rate goal.

Although a floating exchange rate regime will typically lead to greater exchange rate volatility, this need not be harmful as long as the local financial market is developed enough to be able to provide adequate hedging instruments to agents. A further condition is that monetary policy and inflation stabilisation must be credible, as has been the case in Chile in the last two decades.

The adoption of exchange rate flexibility does not imply that the CBC refrains from participating in the market under all circumstances. Since 1999, the CBC has explicitly stated that it can intervene in the market in exceptional occasions, when the health and stability of financial markets may be at risk. This can occur, for example, when large exchange rate fluctuations or excess volatility generate large degrees of uncertainty or muddle the correct interpretation of relative price signals. In that sense, exchange rate interventions are themselves exceptional events whose design and interpretation depend on the nature of the shock that generates them. Interventions are not aimed at sustaining a particular exchange rate level, but rather at facilitating the economy's adjustment in the face of particular circumstances in which an unusually large degree of exchange rate market instability can hinder the operation of the financial market and the price formation process. The CBC has also participated in the market in situations in which market conditions were convenient for the accumulation of international reserves.

Since 1999, the CBC has intervened in the foreign exchange market seven times. All of these interventions have been sterilised in order to isolate the stance of monetary policy in the intervention. This is consistent with the notion that, in the presence of exchange rate misalignments, sterilised interventions can affect the exchange rate, especially in terms of reducing short-term volatility. Three of the intervention episodes were associated with currency purchases to accumulate reserves. The remaining four were carried out to provide liquidity, either through direct currency sales or dollar-denominated instruments, in situations in which the foreign exchange market exhibited relevant levels of stress that could endanger the correct operation of financial markets and the price formation process. The two most recent episodes, in November 2019 and July 2022, are discussed in more detail in Section 3.

d) Financial policy

The financial sector is a key player in the economy, both in the short and the long term. Its importance derives from the multiple functions it performs, such as provision of liquidity, mobilisation and allocation of savings for productive use, risk management, simplification of the payment system and information production. These functions contribute to the economy's long-term growth and development, as well as to its ability to buffer short-term shocks. However, in some contexts, the financial sector can be a source of instability, which can be associated with significant macroeconomic costs as well as amplifying internal or external imbalances.

The CBC shares legal responsibilities with financial sector supervisors, including, among others, the Financial Market Commission (CMF) and the Superintendence of

Pensions. The CBC's concern is preferably system-wide, and its analysis is carried out from a macro-financial perspective. In order to limit risks that threaten the continuity of internal and external payments and to react in a timely and effective manner to adverse events, the CBC is equipped with various legal powers, regulatory attributions and policy tools. Some of the CBC's powers are shared with other authorities, in particular the CMF, which in turn has a broad mandate and regulatory and sanctioning powers over much of the financial system.

Therefore, the stability of the financial sector is itself a fundamental objective of the CBC as part of its mandate, for which it has instruments such as the provision of liquidity in times of need as the lender of last resort. Moreover, financial stability interacts directly with price stability and the objective of keeping inflation low and stable. A fragile financial system hinders the implementation of monetary policy because the transmission and effectiveness of monetary policy requires a correctly functioning financial system. Likewise, episodes of financial stress can have significant and lasting effects on prices through various mechanisms. Meanwhile, macroeconomic imbalances reflected in high and volatile inflation inhibit the development and stability of the financial system. Therefore, controlling inflation requires a stable and well-functioning financial system, and a healthy financial sector requires price stability.

Despite the interaction between price stability and financial stability objectives, both goals are typically addressed using different instruments. This is due to the fundamental difference between price stability, an aggregate objective, and financial stability, which is more directly associated with the functioning of a specific sector in the economy. Thus, the instrument associated with price stability is the monetary policy rate, a macroeconomic instrument with aggregate effects, while financial stability is addressed through more specific prudential instruments. At the same time, coordination between monetary policy and financial policy poses challenges. These are bigger in normal times and require monitoring, model development and analysis, and, ultimately, expert judgment in order to estimate the origin, phase and prospects of the credit cycle. In recent years, the implementation of a Countercyclical Capital Buffer Requirement (CCyB) has provided the CBC with a new financial policy instrument.

In exceptional situations of financial stress, however, the distinction between monetary and financial policy blurs, and the appropriate mitigation tools depend on the nature of the shock. One lesson from the Great Financial Crisis is that central banks can play a crucial role in ensuring the liquidity and functioning of financial markets by supporting careful deleveraging. This can help to avoid massive bankruptcies of institutions and a violent credit crunch that can cause lasting damage to the real economy.

e) Transparency and the role of communication

For many years, opacity and secrecy were seen as desirable features of the monetary policy framework. However, the last three decades have seen a dramatic shift in this view, with a virtual consensus on the advantages of transparency and information provision. In the particular case of inflation targeting, communication plays a central role given the importance of anchoring inflation expectations to the target.

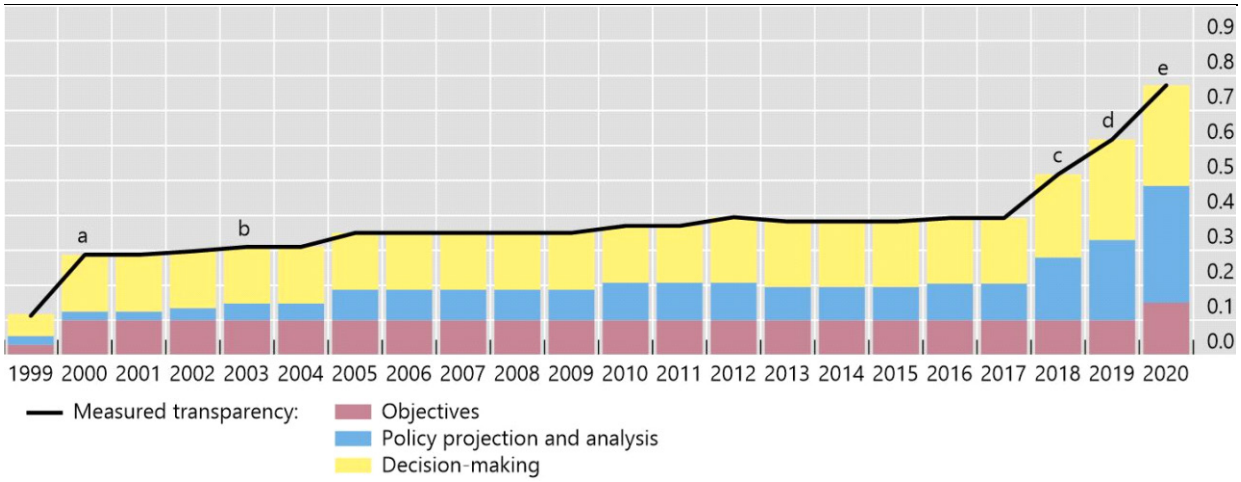
As a result, over the last two decades the Central Bank of Chile has acknowledged the key role of inflation expectations by assigning a central role to communication and transparency. Communication policies can explain the rationale behind monetary

policy decisions aimed at meeting the inflation target, thereby providing valuable information for the formation of inflation expectations. In that sense, providing clear, coherent information on inflation forecasts, policy responses and the convergence path to the target within the two-year horizon is essential to the credibility of monetary policy and the attainment of price stability. Transparency also provides accountability over the CBC's actions and the fulfilment of its mandate.

The Central Bank of Chile uses multiple communication instruments, such as monetary policy meeting statements and minutes, the Monetary Policy Report and related presentations, and reports explaining its analysis and projection. The movement towards greater transparency in monetary policy over the last two decades in Chile is shown in Graph 2, which presents an index of the evolution of the CBC's transparency. The index considers three dimensions: transparency about monetary policy objectives, the forecasting and policy analysis system that supports decisions, and the monetary policymaking process. As can be seen in the graph, the publication of the first Monetary Policy Report and the formal adoption of inflation targeting constituted the first significant change, further enhanced in later years by actions such as the publication of the MEP projection model in 2003. Transparency has increased in all three dimensions in recent years. Communication of the monetary policy decision-making process was improved, and the CBC's operation was assessed by an external evaluation committee. Transparency in objectives was increased through the publication of an updated version of the Monetary Policy Framework document, which was complemented with a new document discussing the financial policy framework. In addition, communication of the forecasting and analysis system was significantly enhanced by publication of the book on the CBC's macroeconomic models and projections, including computational codes to allow for replication, as well as the presentation of an explicit corridor for the expected future monetary policy path as part of the Inflation Report.

A transparency index for the Central Bank of Chile

Index — Graph 2



[a] 2000: Publication of first MP report and MP framework. [b] 2003: Publication of MEP model and the Policy Projection and analysis System. [c] 2018: Updated MP decision-making process and External Evaluation committee. [d] 2019: Publication of updated MP framework whit greater emphasis on financial stability. [e] 2020: Publication of policy and forecasting models book published (including codes for main models) and MPR path corridor.

Source: Fornero et al (2021).

Recent developments and challenges

a) Social crisis and Covid

After three decades of almost uninterrupted macroeconomic stability, over the last three years the Chilean economy has experienced an unexpected and ex ante very unlikely combination of shocks. This sequence of low-probability events, separated only by a few months, has posed policy challenges and dilemmas that had not arisen in several decades.

In October 2019, intense and prolonged episodes of social unrest, in many ways unlike anything else experienced in more than 30 years, abruptly increased uncertainty and caused stress in financial markets, leading to a political agreement to change the Constitution as a potential solution to end the crisis.[6] In that context, the CBC intervened in the foreign exchange market for the first time in almost a decade, selling dollars on the spot market and dollar-denominated instruments in futures markets. This was motivated by unusually high levels of volatility in the exchange rate market, which threatened the normal operation of the financial market. The CBC provided liquidity to facilitate the adjustment of the economy to a new environment with greater degrees of institutional uncertainty. While the intervention program was successful in providing liquidity and reducing volatility, the increased underlying uncertainty in the Chilean economy is reflected to this day in the value of the peso, which has depreciated significantly against most currencies since October 2019.

A few months later, the arrival of Covid took Chile, and indeed most of the world, by storm, and led to the adoption of unprecedented measures to curtail the spread of the virus. The government reacted swiftly, imposing severe restrictions on mobility and the operation of non-essential businesses, while workers started to work remotely from home. These measures, though necessary from a public health perspective, froze the operation of entire sectors overnight, bringing the economy to a halt. In consequence, economic activity fell by 15% in annual terms in April 2020. Services sectors were among the most affected, with month-on-month economic downturns of around 25%. Many firms were forced to cease their operations and employment plummeted.

The extreme nature of these events threatened serious and long-lasting damage to firms, workers, the financial system and the overall economy. Therefore, a battery of policy measures was swiftly implemented. This policy package took advantage of the ample fiscal and monetary policy space available thanks to the strength of the macro policy framework described in the previous section, founded on decades of fiscal discipline and hard-won monetary credibility.

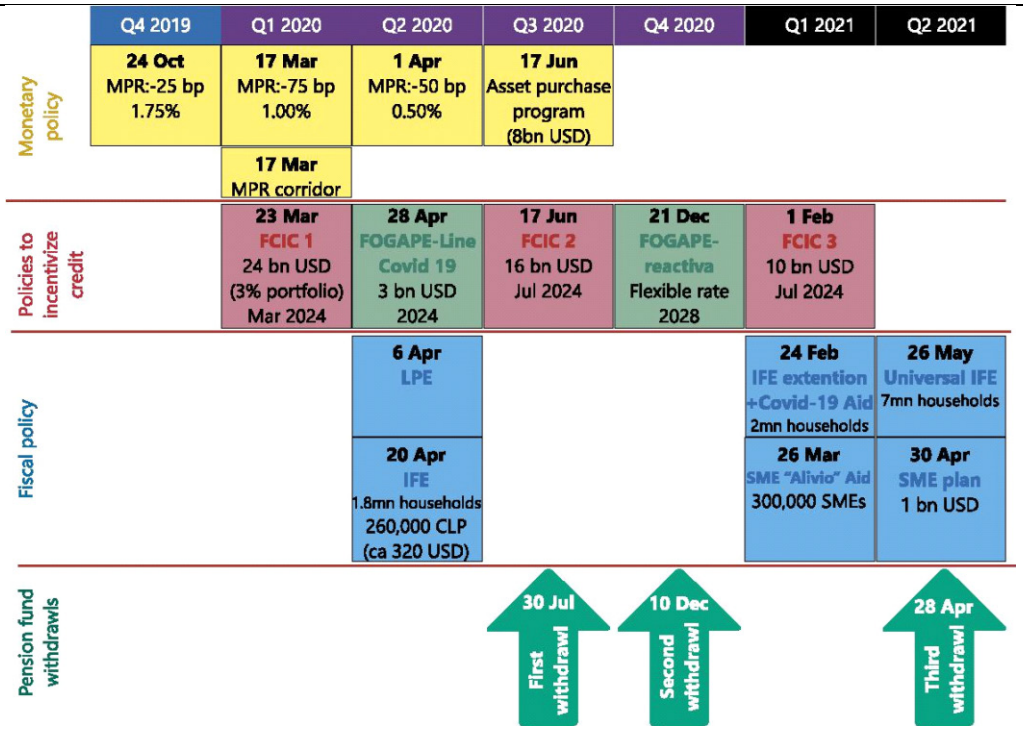
The CBC reacted quickly, both with conventional and unconventional monetary policy tools. Following an extraordinary policy meeting in mid-March 2020, the monetary policy rate was lowered by 75 basis points to 1%, while the scheduled meeting two weeks later brought it further down to 0.5%, the effective lower bound rate for Chile. The policy rate would remain at its minimum feasible level for the next 15 months. Simultaneously, the CBC implemented additional unconventional measures to stimulate credit and provide liquidity to banks and firms. In March, the CBC announced a liquidity facility for commercial banks consisting of a collateralised

[6] A newly drafted constitution was rejected in a referendum in September 2022. The constitutional process will continue in 2023.

fixed credit line of up to 3% of their commercial and retail portfolios and a variable credit line conditional on the provision of loans to firms (FCIC, per the acronym in Spanish).[7] As the pandemic continued, the CBC extended this program twice, lending a total of 37 billion US dollars, about 15% of GDP, to commercial banks. In the context of the crisis and the potential stress it put both on the survival of firms and the health of the financial market, the liquidity provision associated with the FCIC was a key element in the macro policy response and had strong complementarities with the quasi-fiscal measures associated with credit provision discussed below. Coordination between the fiscal and monetary response to Covid-19 was key to the economy's resilience and recovery.

Several fiscal or quasi-fiscal policies were also implemented. Credit provision to liquidity-constrained firms was targeted by two government credit guarantee programs to small and medium-sized firms (FOGAPE Covid in 2020 and FOGAPE Reactiva in early 2021), while an employment protection program (LPE, per the acronym in Spanish) aimed to prevent the widespread destruction of job relationships. LPE allowed firms to freeze labour contracts for a few months while employees could withdraw funds from their unemployment insurance accounts. This provided temporary relief to workers and prevented a massive number of permanent layoffs that could have had lasting consequences for both workers and firms, dampening the strength of recovery when the economy was able to reopen.

Policy responses to the Covid crisis, 2020-21 Graph 3



Source: Central Bank of Chile

Subsequently, massive amounts of liquidity were injected into the economy, directly benefiting households. Some of these actions took place even as most sanitary restrictions were lifted and the operation of the economy headed towards normality, aided by a very rapid and successful vaccination program that further

[7] FCIC stands for *Facilidad de Crédito Condicional al Incremento de las Colocaciones*.

boosted recovery. Liquidity was provided to households through several direct cash transfers by the central government (IFEs, per the acronym in Spanish) and three pension fund withdrawals in July 2020, December 2020 and April 2021. A summary of all macro and financial policies implemented in response to the Covid crisis is presented in Graph 3.

As many of these policy measures took place simultaneously, it is hard to evaluate the specific impact of any of them. However, recent research (Albagli et al (2023)) suggests that the credit guarantee programs (FOGAPE Covid and Reactiva) and the employment protection program (LPE) were highly successful in providing liquidity and relief to ailing firms. Model simulations suggest that without the combined effect of all of the implemented plans, output in 2020 would have fallen 4–7% more (Table 1).[8] Even though all of these policies made important positive contributions to avoiding a further deterioration in output, credit policies in the form of liquidity provision, credit guarantees and regulatory flexibility were the most relevant. For the first time in Chilean history, credit to firms actually increased during a recession (Graph 4). This highlights the importance of unconventional policy measures in the occurrence of extraordinary events and the role of interactions between monetary and financial policy. Moreover, it showed the strength of Chile's macroeconomic policy framework, which was able to take advantage of its reputation and credibility built over the last few decades.

Buffer effect on GDP on measures adopted during COVID-19 crisis

In per cent — Table 1

	2020	2021-first half
Conventional monetary[1]	[0.1-0.8]	[0.6-2.1]
Unconventional credit[2] policies	[2.2-4.8]	[2.7-4.4]
Fiscal policy	0.7	1.7
Total: Fiscal and monetary policy	**[3.1-6.3]**	**[5.0-8.2]**
Pension fund withdrawals	1.2	2.9
Total	**[4.3-7.5]**	**[7.9-11.1]**
Actual GDP	-5.8	8.7
Counterfactual GDP	[-10.1; -13.3]	[0.8; -2.4]

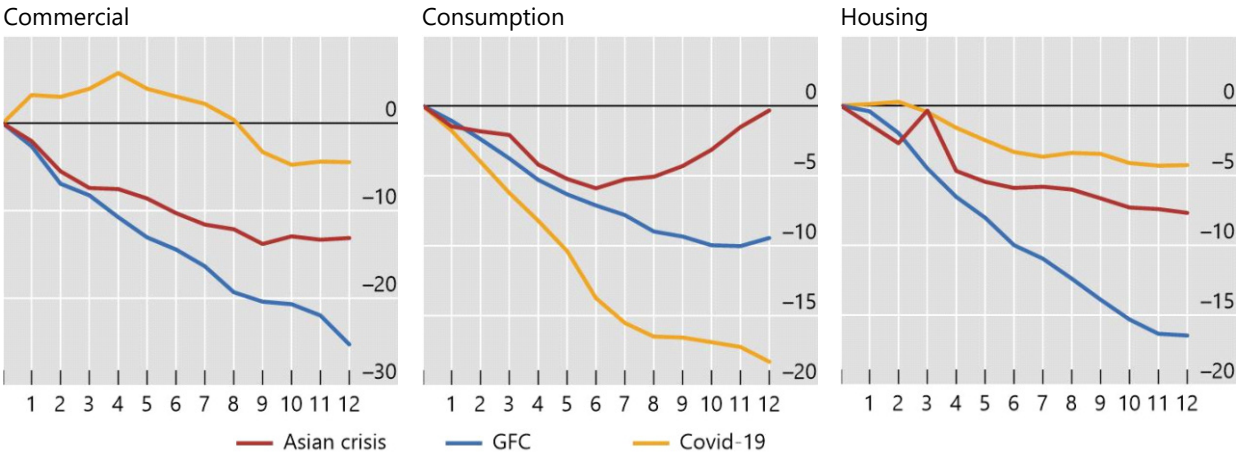
[1] Conventional monetary policy associated with counterfactual of keeping the MPR at 2%. [2] Unconventional credit policies associated with the counterfactual of not implementing the monetary policies as sovereign guarantees that sought to stabilise the financial markets, including the FCIC-FOGAPE program, bond purchase, and liquidity programs in local and foreign currency. Range presented in the two policies is based on two counterfactual exercises: i) where, in the absence of credit policies, the financial shock has been of the same size as that of the 2008-09 financial crisis; and ii) where it had been larger and proportional to the fall of GDP in 2020. Counterfactual GDP subtracts from actual GDP the buffer effects of fiscal and monetary policy and the pension fund withdrawals shown in the upper lines of the table.

Source: Central Bank of Chile.

[8] Notice that this is an illustrative exercise that provides a counterfactual for the behaviour of output in the absence of these policies. It does not include the opportunity costs of these measures, so it is not a cost-benefit analysis. Due to the nature of the model, the analysis also excludes the potential benefit of avoiding a financial crisis, which could have had much larger and persistent effects on real activity and welfare.

Commercial bank loans in recessions[1]

Difference in annual change from period 0, in per cent — Graph 4



[1] Months are in horizontal axis. Period one is the first month with negative Imacec (monthly activity index) for each episode.

Source: Central Bank of Chile.

b) The return of inflation and current challenges

In 2021, as the economy began to reopen and the worst part of the pandemic subsided, fiscal policies and pension fund withdrawals became more important, significantly increasing households' liquidity. The sum of the different sources of household liquidity – regular income plus the resources provided by the state and pension fund withdrawals – came close to 71 billion US dollars between 2020 and 2021, equivalent to 28% of GDP. This led to an unprecedented consumption boom, which drove a record recovery of almost 12% GDP growth in 2021 – one of the highest growth rates in the world.

An unintended consequence of these policies was the abrupt acceleration of inflation, reaching two-digit levels well above the 3% target. This has posed the most urgent and important macroeconomic challenge that the CBC has faced at least since the adoption of inflation targeting in the late 1990s. In August 2022, year-on-year inflation peaked at 14.1%, the highest since 1992, while as of April 2023 year-on-year inflation remains at 10% (Graph 5). The return of inflation, and its adverse effects on welfare, have brought a bitter new experience for many younger Chileans, and a reminder of the country's past for older generations.

While some of this inflation is explained by global factors associated with increases in commodity prices and supply chain disruptions during the pandemic, local demand forces associated with the large liquidity shock in 2020–21 have been the main drivers. This is consistent with the notion that inflation in Chile accelerated more than in comparable economies.

Therefore, the behaviour of inflation over the last three years has reflected the impact of these different forces. During the first few months of the pandemic, between March and December 2020, the disruptions associated with Covid generated a global negative supply shock that put upward pressure on prices. However, these inflationary pressures were neutralised by a large negative demand shock as a result of negative income effects, the increase in uncertainty and the restrictions making up the health response. As a result, inflationary effects were mostly muted.

During the first half of 2021, inflation began to rise, as the supply shock abated but demand began to grow strongly due to the withdrawal of pension savings and fiscal transfers. Thus, in this period, demand pressures prevailed, creating a huge imbalance in the economy, as seen in the behaviour of the current account, and driving inflation upwards. The depreciation of the peso, a reflection of external forces as well as high levels of domestic uncertainty, put additional pressure on prices. As the high dynamism of consumption and the behaviour of the exchange rate ignited the inflationary process, the Central Bank of Chile started its monetary policy tightening cycle early, in July 2021, before most emerging and advanced economies.

This local inflationary process was reinforced at the end of 2021 and 2022 by global factors. Supply-side bottlenecks in the aftermath of the pandemic, the effect of the Russian invasion of Ukraine on energy and commodities prices, and tighter sanitary restrictions in China compounded in the local economy and hit Chile in an already high-inflation environment. Under other circumstances, external shocks typically would not require a direct response in the context of Chile's monetary policy framework. However, the more persistent nature of these shocks, and the fact that they hit an economy already experiencing inflation well above its target, required a monetary policy reaction, as they could further ignite the inflationary process and affect inflationary expectations.

These global forces led central banks to withdraw monetary stimulus far more aggressively than previously expected. The increase in the policy rate by the Federal Reserve led to an appreciation of the US dollar, higher interest rates, higher term premiums, and spreads. This negatively affected financial conditions for emerging markets. In the case of Chile, this had a significant effect on the exchange rate, exacerbated by the uncertainty associated with local factors and the political process. This led to a significant spike in exchange rate volatility and frictions in the price formation process. It also stoked concern about potential spillovers to other markets, especially fixed income, and adverse effects to the real economy. In consequence, a new intervention program was announced in July 2022, with similar characteristics to the one conducted in 2019, which brought a moderation in all metrics of volatility and reduced frictions in the price formation process, although its success was facilitated by an improvement in international conditions.

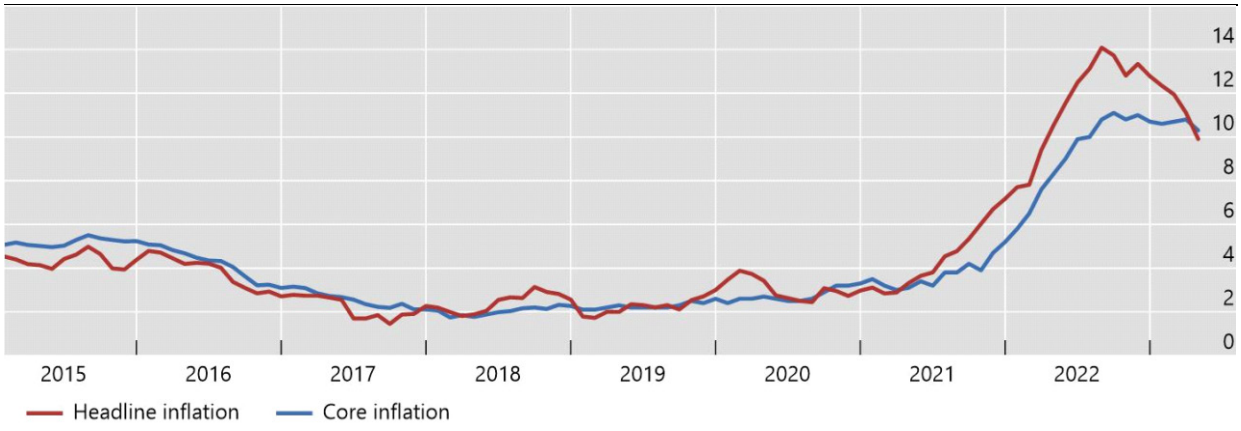
In response to inflation and the need to guarantee convergence to the two-year target, the Board has raised the policy rate over the last 18 months, bringing it up to 11.25% in October of 2022. This has been done swiftly and decisively, as Covid caused the economy to accumulate several macroeconomic imbalances that threatened more severe consequences in the future. This has been aided by the behaviour of fiscal policy, which has adjusted back from its expansionary position in 2020 and 2021. Although the policy rate is expected to have already peaked, it will remain at its current levels until the macroeconomic situation shows a clear convergence of inflation to 3%. To this day, inflation remains at an intolerably high level.

The last two years have a been a painful reminder of the costs of inflation after more than two decades in which inflationary concerns were largely absent from the minds of both households and firms. They have highlighted how inflation directly affects the welfare of households, especially among the poor, and how persistence can make the fight against inflation a long and arduous task. This is especially true in an economy like Chile's, in which, despite two decades of low inflation, the use of automatic indexation mechanisms in prices, wages and contracts is widespread. This reinforces the crucial importance of low and stable inflation for growth, the development of the financial sector, the alleviation of poverty and the overall welfare

of households. Although this upsurge in inflation was driven by a set of unusual circumstances, it shows that the battle against inflation is never really over and that monetary policy must always remain attentive and responsive in order to attain price stability.

Inflation indicators, 2015-22

Year over year changes, in per cent — Graph 5



Source: Central Bank of Chile

Some lessons and insights for the future

Over the last 20 years, the experiences of conducting monetary policy under inflation targeting have generated several lessons. These lessons are valuable in the face of the current situation and the challenges faced by the CBC and the Chilean economy looking towards the future.

The first lesson, which became especially clear during the last three years, is the need for central banks and the policy framework to constantly adapt to changing circumstances in order to have the required flexibility to respond to different types of events. In a sense, this flexibility is embedded in the design of the monetary policy framework, with the two-year horizon for the inflation target providing room for different policy choices without compromising price stability. Exchange rate flexibility fulfils a similar role, allowing the economy to adjust more easily to different types of shock without constraining monetary policy to defend a particular exchange rate target. This overall flexibility has proven very valuable in recent years. In mid-2019, neither a severe social crisis nor a worldwide pandemic seemed very likely to present shocks to the Chilean economy, and their joint occurrence seemed almost impossible. When both shocks hit the economy almost simultaneously, the Central Bank of Chile was able to respond rapidly, using both conventional instruments such as the monetary policy rate and unconventional instruments associated with liquidity and credit provision. This fast response played an important role in avoiding more severe consequences of the 2020 recession, such as massive rates of firm closures, defaults and widespread layoffs that could have had long-lasting effects on the financial sector and the economy over subsequent years. The correct design of timely policy responses and their evaluation as a crisis evolves require a rapid process of analysis, incorporating real-time information and the simulation of different policy scenarios. In the case of the CBC, this is possible due to the development of an ambitious

research and modelling agenda over the last decade, as well as the increasing use of micro data from administrative records and surveys to monitor the behaviour of the economy.

A second lesson is the importance of coordination and the role of complementarities between the different components of the macroeconomic environment. Monetary policy does not operate in a vacuum, and its ability to attain its objectives depends crucially on the behaviour of fiscal policy and the health of the financial sector. As discussed earlier, the success of inflation targeting and exchange rate flexibility relied on responsible management of fiscal policy and the development of a healthy financial sector. During the Covid crisis, credit and liquidity provision by the CBC were complements to the fiscal credit guarantees and the employment protection programs implemented by the government, mutually enhancing their effects. Moreover, the impact of these programs on aggregate credit provision, firm survival and the protection of jobs depended on the health and strength of the banking sector, as well as the institutional arrangements associated with unemployment insurance funds. Similarly, monetary policy alone cannot reduce inflation in the current situation; fiscal adjustment plays a significant role. This also poses challenges for the future. On the fiscal side, the process of fiscal consolidation must be maintained. Hopefully, over the next few years, this will help rebuild the sovereign funds that have provided an important buffer in recent years. On the financial side, the recovery of the domestic capital market seems imperative. Pension fund withdrawals had a significant impact on the size and depth of financial markets, reducing their capacity to provide credit to firms and households and their ability to shelter the economy from domestic and external shocks.

Finally, management of inflation expectations is a key component for the success of the inflation targeting regime and the capacity to conduct countercyclical monetary policy. In that sense, the ultimate objective of transparency and communication is to build up credibility that anchors expectations to the target. Over most of the last 20 years, inflation expectations in Chile stayed very close to the 3% target, despite temporary fluctuations in current inflation. This was especially true for two-year expectations, the most direct measure of the credibility of the inflation target. This has not been true in the last year, with measures of one- and two-year expectations deviating significantly from the target. This was a serious cause of concern and one of the reasons behind the rapid increase in interest rates, as a more permanent deviation of expectations could lead to de-anchoring, jeopardising the foundations of the inflation targeting regime. Fortunately, two-year expectations have come closer to the target, signalling that agents believe that the process of inflationary convergence is underway. The CBC is also pursuing an agenda to develop a better understanding of inflation expectations, with new detailed surveys for both firms and households.

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The monetary and macroprudential policy framework in Colombia in the last 30 years: lessons learnt and challenges for the future

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Abstract

Over the past 30 years, Colombia's monetary and macroprudential policy framework has evolved in pursuit of a credible low inflation objective and a more stable financial system. To some extent, the framework is shaped by both the entrenched inflation that started in the early 1970s and the financial vulnerability build-up of the 1990s, which led to the financial crisis at the end of the 20th century, a full-blown economic crisis that was part of the emerging market crisis in 1997–99 and involved both external and internal financial sector aspects, among others.

This chapter describes the evolution of the monetary and macroprudential policy framework in Colombia (Sections 1 and 2). It also discusses some of the lessons learnt from the implementation of the monetary and macroprudential framework (Section 3). Finally, the chapter concludes with some present and future challenges, namely the need to return inflation to its target and the need to preserve financial stability as financial deepening and capital market development proceed in a financial system that has become complex and international (Section 4).

The evolution of the monetary policy framework

In the early 1970s, Colombia experienced rising inflation similar to that in other advanced economies (AEs) and emerging market and developing economies (EMDEs) (Graph 1). The upsurge in inflation in Colombia did not reach the hyperinflation levels of other Latin American countries, but it did become entrenched, not to be subdued until the dawn of the new century.

In 1991, after almost 20 years of moderate inflation, the new Political Constitution made the Banco de la República, the central bank of Colombia (CB), responsible for

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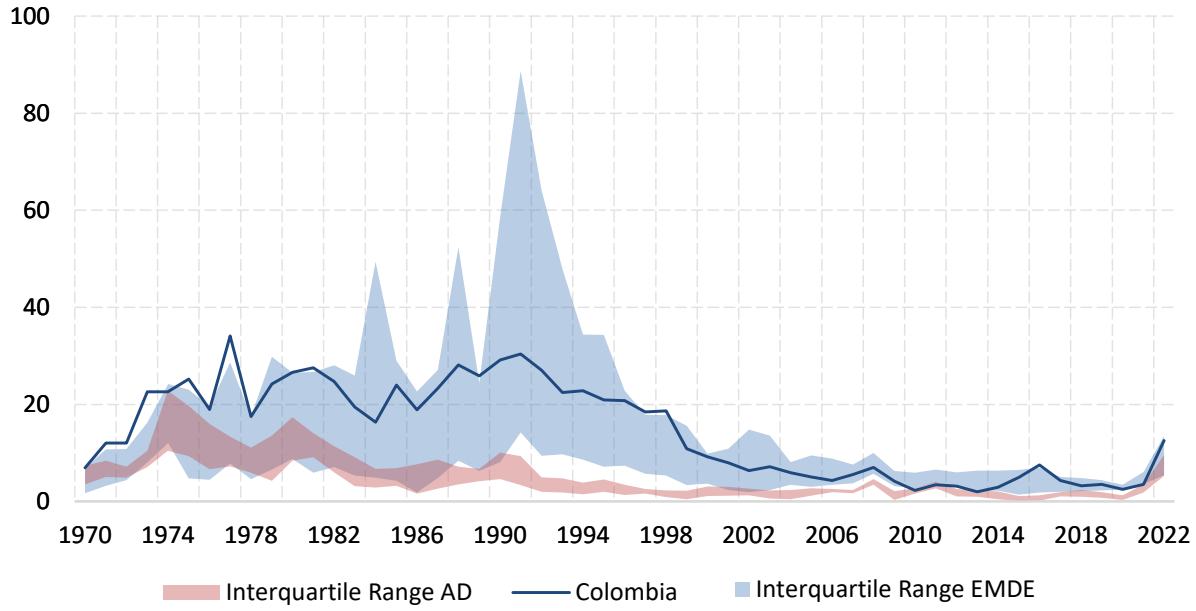
maintaining the purchasing power of money and endowed the CB with the legal, technical and operational independence necessary to achieve the inflation objective.[6]

Colombian inflation in the international context — Graph 1



EMDEs: Argentina, Cambodia, Chile, China, Colombia, Hungary, India, Indonesia, Iraq, Iran, Kenya, Mexico, Malaysia, Peru, Philippines, Poland, Romania, Russia, Saudi Arabia, South Africa, Thailand, Turkey.

AEs: Australia, Canada, Czech Republic, Denmark, Hong Kong SAR, Iceland, Israel, Japan, Korea, Norway, New Zealand, Singapore, Sweden, Switzerland, United Kingdom, United States, Euro Area.

Sources: Ha et al (2021); central bank websites; Federal Reserve Bank of St. Louis, Federal Reserve Economic Data; authors' calculations.

To lead the CB, the Political Constitution created an independent Board of Directors consisting of seven members,[7] including the Minister of Finance,[8] who would also be the president of the Board. The Political Constitution states that the Governor of the CB is a member of the Board, appointed by the Board itself for periods of four years not to exceed three consecutive periods.[9] It also states that the remaining five members represent the interest of the nation and are appointed by the President of the Republic for overlapping periods of four years, also not to exceed three consecutive periods for each member.[10,11]

Despite the central bank's independence and the explicitly stated goal of inflation as the main objective of monetary policy, low single-digit inflation was not achieved during the 1990s. The central bank struggled to maintain monetary targets

6 See Article 371 of the Political Constitution.

7 See Article 372 of the Political Constitution.

8 In Spanish, *Ministro de Hacienda y Crédito Público*.

9 See Article 43 of Decree 2520 of 1993.

10 The President of the Republic appoints two members during the second half of their mandate. In case of resignation of one of the members, the president also appoints a replacement for the remainder of the four-year term. See Articles 34 and 35 of Law 31 of 1992.

11 Hamann et al (2014, p 6) point out that this arrangement was established to preserve the CB's independence, as most of the Board members are appointed by the previous president.

as well as exchange rate bands, an endeavour that proved considerably difficult under increasing capital mobility.[12] A sudden stop in capital flows at the end of the 1990s hit an economy that featured an exchange rate band, pervasive financial fragilities and increasing government financing needs. Against this backdrop, the exchange rate band system in Colombia, like many others around the world, became unsustainable.[13]

In September 1999 the Colombian peso was allowed to float in the context of an agreement between Colombia and the International Monetary Fund (IMF).[14] At the outset, the arrangement included targets for monetary aggregates, yet monetary targets were rapidly waived on the grounds that the monetary policy framework had evolved into a fully-fledged inflation targeting (IT) regime.

Overview of capital inflows

As in most EMDEs with international capital mobility, capital inflows in Colombia have been a key driver of the exchange rate and a critical factor in financial stress. Graph 2 shows capital inflows and outflows, illustrating the ebb and flow of foreign capital movements in Colombia, which mark important events in the world economy and in Colombia.[15]

The literature emphasises the role of external ("push") factors, mainly the VIX (see eg the survey by Koepke (2019)), as drivers of capital flows. Related literature around the global financial cycle (GFCy) also gives relevance to the VIX, although indirectly, given that the effect of US interest rates on the GFCy is limited to at most a third of the variance decomposition of the GFCy (see Bekaert et al (2013), Rey (2015) and Bruno and Shin (2015)). Thus, the swings in capital inflows shown in Graph 2 are important factors in financial stress in Colombia; they are inversely related to the VIX and directly related to Rey's (2015) common factor for the GFC.[16]

The implementation of the IT regime

An IT regime is commonly defined by a number of key characteristics: an inflation target, a forward-looking operational procedure, transparency and accountability. The monetary policy goal of low inflation and the accountability of the CB were established in the Political Constitution of 1991. In turn, the forward-looking operational procedure and the element of transparency, understood as an inflation projection and Inflation Report (IR) that use a forward-looking inflation model, were formalised in March 2001,[17] though some of these characteristics had already been

[12] The argument for a transparent solution to this trilemma is put forth by Fischer (2001). A similar argument in the context of Colombia is underscored by Gómez-Pineda (2006).

[13] See Fischer (2001, p 5), who notes that "soft exchange rate pegs are not sustainable".

[14] It was an Extended Fund Facility arrangement that would later become a Stand-By Agreement. Urrutia Montoya (2002, p 15) points out that the arrangement helped avoid a possible exchange rate depreciation.

[15] The figure shows the run-up to the financial crisis of the end of the 1990s, the Latin American financial crisis, the burst of the dotcom bubble, the risk-on episode at the time of the Great Moderation, the GFC, the rise in global liquidity, the taper tantrum talk and the pandemic.

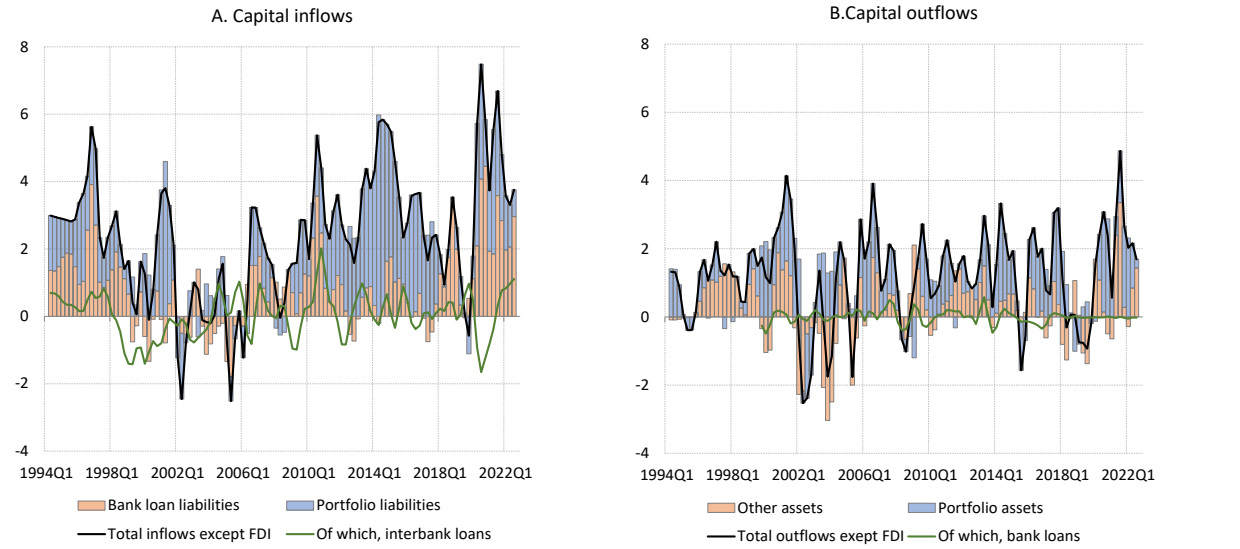
[16] For a review of the effect of the GFCy in Colombia, see Sarmiento et al (2023).

[17] Urrutia Montoya (2002, p 20) notes that "the refinement of inflation forecasting models was a necessary condition for the formal adoption of inflation targeting".

introduced before. Indeed, from September 1999 through end-2000, decisions about the instrument of monetary policy in Colombia were made in the form of growth targets for the monetary base (Hernández-Gamarra and Tolosa-Buitrago (2001)).

In what follows, we organise our presentation of the evolution of IT in Colombia around these IT characteristics.[18] We also discuss FX intervention because it has been a feature of the central bank policy framework in Colombia.

Capital inflows and outflows — Graph 2



Note: Bank loan liabilities were approximated from the balance of payments as "Other investment" and "Other liabilities incurred" and excluding other liabilities incurred by the CB. Portfolio inflows were taken from the balance of payments as "Portfolio investment liabilities" and "Net liabilities incurred". "Other assets" include bank deposits, bank loans, assets of insurance companies and credit granted by suppliers. Dollar GDP was smoothed with a local linear trend model. Data in percent of GDP was smoothed with the following two-sided truncated exponential filter: ¼ x (t – 1) + ½ x(t) + ¼ x(t + 1).

Sources: From 1996–2002: Central Bank of Colombia, quarterly balance of payments statistics; from 1994–95: Central Bank of Colombia, yearly balance of payments statistics.

The inflation target

As said above, the Political Constitution in 1991 established low inflation as the goal of monetary policy. The Political Constitution also required the CB to carry out the central banking function with administrative autonomy.[19] This legal setup gave the CB the necessary independence to establish a specific numerical value for the inflation target.[20]

Inflation targets have taken the form of both point and range targets. In most EMDEs, the point target or the middle of the range target has been set at 3%.[21] This has also been the case of the long-term target in Colombia. In November 2002, the

[18] For a narrative account of IT under the different macroeconomic developments that took place during 1999–2015, see López-Enciso et al (2017, pp 483–513).

[19] See Articles 371–73 of the Political Constitution and Ruling C481-99 of the Constitutional Court.

[20] This is also underscored by González et al (2019).

[21] In comparison, in most advanced economies, the point target or the middle of the range is most commonly 2%.

CB announced a long-term inflation target of 3% (Gómez-Pineda et al (2002, p 10)) and followed a process of gradual disinflation. Although price stability literally means zero inflation, a small but positive inflation rate can help incorporate an inflation bias that could arise due to increased quality of the goods in the CPI. At the same time, it can help avoid the major limitations and costs to monetary policy of the effective lower bound on the policy interest rate.[22] The effective lower bound has substantial costs in terms of the inability of conventional monetary policy to stimulate aggregate demand during a recession.[23]

After the disinflation process was complete, the CB reiterated that, starting in 2010, the inflation target would be permanently set at 3%, within a two-percentage point range.[24]

The forward-looking operating procedure

The second characteristic of an IT regime is a forward-looking operational procedure. This procedure is based on a dynamic forward-looking inflation model so that inflation projections are consistent with an interest rate policy path. An inflation model also enables the construction of scenarios for policy and risk analysis.

A forward-looking inflation model was introduced at the CB in October 2000 (the transmission mechanisms model, MMT per its acronym in Spanish; see Gómez-Pineda and Julio-Román (2001) and Central Bank of Colombia (2001b)). The semi-structural MMT included the monetary transmission channels now standard in inflation models. The model emphasised both the strong aggregate demand channel and inflation inertia as key features of the inflation process in Colombia. It also included the main shocks relevant to the country, namely a disinflation shock, a risk premium shock and a food inflation shock. The semi-structural MMT was incorporated into the March 2001 monetary policy decision process and the Inflation Report.[25]

In October 2000, the Board of the CB adopted a two-pillar strategy for the monetary policy framework (Urrutia Montoya (2000)). The strategy, akin to that implemented at the time by the ECB, included both IT and monetary base targets. This strategy provided a transitional phase in the move towards IT to allow for the build-up of knowledge about the transmission mechanisms of monetary policy (Gómez-Pineda et al (2002, pp 7–8)). The monetary pillar was implemented based on the assumption of a relatively stable demand for money (Gómez-Pineda et al (2002, p 6)).

In 2002, with technical assistance from the IMF, a new version of the semi-structural MMT was set up on an improved platform.[26] This version was used for policy decisions and the central projection of the IR until 2019. Shortly after the introduction of the forward-looking operational procedure, and considering the

[22] Another effect is that it can enable changes in relative prices that otherwise would not take place under zero inflation.

[23] In this light, shortly after the GFC, Blanchard et al (2010) and Ball (2014) argued that, in the context of advanced economies, an increase in the inflation target would reduce the likelihood of hitting the effective lower bound on interest rates.

[24] For a list of the short-term inflation targets in Colombia, see López-Enciso et al (2017, p 522).

[25] Research on the transmission mechanisms of monetary policy and testing of the semi-structural MMT was carried out in Central Bank of Colombia (2001a) and (2001c).

[26] The new platform ran on Iris-Matlab, in contrast with the former platform, which ran on Winsolve, a software programme developed at the Bank of England.

evidence on the instability of money demand, the monetary targets of the transitional two-pillar strategy lost pre-eminence or were abandoned. Indeed, IMF (2003, p 4) states that the CB would "continue to cast monetary policy within and IT framework and a floating exchange rate regime".

To enhance the forward-looking operational procedure, in 2002 the CB created a Macro Modelling Division. Since its establishment, the Division has carried out work on the transmission mechanisms of monetary policy and has also supported periodic forecasting rounds.

As IT developed around the world, leading central banks introduced dynamic stochastic general equilibrium (DSGE) models into the forward-looking operating procedure. The CB first incorporated a DSGE inflation model into its forecasting in June 2011. The model, called PATACON (González et al (2011)),[27] is a rational expectations DSGE model tailored for the Colombian economy. It is used for forecasting and policy analysis.

In 2019, the semi-structural MMT morphed into a four-goods model (4GM, see González et al (2020)).[28] The semi-structural 4GM incorporated four Phillips curves covering foods, regulated prices, goods and services. It also included trends for the real exchange rate and relative prices, as well as some features of the real economy that were considered relevant to a model tailored to Colombia, such as the price of oil and the terms of trade. The semi-structural 4GM was incorporated into policy discussions in December 2018 and into the Monetary Policy Report[29] (*Informe de Política Monetaria*, or MPR), in September 2019.

Transparency and communication strategy

Transparency stems from communication to the public of the rationale behind policy decisions. Several communication instruments have served this purpose, namely a press release published after policy meetings, which includes the distribution of Board members' votes; a press conference that explains the rationale behind decisions to the media; policy meeting minutes explaining the policy decision, the opinions shared by the members of the Board and their main differences; and the MPR, made public and presented a few days after the policy meeting. In addition, technical documents are made available through the CB's working paper series, *Borradores de Economía*,[30] as well as in Boxes in the MPR. Of these, the MPR is the most comprehensive technical communication instrument and so deserves some comment.

The first IR with an inflation projection constructed on the basis of an inflation model with an endogenous policy path was published in March 2001.[31] At this time,

[27] The calibration of the DSGE PATACON model and the main impulse responses are presented in Bonaldi et al (2011). When they were launched, the DSGE PATACON and semi-structural 4GM ran on a Dynare-Matlab platform.

[28] The semi-structural 4GM is less backward-looking than the semi-structural MMT, which used to emphasise inflation rigidities during disinflation. Regarding the evolution of the transmission mechanisms of monetary policy, see for instance Mohanty and Turner (2008).

[29] The Inflation Report had been transformed into the Monetary Policy Report (MPR) by this point.

[30] The CB's working paper series can be found at repositorio.banrep.gov.co/handle/20.500.12134/5018.

[31] A monthly internal IR has circulated within the CB since 1995. A quarterly IR was first made public in January 1999.

the IR also started using an inflation fan chart to evaluate uncertainty and risks to the outlook, which are also inputs to the policy decision.[32],[33]

With the outbreak of the pandemic, given the unprecedented level of uncertainty in the outlook, the fan chart ceased to be published for a brief period. The pause served to introduce an important enhancement to the communication strategy. Starting with the July 2021 MPR, uncertainty and risks to the outlook were built using the predictive densities method.[34] With the new method, the forward-looking distributions of the variables of interest, mainly inflation and output, are consistent with each other.

In October 2019, to enhance the analysis and discussion of the monetary decision process, the number of meetings at which the Board makes monetary policy decisions was reduced from 12 to eight per year (Central Bank of Colombia (2019b)). The Board of the CB continues to meet monthly, holding a total of 12 meetings a year, but as of October 2019, it does not, in principle, make monetary policy decisions in February, May, August or November. In addition, the IR was made more forward-looking and concise, and its name was changed to MPR.

Accountability

In the pursuit of its price stability IT mandate, the CB is accountable to Congress as well as to the public at large. At the same time, in the pursuit of other central banking functions, the CB is accountable to other public entities.[35]

Biannually, within 10 days of the beginning of Congress' ordinary sessions, the Board of the CB presents a report to Congress (*Informe de la Junta Directiva al Congreso de la República*) on the current developments and outlook of monetary policy as well as on the administration of international reserves and the CB's financial statements. Furthermore, the Economic Commission of Congress can ask for any report it deems necessary in the pursuit of its functions, and the Governor and the members of the Board can be summoned to explain the content of the report to Congress as well as the policies implemented.

The CB is also accountable to the public. After every monetary policy meeting, the Minister of Finance and the Governor of the CB hold a press conference for an audience of communications professionals and answer questions from them. In

[32] The fan chart was explained in the March 2001 IR; the technical details appear in Julio-Román (2007).

[33] The level of uncertainty in the fan chart was constructed first using a notion of statistical uncertainty and later using the history of inflation forecast errors. The balance of risks was constructed using an evaluation of the different shocks that could materialise over the forecasting horizon. The fan chart was constructed by overlaying the level of uncertainty and the balance of risks on the central projection of the semi-structural MMT.

[34] In contrast with the previous fan-chart method, in which uncertainty and risks were overlayed on the central inflation projection, the predictive densities method uses the expected probability distribution of the shocks within the macroeconomic model to get a full distribution of the main macroeconomic variables. This method was explained in Central Bank of Colombia (2021b).

[35] In its capacity as a central bank with its own legal regime, the CB is supervised by the Superintendency of the Financial Sector (*Superintendencia Financiera de Colombia*, or SFC) and controlled by an auditor appointed by the President of the Republic. The supervision function is as stated in Articles 46 and 47 of Law 31 of 1992, and the control function is as stated in Articles 70 and 71 of Decree 2520 of 1993. In addition, as a public entity, the CB is subject to fiscal control by the Office of the Comptroller (*Contraloría General de la República*) and has a disciplinary regime overseen by the Office of the Attorney General (*Procuraduría General de la Nación*).

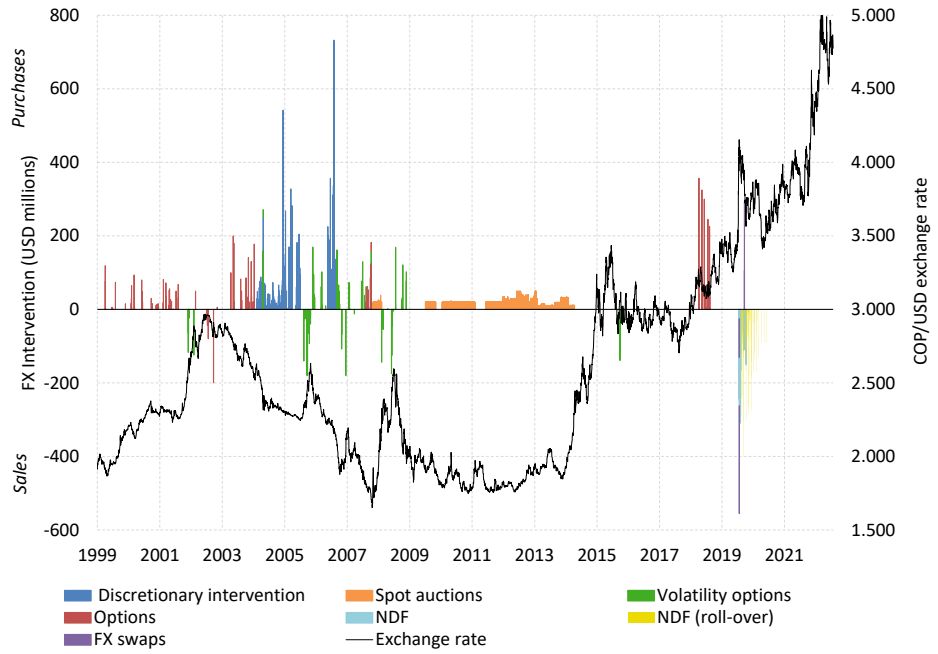
addition, three days after the press release and press conference, the Deputy Governor of the CB presents the MPR to the public and also answers questions from the audience.

FX intervention

Colombia has one of the most flexible exchange rates among EMDEs. The monetary policy regime has made the exchange rate the first line of defence against capital flow swings as well as other external shocks, thus enabling monetary autonomy and reducing real volatility in the face of external shocks. In addition, the floating exchange rate has helped to contain the incentives for exchange rate risk-taking (see eg Vargas (2011)).

As has been the case with CBs in other EMDEs and even in some AEs, the CB intervenes in the FX market. In Colombia, this has been the case since the exchange rate was allowed to float (Graph 3). FX intervention in Colombia has had three explicit motivations: to accumulate international reserves, to reduce exchange rate volatility and to moderate deviations of the exchange rate from trend (see Rincón et al (2020) and Vargas (2011)). In addition, during the pandemic crisis, the CB intervened to preserve FX market liquidity and to support the supply of FX hedging alternatives (Central Bank of Colombia (2023, p 80)).

The floating exchange rate and FX intervention — Graph 3



Note: The left axis shows the data as stacked columns.

Source: CB website.

The literature on fear of floating (eg Calvo and Reinhart (2002)) has established that CBs in EMDEs intervene to offset both the financial channel of the exchange rate

and the pass-through of the exchange rate to inflation.[36] Still, as noted below, ever since the Colombian peso was allowed to float and several macroprudential policies were implemented, the strength of both the financial channel of the exchange rate and the pass-through to inflation appears to have receded.[37]

Graph 3 shows the amount of FX intervention implemented by the CB along with the direct COP/USD exchange rate. The graph suggests that FX purchases tend to take place during periods of Colombian peso appreciation, and sales, during depreciation. Beyond these short-term interventions, over the long term, FX intervention has helped to achieve the reserve accumulation objective, one of the stated goals of FX intervention in Colombia. The CB generally aims at maintaining international liquidity (reserves plus the flexible credit line from the IMF)[38] close to the current account deficit plus expected payments on external debt for the following year, plus an estimate of capital outflows in the event of external financial stress.[39]

As mentioned above, the CB has also recently intervened to preserve the liquidity of the FX market. In particular, intervention during the pandemic crisis aimed to provide market participants with alternatives for their FX hedging needs and short-term liquidity in foreign currency. From March 2020 to March 2021, the CB sold dollars through non-deliverable forward (NDF) contracts to offset potential restrictions across hedging instruments.40 In March and April 2020, the CB performed 60-day FX swaps to provide short-term dollar funding.41

BIS (2019, p 41) underscores that the effect of FX intervention on the exchange rate may not be trivial and reviews some literature explaining the effect. By contrast, in the literature for Colombia, the effect of FX intervention on the exchange rate has been found to be small and short-lived (see Rincón et al (2020) and the references therein). In implementing FX intervention, the CB carries out a cost-benefit analysis, including the possible small and short-lived effect of FX intervention on the exchange rate (Rincón et al (2020)).

The evolution of the macroprudential policy framework

Macroprudential policy seeks to limit financial crises and their macroeconomic costs by protecting the resilience of the financial system (Crockett (2000), Borio et al (2001), Galati and Moessner (2013), IMF-FSB-BIS (2016)). In pursuit of this objective,

[36] In addition, it has recently been pointed out that FX intervention can have a macroprudential role as it can offset the effect of capital movements on credit (see Hofmann et al (2021)).

[37] The term "macroprudential policy" was not widely used before the Great Financial Crisis (GFC). McCauley (2009) points out that EMDEs were early adopters of policies with a macroprudential objective, though they did not label them as such.

[38] In a way, Colombia's access to the IMF FCL in 2009 was an endorsement of the quality of the country's monetary, fiscal and macroprudential policy framework.

[39] See Central Bank of Colombia (2021a), Rincón et al (2020), Central Bank of Colombia (2023, p 79–83) and Vargas (2011). These criteria follow the IMF (2016) Assessment of Reserve Adequacy (ARA) criteria; at the same time, these criteria also resemble the Liquidity Coverage Ratio at a macroeconomic level.

[40] In the NDF, the CB sells dollars forward and, on the due date, pays the difference between the spot rate and the forward rate.

[41] In the swap contract, the CB sells dollars spot and buys the same amount at some point in the future. See Central Bank of Colombia (2023, p 81).

authorities implement a range of macroprudential measures that seek to contain systemic risk.

In Colombia, macroprudential policy (as described by Vargas et al (2017)) is implemented by four institutions: the Ministry of Finance (*Ministerio de Hacienda y Crédito Público*, or MoF), the Superintendency of the Financial Sector (*Superintendencia Financiera de Colombia*, or SFC), the Deposit Guarantee Fund (*Fondo de Garantías de Instituciones Financieras*, or DGF) and the CB. The MoF regulates the capital requirements for all financial institutions and the controls on portfolios and foreign direct investment. The SFC regulates liquidity and market risk. The CB regulates limits on FX positions, deposits on foreign indebtedness and reserve requirements. The government (MoF) establishes limits to the LTV and DSTI ratios in the mortgage market.[42] The SFC carries out the supervision function, whereas both the SFC and the DGF carry out the resolution function. The DGF is also responsible for the deposit insurance scheme. Finally, the CB serves as the lender of last resort with information support from the SFC.

Macroprudential policy is discussed and coordinated within a Financial System Coordination and Surveillance Committee (*Comité de Coordinación y Seguimiento del Sistema Financiero*, or CCSSF). Colombia is an early adopter of this type of institution; the CCSSF was created in 2003, much earlier than in other economies, where committees of this sort appeared after the GFC. The members of the CCSSF are the heads of the SFC, CB, MoF and DGF. Although the CCSSF does not have a legal macroprudential mandate or decision-making power and none of its members has explicit legal responsibility for macroprudential stability or policy, various macroprudential policies fall within the legal mandate of its members. The CCSSF has benefited from good coordination, as shown for instance by the package of measures taken during the capital inflow and credit growth of 2006–07 (see below).

Colombia's intricate financial system features financial conglomerates with systemic relevance. These financial conglomerates also have systemic relevance in several Central American countries.[43] Currently, the assets of Colombian banks account for about half of financial system assets in Central American countries and about one fourth of the assets of Colombian conglomerates, although these shares differ across countries and conglomerates. The expansion of Colombian conglomerates throughout Central America took place as European banks retrenched during the financial crisis in Europe (Cardozo et al (2022)) and posed new macro-prudential challenges for Colombian authorities.

The macroprudential measures implemented in Colombia have been documented exhaustively by Mora-Arbeláez et al (2015). The various macroprudential measures in place include a set that has a capital flow aspect (see Frost et al (2020), Das et al (2022), Bergant et al (2020)), which is important to limit foreign exchange exposure by the financial system. The relevance of these measures in an EMDE is that capital flow swings can have important effects on systemic risk (Cetorelli and Goldberg (2011), Bruno and Shin (2015), Kalemli-Özcan (2019)). In Colombia, some prudential measures are permanently in place, while others have been used countercyclically. These policies include limits on open FX positions of financial

[42] In 1999, Congress enacted a law that instructed the government to establish limits for these metrics. Those limits were imposed by a government decree in 2000 and modified in 2008.

[43] Colombian conglomerates have a market share of 24% in Panama, 53% in El Salvador, 50% in Costa Rica, 16% in Guatemala, 16% in Honduras and 22% in Nicaragua (Cardozo et al (2022, p 11).

intermediaries, limits on leverage in foreign currency, and unremunerated reserve requirements on foreign indebtedness and foreign portfolio inflows.

Overview of macroprudential policy measures in the international context

Macroprudential policy includes a wide range of measures. In the banking sector, it includes capital requirements, limits on banks' leverage, requirements on loan loss provisions, liquidity requirements such as the Net Stable Funding Ratio (NSFR), limits on FX positions, reserve requirements for macroprudential purposes (RRs) and capital buffers on systemically important financial institutions (SIFIs). In the household sector, it includes the loan-to-value ratio (LTV) and the debt service-to-income ratio (DSTI), among others. In the corporate sector, it includes the LTV and the debt service coverage ratio (DSCR).

The IMF integrated Macroprudential Policy (iMaPP) database (Alam et al (2019)) can contribute to the study of the evolution of the macroprudential measures implemented in Colombia. The database provides a policy action indicator for each macroprudential instrument through a monthly dummy variable that indicates a policy action in a particular month, as well as its direction, tightening if positive and loosening if negative.[44]

The results of the iMaPP database in Colombia (Echavarría Soto (2020)) show that Colombia has a relatively high number of macroprudential measures related to liquidity and exchange rate risks, as well as measures to deal with risks taken by the household sector. In contrast, the number of measures related to corporate and non-bank financial intermediaries is below the regional average.

For illustration purposes, we use, on the one hand, a Macroprudential Indicator 1 (MI1), or the cumulative sum of the number of tightening and loosening macroprudential polices; and on the other hand, a Macroprudential Indicator 2 (MI2), or the cumulative sum of the number of tightening and loosening policies over 12 months. Although the indicators aggregate policy actions that may have different intensities, we regard an increase in the MI1 or a positive MI2 as a macroprudential policy tightening and a decrease in the MI1 or a negative MI2 as a macroprudential policy loosening.

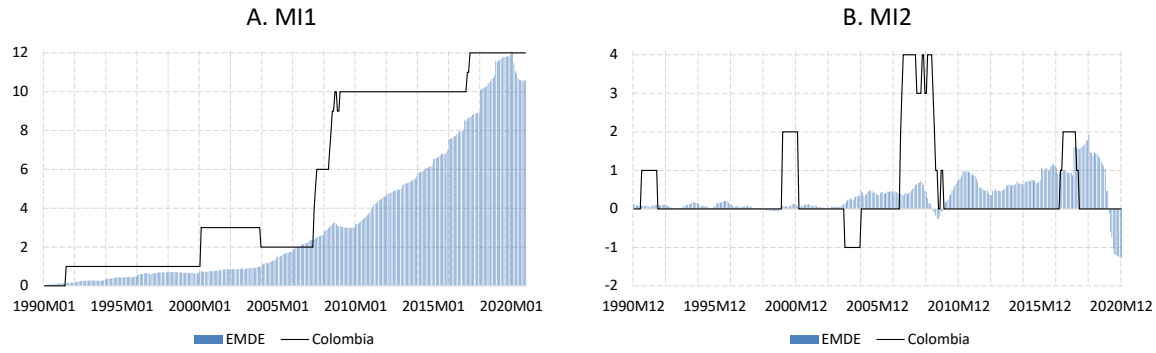
Graph 4 shows the MI1 and MI2 for the macroprudential policy instruments in the iMaPP database for Colombia as well as for the comparable group of EMDEs. As is well known, the net number of tightening macroprudential policy actions increased in EMDEs well before it did in AEs (eg Cerutti et al (2017)); Graph 4 shows that the net number of tightening macroprudential policy measures increased in Colombia ahead of the average for EMDEs. The graph also shows that the macroprudential stance in Colombia tightened before the GFC and loosened afterwards.

As mentioned above, one of these macroprudential measures – limits on FX positions – may help manage capital flow swings. Graph 5 shows the MI1 and MI2 for this specific macroprudential policy. Compared with the average for EMDEs, Colombia was an early adopter of this type of measure (Panel A). Limits on FX positions were further tightened during the capital inflow of 2006–07, as well as in 2017 (Panel B).

[44] As indicated by Alam et al (2019), the dummy indicators do not account for intensity and are added up despite heterogeneity across measures and economies. In addition, the cumulative sum may indicate the existence of a measure even though its effect may have lapsed.

Macroprudential policy action indicators

Graph 4

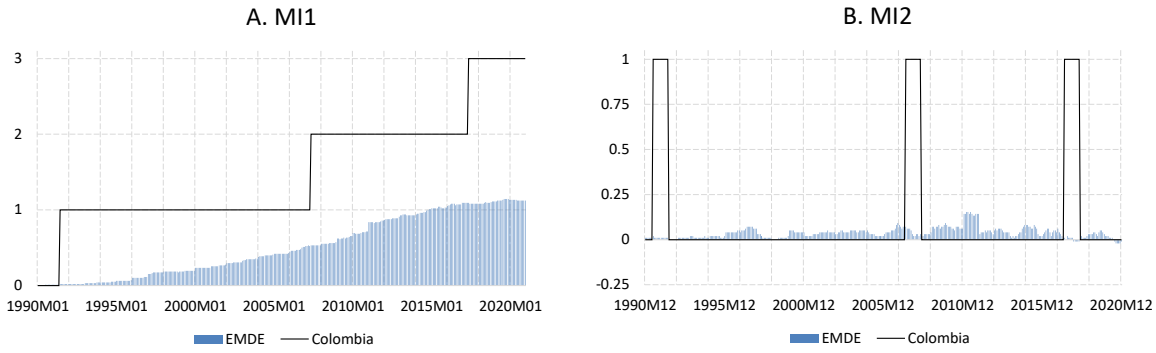


EMDEs: Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bahamas, Bahrain, Bangladesh, Belarus, Benin, Bhutan, Bosnia and Herzegovina, Botswana, CambodiaB, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cabo Verde, Chile, China, Colombia, Congo, Costa Rica, Côte d'Ivoire, Croatia, Dominican Republic, East Timor, Ecuador, El Salvador, Ethiopia, Fiji, The Gambia, Georgia, Ghana, Guinea-Bissau, Haiti, Honduras, Hungary, India, Indonesia, Jamaica, Jordan, Kazakhstan, Kenya, Kosovo, Kuwait, Kyrgyz Republic, Laos, Lebanon, Lesotho, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Nepal, Niger, Nigeria, North Macedonia, Oman, Pakistan, Paraguay, Peru, Philippines, Poland, Romania, Russia, St Kitts and Nevis, Saudi Arabia, Senegal, Serbia, Solomon Islands, South Africa, Sri Lanka, Sudan, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, Uruguay, Vietnam, Yemen, Zambia.

Sources: Alam et al (2019), IMF iMaPP database, indicator SUM_17; authors' calculations.

Macroprudential policy action indicator for limits on FX positions

Graph 5



Note: EMDEs are those indicated in Graph 4.

Sources: Alam et al (2019), IMF, iMaPP database, indicator LFX; authors' calculations.

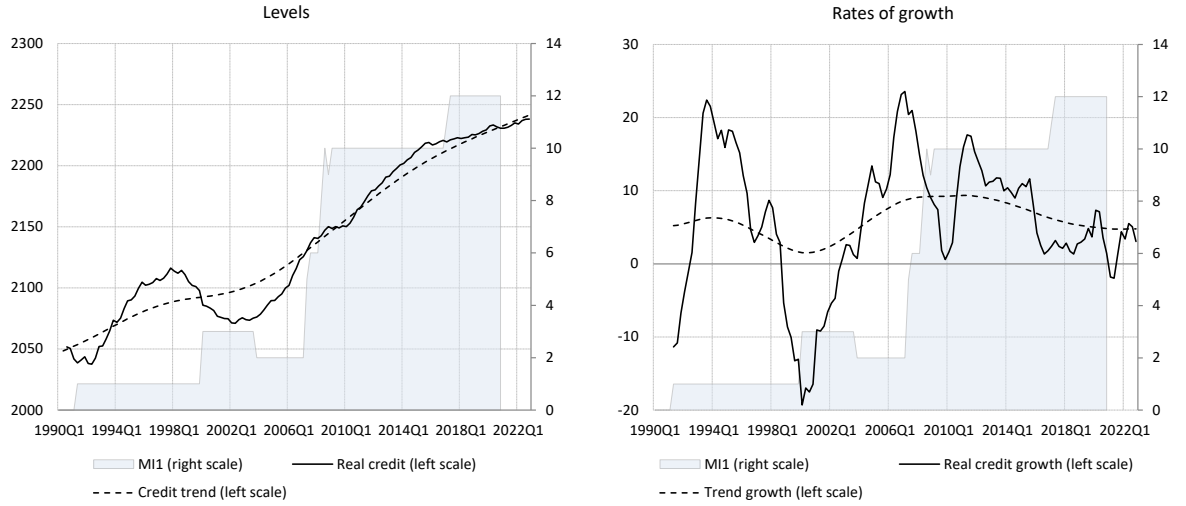
Multi-country studies by Gambacorta and Murcia (2020) and Cerutti et al (2017) have shown that these macroprudential policies are effective. In studies for Colombia, their effectiveness has been shown by Gómez et al (2020).[45] In addition, Graph 6 shows that the amplitude of the credit cycle in Colombia dropped as the number of macroprudential measures increased over time.

The remainder of this section presents some of these macroprudential measures in the context in which they were implemented.

[45] In addition, Vargas et al (2017) show that macroprudential measures improved the solvency and liquidity in the financial system.

The credit cycle

Graph 6



Note: Latent credit is estimated as endogenous to a common factor (not reported) among real credit, real housing prices and leverage measured as the credit-to-GDP ratio.

Source: authors' estimations based on data on credit and housing prices from the Central Bank of Colombia, consumption data from the National Statistical Department of Colombia (Departamento Administrativo Nacional de Estadística, DANE) and the MI1 index as in Graph 4.

The run-up to the financial crisis of the end of the 1990s

The reforms of 1991[46] transformed a regime of decades-long restrictions on capital movements into a regime with international capital mobility.[47] The CB liberalised several interest rates while the MoF helped create a public debt market and a yield curve. As underscored by Perez-Reyna (2017), Caballero Argáez et al (2006) and Zárate Perdomo et al (2012), the surge in capital inflows was accompanied by increases in the price of real estate, the number of financial intermediaries, the participation of foreign capital in the banking sector, bank privatisations, and the credit level and rate of growth.[48] As shown in Graph 6, the highest rates of credit growth leading to the financial crisis at the end of the 1990s took place in 1993–95. Positive rates of credit growth continued until 1998; thereafter, the credit level dropped amidst the financial crisis of the end of the 1990s. The upsurge in credit took place under poor regulation and low capitalisation.

Moreover, an exchange rate policy that maintained the exchange rate within a band provided incentives for considerable currency mismatches in both the corporate sector and the central government. In contrast, in the banking sector, unhedged FX positions were contained using macroprudential limits,[49] which are perhaps the earliest measure taken in Colombia with an explicit macroprudential objective.

46 See Law 45 of 1990 and Law 9 of 1991.

47 In Colombia, the liberalisation process was known as the "opening of the economy" (in Spanish, *apertura*). Sufi and Taylor (2021, p 24) point out that deregulation of the financial sector frequently led to credit growth.

48 An account of the financial crisis of the end of the 1990s can be found in Perez-Reyna (2017) and the references therein.

49 See Resolution No. 57 of 1991 issued by *Junta Monetaria* (the governing body of the Central Bank of Colombia before the constitutional reform that created the independent central bank)

Several factors set the stage for the financial crisis of the end of the 1990s: the capital inflow during that decade, insufficient macroprudential regulation, widespread risk-taking in the household and corporate sectors, a high rate of credit growth, a significant surge in real estate prices and the government's increasingly fragile financial position.[50] When capital flows reversed, the substantial risks taken by the different sectors materialised. The crisis was amplified due to the poor capital provisions in the banking sector (Zárate Perdomo et al (2012)).

The financial crisis of the end of the 1990s

The EM crisis of 1997–99 led to a drop in net capital inflows (Graph 2). Widespread latent risks materialised, and a profound and prolonged financial crisis ensued. A brief account of the crisis follows.

In the late 1990s, real estate prices stagnated while the nominal value of housing loans, which incorporated an inflation adjustment, continued increasing. A large number of households were left with negative equity and little incentive to repay, leading to an increase in non-performing loans. Mortgage banks were also hit by the materialisation of interest rate risk.[51] Solvency indicators in this and other parts of the financial system sharply deteriorated. Several private and state-owned banks went insolvent; some were rescued, while others were merged or liquidated (Zárate Perdomo et al (2012)). The cooperative sector (credit unions) also experienced solvency problems and liquidations due to the deterioration in household balance sheets (see Zárate Perdomo et al (2012)).

Amidst the profound financial crisis and recession, monetary policy turned procyclical as a result of the defence of an exchange rate band. Consequently, by end-1998 the real interest rate had risen above and beyond 15%.[52] Despite the strong defence of the exchange rate, net capital outflows forced several realignments of the exchange rate band. With each successive realignment of the band, the Colombian peso depreciated, adding to the recession via the financial channel of the exchange rate.[53] Unemployment soared to more than one fifth of people in the workforce.

The aftermath of the financial crisis of the end of the 1990s

The unprecedented economic crisis led to a profound reassessment of the perception of risk, as well as of risk-taking by households, firms, banks and the government. It also gave rise to some important institutional developments and macroprudential measures.

An important institutional development was the creation in 2003 of the CCSSF, which is, as mentioned above, a mechanism for discussing and coordinating macroprudential policies. Another important institutional development was the

[50] For an account of the views on the role of government expenditure and debt in the crisis, see Perez-Reyna (2017, p 445) and López-Enciso et al (2017, pp 472 and 476).

[51] The materialisation was due to the rise in interest rates to defend the exchange rate band, as well as a change in the inflation adjustment of the mortgage banks' deposit rates, now calculated as a percentage of the system-wide average deposit interest rate.

[52] This is the real interest rate on 90-day deposits, deflated by 12-month CPI inflation.

[53] For an approach that emphasises the internal factors of the sudden stop, such as the insolvency of the financial sector and the deterioration of public finances owing to the increase in expenditure and the drop in economic activity, see López-Enciso et al (2017).

creation of the Financial Stability Department (FSD) within the CB in 2002. Twice a year, the FSD prepares and publishes a Financial Stability Report (*Reporte de Estabilidad Financiera* or FSR).[54] Since its creation, the FSR has undergone significant enhancements, including the incorporation of the systemic stress model SYSMO in 2017 (Gamba-Santamaría et al (2017)), which is the analytical framework used by the FSD to construct stress testing exercises.[55] The FSD's continuous financial stability assessments also serve as inputs to the CB's participation in the CCSSF.[56] These institutional developments have strengthened the CB's capacity to directly influence macroprudential policy through the macroprudential instruments under its control as well as indirectly as a member of the CCSSF.

Still another institutional development was the creation of the Financial Regulation Unit (*Unidad de Regulación Financiera*, or URF). The URF supports the regulatory work of the MoF and is a permanent guest of the CCSSF.

Aside from these institutional developments, the financial crisis of the end of the 1990s also led to the introduction of important macroprudential policy measures. Such is the case of the above-mentioned limits on the loan-to-value (LTV) and debt service-to-income (DSTI) ratios. Another decision that has served as an important macroprudential policy is the flotation of the Colombian peso, as this is an important deterrent against open, unhedged FX positions.

The capital inflow and credit growth of 2006–07

In 2006–07, the global financial cycle was in the risk-on phase, as indicated by Rey (2015) using a common factor indicator as well as the VIX. In Colombia, as well as in other EMDEs, this led to an increase in capital inflows and an upsurge in credit growth. In Colombia, the increase in credit corresponded with a change in the composition of bank assets towards credit and away from government bonds.[57] All this took place in an economy that had, not long ago, experienced the financial crisis of the end of the 1990s. Thus, all the regulatory agencies were ready to take measures. The CB established a marginal reserve requirement on domestic deposits[58] and an unremunerated reserve requirement (URR) on debt inflows. The MoF established a URR on portfolio inflows. The SFC contributed to the package with a provisioning method based on expected credit losses.[59]

The marginal reserve requirement, implemented by the CB in May 2007, had a deliberate macroprudential purpose. The decision was motivated by a growth in real

[54] The first report was published in July 2002.

[55] The SYSMO model consists of a DSGE model of the economy, satellite risk models of credit and market risks, and a bank model to simulate banks' response. In addition to the FSR, further detailed analysis of certain risks relevant to financial stability in Colombia are provided in Special FSRs (in Spanish, *Reportes Especiales de Estabilidad Financiera*).

[56] The FSD participates in collaborative research work in the Consultative Group of Directors of Financial Stability (CGDFS) of the Consultative Council of the Americas (CCA). One example of the CGDFS research group's work on stress testing is Cardozo et al (2022).

[57] For a discussion with this approach, see Vargas et al (2017).

[58] The rationale for the marginal reserve requirement and its effectiveness are presented in Vargas et al (2011) and Vargas and Cardozo (2012).

[59] For details on the package of measures, see Vargas et al (2017).

credit above and beyond 30%.[60] In the year after the measure was implemented, credit growth dropped sharply (Graph 6).[61] In June 2008, the marginal reserve requirement was eliminated and the ordinary reserve requirement was increased (Mora-Arbeláez et al (2015)).[62]

In parallel with the marginal reserve requirement, the CB reactivated a URR on foreign indebtedness in order to deter regulatory arbitrage (see Vargas et al (2017)),[63] and the MoF established a URR on portfolio inflows.[64] One year later, both the URR on foreign indebtedness and that on portfolio inflows were reverted to zero.[65]

In 2007 and 2008, the SFC enhanced the provisioning scheme using the method of expected credit losses (ECL).66 The ECL method helps cushion the effect of bank provisions on credit supply, banks' profits and economic activity.67 The SFC also implemented a dynamic ECL method that links provisions to a handful of bank indicators.68 69

The GFC and the 2008 capital outflows

The macroprudential framework was put to the test again during the GFC. In contrast with the previous period of a crawling exchange rate and crawling bands, both the floating exchange rate regime and the limits on FX positions had now helped to contain FX risk. Therefore, the capital outflow that took place during the GFC could easily be met with currency depreciation and a countercyclical interest rate policy; this is what Vegh and Vuletin (2012) call the graduation of monetary authorities or, in other words, the implementation of countercyclical monetary policy.

Under the new IT framework, a more generalised policy across EMDEs was a countercyclical reduction in interest rates. In Colombia, this policy was feasible due to limited open FX positions and the low exchange rate pass-through to inflation (eg Zárate Perdomo et al (2012) and Vargas (2011)). This contrasts with the experience

60 In an authoritative comment, Hamann et al (2014, p 35) point out that real credit growth reached rates beyond 30%. Indeed, this was the case for some credit aggregates. This number may not be reflected in Figure 6 due to the quarterly frequency of the data and because the figure refers to total credit.

61 As Gómez et al (2020, p 2) point out, part of the collapse in credit was due to the GFC. The marginal reserve requirement also increased monetary policy transmission from the policy interest rate to other interest rates (Vargas et al (2017)).

62 See External Resolution No. 5 of 2008 issued by the Board of Directors of Central Bank of Colombia.

63 The URR had first been established in the 1990s through Resolution 21 of 1993.

64 See Decree 1801 of 2007.

65 See Decree 3264 of 2008.

66 The previous method was based on incurred credit losses (ICL), ie provisions are made in the event of a loss. The ICL method can result in insufficient and/or untimely provisions, potentially tightening credit supply at times of financial stress. The ECL method was set as part of the Credit Risk Management System (*Sistema de administración del riesgo crediticio,* SARC); see SFC (2002) and Morais et al (2021).

67 The regulation was implemented for commercial credit on 1 July 2007 and for consumption credit on 11 July 2008. The measures hold for banks.

68 As the indicators are at the bank level, the SFC does not have to take a stance on the financial cycle. See Chapter II of *Circular Básica Contable y Financiera*.

69 For a study of loan provisions in Colombia, see Cabrera et al (2022).

during the financial crisis of the end of the 1990s, when a drop in the policy interest rate during a crisis would have been considered a luxury accessible only to AEs.

For its part, in 2009 the SFC implemented an instrument similar to the Basel III liquidity coverage ratio (LCR).[70]

It bears emphasising that the capital outflow during the GFC did not go hand in hand with any major disruption of the Colombian financial system.

The 2010 global liquidity glut, the taper tantrum and the fall in oil prices

As was the case in other EMDEs, Colombia recovered rapidly from the GFC. Given the health of its balance sheets, the countercyclical monetary policy was quickly transmitted to aggregate demand. This was in sharp contrast with the financial crisis of the end of the 1990s, when the prolonged balance sheet repair prevented a quick recovery.

This time, AEs were launching unconventional monetary policies (UMPs). The period of global liquidity that started in 2010 led to a surge in capital flows to EMDEs (Sahay et al (2014) and Borrallo et al (2016)). In addition, in 2014 JPMorgan increased the weight of Colombia in their EM bond indices,[71] which led to increased participation by foreign investors in the public debt market and, thus, to an increase in Colombia's exposure to foreign liquidity (see Romero et al (2021) and García-Andrade (2019)).

In 2013, the mere mention of the possibility of unwinding UMPs led to an increase in financial market volatility (Sahay et al (2014) and Borrallo et al (2016)). The Federal Reserve's programme of actually tapering bond-buying purchases at end-2014 began alongside other recessionary forces that consolidated in 2015, such as lower growth in China. Consequently, a large drop in commodity prices ensued and capital flows to EMDEs receded. EM currencies depreciated, including the Colombian peso, which was highly related to collapsing oil prices.

This episode highlights one of the advantages of the IT regime with floating exchange rate. The sharp depreciation of the Colombian peso by more than 60% in nominal terms in August 2015 had a relatively small effect on domestic prices and no effect on financial stability. Indeed, core inflation rose to 7% by mid-2016 and returned to the target range by end-2017. The pass-through had decreased with the disinflation as well as with the increase in central bank credibility. In addition, both the macroprudential framework put in place and the floating exchange rate regime had helped to limit the effect of the exchange rate financial channel.

The capital inflow during the 2010 global liquidity glut affected credit to a smaller extent than during the previous 1990–98 credit build-up.[72] As illustrated in Graph 6,

[70] This instrument limits short-term liquidity risk by requiring banks to maintain enough liquid assets to meet their liquidity requirements for the next seven and 30 days. See Central Bank of Colombia (2008, p 108), Central Bank of Colombia (2009, p 99) and Chapter VI of *Circular Básica Contable y Financiera*, issued by the SFC.

[71] Importantly, in 2012 the withholding tax on foreign portfolio investment earnings was reduced and simplified in Colombia.

[72] For an analysis of the effect of capital flow swings on credit, see Sarmiento (2022).

the macroprudential measures in place helped tame the amplitude of the credit growth cycle.

In 2013, the IMF Financial System Stability Assessment (FSSA) (IMF (2013)) underscored the complexity of the Colombian financial system and recommended that the SFC be given greater powers to regulate financial conglomerates. In this vein, the Conglomerates Law of 2017[73] stated that the SFC should supervise financial conglomerates, as well as their holding companies, and regulate their capital adequacy ratios, if necessary.

The growing complexity of Colombia's financial system demanded further enhancements to the macroprudential policy framework. To limit exchange rate risk, in 2017 the CB set limits on net FX positions in different currencies.[74] In addition, in order to limit liquidity risk in different currencies, the CB established limits on an individual position indicator (IEI).[75] The IEI is designed to limit liquidity risk by ensuring that banks have sufficient resources to meet their obligations in different currencies. In the same vein, for the case of conglomerates, the CB established a consolidated position indicator[76] (Central Bank of Colombia (2016)).

The implementation of Basel III and the pandemic test of the macroprudential framework

The convergence to Basel III reforms was completed in 2018 with the implementation of important regulatory enhancements.[77] That same year, a solvency requirement was established for systemically important institutions. The requirement was to be increased gradually to 1% of risk-weighted assets in 2024, starting from 0.25% in 2021.[78] In addition, a capital conservation buffer was set to reach 1.5% in 2024, starting at 0.375% of risk-weighted assets in 2021.[79] [80] Furthermore, in 2019 a lower limit of 3% was introduced for the leverage ratio, or the ratio of bank capital to assets, effective in 2021.[81]

[73] See Law 1870 of 2017.

[74] In the process, new exchange rate risk indicators were defined. The positive exchange rate risk indicator (ICR+) was defined as the dollar sum of positive net FX positions in different currencies. Likewise, the negative exchange rate risk indicator (ICR–) was defined as the dollar sum of negative net FX positions in different currencies. Limits on indicators ICR+ and ICR– were set at +40 and –40 per cent of top-tier capital (in Spanish, *patrimonio técnico*), respectively. See External Resolution No. 3 of 2016 and *Circular Reglamentaria Externa* DODM-361 issued by the Board of Directors of Central Bank of Colombia. See also Central Bank of Colombia (2019a).

[75] See External Resolution No. 1 of 2018 issued by the Board of Directors of Central Bank of Colombia. See also Central Bank of Colombia (2019a).

[76] Ibid.

[77] For an evaluation of Colombia's convergence to Basel III regulations, see IMF (2022b, p 22).

[78] The solvency requirement was set as follows: 0.25% in 2021, 0.5% in 2022, 0.75% in 2023 and 1% in 2024. See Decree 1477 of 2018.

[79] The capital conservation buffer was set as follows: 0.375% in 2021, 0.75% in 2022, 1.125% in 2023 and 1.5% in 2024. The capital conservation buffer was set by Decree 1477 of 2018.

[80] This 1.5% requirement differs from the 2.5% requirement of the Basel III regulations because the total solvency limit in Colombia is 9% and not 8% as in other countries.

[81] *Circular* No. 020 of 2019 of the SFC set the limit at 3%. See also Decree 1477 of 2018.

In 2020, an instrument similar to the Basel III Net Stable Funding Ratio regulation was implemented.[82] Sources of stable funding include long-term loans, bank deposits and equity. To ensure that financial institutions do not undertake excessive maturity transformation, the ratio was to be gradually built up through 2022, to 100% for large banks and 80% for medium-sized banks. Smaller banks only inform the SFC and are not subject to a minimum NSFR (see Central Bank of Colombia (2020)).

The pandemic presented yet another test for the macroprudential framework, now equipped with increased capital buffers. As in the GFC, this new test was weathered without any bankruptcy.[83] During the pandemic, capital inflows decreased (Graph 2), external demand fell sharply and the terms of trade collapsed, driven by the price of oil. The exchange rate absorbed a substantial part of the shock, the CB supported the liquidity of the FX and local bond markets, and monetary policy was relaxed in the face of a rapidly weakening economy (Vargas et al (2022)). In addition, to help cushion the shock, the SFC released the countercyclical provisions while the CB provided support with short-term liquidity.

Lessons learnt

Having reviewed the development of the monetary and macroprudential framework in Colombia, it seems natural to draw some lessons. Some lessons have already been pointed out by Zárate Perdomo et al (2012). A first, long-established lesson is that macroeconomic stability is not guaranteed by the price stability objective alone. Instead, the financial stability objective requires that it be accompanied by macroprudential policy. Second, limits on open FX positions aside, the floating exchange rate regime plays a role in containing FX risk. Third, an adequate stock of international reserves plays an important role in preserving macro-financial stability. Fourth, limits on risk-taking must be balanced with the goal of financial development and financial deepening. [84]

An additional lesson is that, in contrast with the monetary policy framework that prevailed before the financial crisis of the end of the 1990s, a transparent monetary policy framework with a floating exchange rate helped the CB focus on the inflation objective, enabling the CB to overcome 25 years of so-called moderate inflation.[85]

Still another lesson is that financial stability risks change over time; therefore, continuous assessments of the evolving risks and suitable evaluations of the measures at hand are necessary. In the future, risks to financial stability may arise from instruments or markets that are not completely understood or for which information is not currently available, such as non-bank financial institutions, fintech, cryptoassets and even possibly central bank digital currencies, among others.

[82] See *Circular Básica Contable y Financiera* of 2020 issued by the SFC.

[83] Still, five institutions were required to increase their capital (see IMF (2022b, p 12)).

[84] Not all of the lessons pointed out by Zárate Perdomo et al (2012) are developed in detail in this chapter.

[85] Dornbusch and Fischer (1993) introduced the term "moderate inflation" to refer to inflation rates that persist in the range of 15 to 30 per cent.

A final lesson has to do with the interaction between monetary and macroprudential policies.[86] As pointed out by Gambacorta and Murcia (2020), macroprudential measures and monetary policy seem to reinforce each other; their effect on credit growth seems to be greater when both policies are used simultaneously. Both policies work through the financial system, so the development of both the financial system and the macroprudential policies in place can influence the transmission mechanism and the effectiveness of monetary policy (see Vargas et al (2011) and Morales et al (2022)). The complex interaction between monetary policy and macroprudential policy poses plenty of research questions, particularly considering the trade-offs that capital flow swings impose on monetary policy in EMDEs.

Challenges ahead

The challenge for the future is to preserve both price and financial stability. The fight against inflation is currently the most imminent task, and with the current IT framework, the CB is well equipped to attain the objective. The challenge in this case is to maintain the credibility of the inflation target by avoiding fiscal or financial dominance of monetary policy. Sound fiscal and macroprudential policies are key elements in this endeavour.

As for financial stability, a key issue is strengthening the role of the CB in macroprudential policy (see IMF (2022a, p 7)). In principle, as pointed out by Martin et al (2021), if macroprudential policy is effective, it can be directed towards achieving the financial stability objective while monetary policy is directed towards the inflation objective. If macroprudential policy is not completely effective, then there would be a case for monetary policy to act as a complement.

Financial deepening and inclusion, as well as capital market development, are ongoing processes in Colombia. Progress in these areas in the context of financial stability is a challenge that requires learning and careful adaptation of financial regulation and international standards. In this light, the recent IMF FSSA (see IMF (2022a)) recommended strengthening the monitoring of household indebtedness and cross-border links of financial institutions, as well as enhancing the central bank's role in the evaluation of systemic risk within the CCSSF, among others.[87]

In addition, Colombia is host as well as home to international banks. In this international environment, the control, supervision and, in particular, resolution of financial institutions in times of crisis is subject to the challenges exposed by Schoenmaker (2013) in the financial trilemma,[88] namely that the quest for financial stability in a world with capital mobility requires bilateral and multilateral instances of macroprudential policy coordination. In this vein, the challenge is to continue strengthening these international coordination and cooperation channels.[89]

[86] See Martin et al (2021) on this topic.

[87] See also Central Bank of Colombia (2022).

[88] See also IMF-FSB-BIS (2016, p 8).

[89] For a list of bilateral and multilateral instances of Colombia's coordination with the Central American countries, see CCSBSO (2016).

Finally, adaptation of policy frameworks to financial and payment innovations and the increasing threat of cyber risk is an important challenge for the central bank and other financial authorities.

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Inflation targeting in Mexico: evolution, achievements and policy lessons

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Abstract

This chapter reviews the importance of the inflation targeting framework to the progress in attaining a credible monetary policy regime in Mexico, which in turn, has contributed to the achievement of a price stability environment in the face of shocks. Importantly, its adoption was preceded by Banco de México's autonomy, a cornerstone of the country's macroeconomic stability. It is argued that the Great Financial Crisis, the unfavourable shocks that the Mexican economy experienced during the 2014-17 period and, more recently, the shocks derived from the pandemic and the military conflict in Ukraine have presented important tests to the anchoring of inflation expectations. Actions and measures that have underpinned the Bank's commitment with its price stability mandate are discussed. Some policy lessons are drawn from the current environment.

Introduction

In response to episodes of high inflation in the 1980s and 1990s, the macroeconomic framework of the Mexican economy and, in particular, its monetary policy regime was aimed at achieving price stability. A fundamental step in this process was the constitutional reform granting autonomy to the Bank of Mexico, which came into force in 1994. It established as the Bank's main objective the pursuit of stability in the national currency's purchasing power.

The adoption of an inflation targeting (IT) framework represented another crucial step towards achieving price stability in Mexico.[1] This regime, which leverages central banks' autonomy, was formally adopted as Bank of Mexico's monetary policy framework in 2001. From that moment to date, the Mexican economy has made significant progress in maintaining a credible monetary policy regime, which in turn has contributed to an environment of low and stable inflation.

There has also been notable progress in achieving an environment of price stability. The current monetary policy framework and inflationary environment in Mexico cannot be understood without considering its autonomous central bank or

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1 See Bernanke et al (1999) for an early survey of the IT regime across industrialised economies and Corbo and Schmidt-Hebbel (2002) for early experiences with said regime in Latin America.

the IT regime. In particular, the IT framework has anchored agents' inflation expectations in the face of extremely adverse economic shocks such as those of the Great Financial Crisis (GFC) and the unfavourable shocks that the Mexican economy experienced during the period 2014–17 due to the drop in international oil prices, increased uncertainty associated with Mexico's commercial relationship with the United States, and the liberalisation of the domestic price of gasoline, which marked the beginning of a short period of market-based consumer gasoline prices. More recently, the shocks derived from the pandemic and the military conflict in Ukraine have presented important tests to the anchoring of inflation expectations.

The IT regime in Mexico, which has evolved into an inflation forecast targeting (IFT) regime, has yielded high returns in terms of its fundamental role in controlling inflation in Mexico. It has also grown stronger as a transparency- and accountability-based framework through which monetary policy actions and communications reinforce the central bank's commitment to its price stability mandate.

The beginnings of the IT regime in Mexico coincide with the opening of the BIS Office of the Americas in 2002. Since then, the Office has provided services to the entire region. Today, it coordinates the meetings of various groups that are fundamental to modern central banking, facilitating discussions on key issues. It is in that setting that the last 20 years' worth of continuous improvements to Mexico's monetary policy frameworks and tools, including in communications with the public, have been discussed, putting the Bank of Mexico in a better position to tackle the current inflationary episode.

Evolution of the current monetary policy framework in Mexico

During the 20th century, various countries – including Mexico – experienced episodes of high inflation which affected the well-being of the population. In many cases, systematically expansionary monetary policies were implemented, under the belief that such policies could have permanent effects on economic growth and job creation. In the end, such episodes were often associated with the development of macroeconomic imbalances, mainly large fiscal and external deficits related to the implementation of unsustainable macroeconomic policies, which only led to extended periods of high inflation. In the case of many developing countries, including several Latin American economies, the underlying root of these inflationary problems was the phenomenon of fiscal dominance. Under such a phenomenon, money supply is set to simply satisfy a government budget constraint on a consolidated basis. Typically, if economic agents believe that fiscal deficits may be met with monetary expansions as opposed to the use of additional government revenues, this would lead to a de-anchoring of inflation expectations. At times, these fiscal deficits may even lead to hyperinflationary episodes, which the Mexican economy managed to avoid even as it suffered extremely high levels of inflation.[2]

This led to a consensus among academics and policymakers on the advisability of giving central banks status as autonomous bodies and a price stability mandate as

[2] See Sargent and Wallace (1981) and Sargent (1982).

their main objective.[3] In this context, a constitutional reform in Mexico came into force in 1994, granting autonomy to the Bank of Mexico and establishing the pursuit of the stability of the national currency's purchasing power as its primary objective. The Mexican Constitution establishes that no authority can demand credit from the Bank of Mexico.

A year after the approval of this constitutional reform, the financial crisis that broke out in Mexico in the mid-1990s, which would come to be known as the Tequila Crisis, led to a pickup in inflation, bringing it to double-digit levels and causing a substantial decline in the well-being of the country's population. A flexible exchange rate was adopted by the Foreign Exchange Commission,[4] and the central bank established intermediate targets for monetary aggregates. Over the next few years, several measures were taken in order to move gradually towards an IT regime, which was formally adopted in 2001. In 1996, the Bank started setting annual inflation targets for subsequent years. Later, in 2000, an inflation target of 3% was set for 2003, communicated then as a medium-term target, with intermediate inflation targets of no more than 6.5% and 4.5% for 2001 and 2002, respectively.

Given the instability exhibited by the velocity of money, the targets for monetary aggregates were abandoned. The 2001 adoption of an IT regime as a framework for conducting monetary policy in Mexico was officially announced in Bank of Mexico's *Inflation Report* for July–September 2000. In said report, a permanent target of 3% corresponding to the annual variation in the Mexican CPI (*Índice Nacional de Precios al Consumidor*, or INPC) was defined.

As is well known, one of the premises of IT is transparency, which is based on a strategy of communicating the monetary authority's objectives, plans and decisions. Information and communication also make for an efficient accountability mechanism, a key aspect of central bank independence, which is a fundamental part of the operation of the regime.[5] In the case of Mexico, over the last two decades this monetary policy framework has been strengthened through different measures aimed mainly at improving transparency and accountability. This has reinforced the central bank's commitment to its price stability mandate. Efforts to improve communication with the public have been ongoing (see Table 1).

With these actions, the monetary policy framework in Mexico transitioned to an IFT regime.[6] Under this regime, central banks determine the monetary policy stance such that the resulting inflation forecasts are consistent with the fulfilment of their mandate, considering the horizon in which monetary policy operates. Thus, when, in the face of inflationary shocks, the forecast trajectory for inflation no longer aligns with the price stability objective, monetary authorities assess the expected nature, magnitude and persistence of said shocks and adjust the monetary policy stance accordingly.

[3] See the seminal contributions of Kydland and Prescott (1977) and Barro and Gordon (1983) for arguments in favour of using the time-consistency approach for setting monetary policy, thereby avoiding inflationary bias. See also Cukierman (1992) and Persson and Tabellini (1993).

[4] This body, which comprises top officials of the Bank of Mexico and the Ministry of Finance, including the Governor of the Bank of Mexico and the Minister of Finance, is responsible for foreign exchange policy in Mexico.

[5] See Blinder et al (2008) and Woodford (2005).

[6] See Box 6, "Inflation targeting regime and the role of forecasts", published in BDM (2017) for an explanation of the regime.

The economic literature suggests that the publication of inflation forecasts allows agents to better understand central banks' reaction function and provides more information on monetary authorities' interpretation of the economic environment and their policy response to changes in said environment.[7] In line with this, in 2018 the Bank of Mexico started publishing the point values for headline and core annual inflation for the next eight quarters in its *Quarterly Report*.

The IT scheme, which has evolved into an IFT regime over the last few years, has become a fundamental pillar of Mexico's macroeconomic policy framework. This framework has been accompanied with fiscal discipline, a regime of exchange rate flexibility, and the strengthening of financial regulation and supervision.

Progress in achieving an environment of price stability in Mexico (2001–19)

During the first two decades of the 21st century, the monetary policy framework, along with the macroeconomic policy framework, made it possible to advance in the creation of an environment of low and stable inflation in Mexico. In particular, headline inflation dropped.

With the benefit of hindsight, the main achievements associated with a monetary policy framework focused on a price stability mandate include:

i. a reduction in the level, volatility and persistence of inflation;[8]

ii. lower pass-through of exchange rate fluctuations to prices;[9]

iii. reduced dispersion of inflation expectations, which results in a better anchoring;[10]

iv. an inflationary process determined more by forward-looking elements rather than backward-looking ones, which reflects the strengthening of the monetary policy expectations channel;[11] and

v. increased room for manoeuvre for monetary policy to implement countercyclical policies, as occurred during the GFC, the sequence of adverse shocks to the Mexican economy during 2014–17 and, more recently, during the first stage of the Covid-19 crisis in 2020, thanks to the anchoring of longer-term inflation expectations.

7 See Svensson (1997) and (1999).

8 See Chiquiar et al (2010).

9 See, for instance, Cortés (2013), Kochen and Sámano (2016) and Angeles et al (2019).

10 Box 5, "Behavior of long-term inflation expectations in the context of inflationary pressures", published in BDM (2022) presents evidence supporting the view that, despite the severity of the shocks that have affected inflation in Mexico, long-term inflation expectations have remained anchored around their historical levels. Similarly, econometric analysis indicates that long-term inflation expectations do not exhibit a statistically significant response to either permanent or transitory inflationary shocks. These results are consistent with those of Beauregard et al (2023), De Pooter et al (2014) and Aguilar et al (2014).

11 See Box 2, "Recent changes in the transmission mechanism of monetary policy in Mexico", published in BDM (2016a). It shows that, for the periods 2001–06 and 2001–15, the reduced-form forward-looking coefficients of the hybrid Phillips curve and those of the IS curve are larger in the latter period than in the former. This strengthens the expectations channel of monetary policy in Mexico.

The main benefits associated with advancement in controlling inflation in Mexico include the following:

1. An environment of greater price stability has contributed to the development and deepening of the national financial system. In particular, it has allowed for the development of medium- and long-term financial instruments.[12]
2. The fall in inflation caused a decline in both inflation expectations and the inflationary risk premium, which led to lower interest rates. Accordingly, the financing costs incurred by households, firms and the federal government have tended to decline.[13]
3. An environment of low and stable inflation has helped preserve the stability of households' purchasing power.[14]

There has been notable progress in achieving an environment of price stability. In this context, it is important to note that the credibility of the central bank is not permanent but rather is earned from day to day through the bank's work to achieve and preserve an environment of low and stable inflation. Once the public believes that the bank is credible in delivering said inflationary environment, it can face episodes of adverse shocks more effectively. Among such episodes, there are three that stand out in Mexico.

The first of these is the GFC. Following the collapse of the investment bank Lehman Brothers in 2008, the crisis intensified and significantly affected emerging market economies (EMEs) like Mexico. The sharp increase in global risk aversion and the contraction in world economic activity deeply affected the national economy, leading to domestic financial market turmoil. In this context, the Bank of Mexico, along with the federal government, implemented a series of measures aimed at re-establishing the orderly functioning of these markets and ultimately preserving financial stability. After picking up with the adverse financial shock of 2008, headline inflation reached 6.53% in December 2008 before starting a downward trend in early 2009. The easing of inflationary pressures was driven by the drop in international commodity prices and greater slack in the economy as the economic outlook worsened. In this setting, and considering the fact that inflation expectations remained well anchored, the Bank of Mexico initiated a monetary easing cycle.

The second episode occurred more recently, during the period 2014–17. The Bank of Mexico conducted monetary policy in a complex environment in which the Mexican economy faced a series of adverse shocks, many of them having an effect on the Mexican currency. From mid-2014 to its lowest point in mid-January 2017, the peso depreciated against the dollar by close to 68%. One of the shocks that occurred during this period was a deterioration in the terms of trade due to the persistent drop in international oil prices in late 2014. This shock, together with a generalised appreciation of the dollar due to the expectation of monetary policy normalisation in the United States, gave rise to greater volatility in international financial markets, including EMEs' currencies.

[12] See Technical Chapter, "Change in the nominal system of the Mexican economy in the early 2000's", published in BDM (2010) and Box 6, "Importance of central bank's autonomy and of the price stability mandate" in BDM (2019).

[13] Ibid.

[14] See Box 6, "Importance of central bank's autonomy and of the price stability mandate" published in BDM (2019).

In 2015, economic conditions in the United States created the expectation that monetary policy normalisation was imminent after several years of very lax conditions in that economy. This was reflected in financial markets volatility and further adjustments of the Mexican peso, which led to a real exchange rate depreciation. This process was absent of second-round effects given the anchoring of inflation expectations and the low pass-through of exchange rate variations to prices, both factors being dependent on the Bank of Mexico's commitment to its price stability mandate.

In 2016, as the result of the US elections in November pointed towards protectionist measures, the future of Mexico's trade relationship with the United States became highly uncertain, affecting the Mexican economy. In this context, domestic financial markets exhibited heightened volatility at the end of 2016 and the beginning of 2017. In particular, the Mexican peso depreciated sharply, reaching its pre-pandemic low against the dollar, and long-term interest rates increased. The increase in volatility was also driven by the expectation of a fiscal expansion carried out by the new US administration, which led markets to anticipate a more accelerated process of monetary policy normalisation in that country.

In the second half of January 2017, a combination of factors, namely the monetary policy actions implemented by the Bank of Mexico, the measures set forth by the Foreign Exchange Commission and some constructive comments by members of the US government regarding the future bilateral relationship between the United States and Mexico, partially reversed the depreciation of the domestic currency.

In early 2017, the domestic price of gasoline was liberalised, resulting in significant inflationary pressures in an already complex scenario for inflation.[15] In January 2017, headline inflation was around 4.72%. Close to 80% of the increase in headline inflation in annual terms from December 2016 to January 2017 can be attributed to the direct effect of the increase in gasoline prices.[16] An upward trend in inflation would follow as a result of both external and domestic factors. On one hand, inflation started to reflect the effects of the peso's depreciation, which, despite its partial reversal in 2017, still left the peso about 35% weaker than its mid-2014 level, even at its strongest point in July 2017. This took place in an environment of relatively tight cyclical economic conditions. The currency further weakened over the last few months of the year, and the minimum wage was adjusted in December 2017.[17] On the other hand, the non-core component of inflation was also affected by adverse shocks to the prices of LP gas, public transportation and some agricultural goods. In this context, headline inflation ended 2017 at 6.77%, a level not seen since 2001, when

[15] In December 2016, the Ministry of Finance established a mechanism for determining the price of gasoline in Mexico that aimed to introduce more flexibility in said prices in order to align them with their international benchmarks, thereby gradually limiting the role of subsidies in smoothing them over time, except in the case of excessive fluctuations. In an environment of upward adjustments in international gasoline benchmarks and a considerable depreciation of the domestic currency, this change in the determination of gasoline prices implied a considerable price increase in January 2017. In February 2017, the Ministry of Finance adjusted this mechanism to allow gasoline prices to be smoothed out further.

[16] See Box 1, "Indirect effects of energy price increments onto the price formation process of the Mexican economy", published in BDM (2016b).

[17] The increase in the minimum wage in December 2017 was the first of several multi-year minimum wage increases of considerable magnitude. It rose from 80.04 pesos a day to 88.36. However, an important assumption behind this policy was that a lump-sum increase (*Monto Independiente de Recuperación*), in combination with a percentage increase in the minimum wage, would mitigate the lighthouse effect on other wages.

core inflation reached 4.87% by the end of that year. In January 2018, annual headline inflation dropped significantly to a still high level of 5.55%, with a strong decrease in non-core inflation and a smaller decline in core inflation, which landed at 4.56%.[18]

In response to this set of shocks, the Bank of Mexico raised the reference rate from 3% in 2015 to 8.25% in 2018. In the face of an incredibly difficult inflationary outlook, the main challenge for the Bank of Mexico was to prevent a de-anchoring of longer-term inflation expectations and negative effects on the price formation process, while also facilitating an orderly adjustment of relative prices induced by the real exchange rate depreciation. A message that was emphasised in its communications was that the Bank remained vigilant regarding all inflation determinants and expectations for the medium- and long-term, among them the exchange rate and its possible pass-through to consumer prices, Mexico's monetary stance relative to the United States, and the potential effects of international energy prices, in particular that of gasoline, on prices in the rest of the economy. The purpose of this was to consolidate the convergence of inflation to the target.

The monetary policy response to the inflationary episode of the Covid-19 pandemic and war in Ukraine (2020 to present)

As a result of the shocks caused by the Covid-19 pandemic and, later, the geopolitical conflict in Ukraine, central banks around the world, including the Bank of Mexico, have faced an extremely complex and uncertain environment. Global inflation has been subjected to multiple shocks, which have caused it to increase considerably for a long period of time. In fact, inflation figures in several economies have reached levels not seen decades ago. Although the pandemic has affected the economy and society in several ways, the evolution of inflation has posed multiple challenges for monetary policy management.

In March 2020, at the onset of the pandemic in Mexico, annual headline inflation was 3.25% and core inflation was 3.60%. In the early stages of the pandemic, annual headline inflation even declined and registered its second-lowest level on record, reaching 2.15% in April. This was due in large part to significant decreases in energy prices.

As for the remainder of 2020, there was a change in relative prices within the core component as the lockdown exerted downward pressures on services inflation and upward pressures on merchandise inflation. These conditions, combined with various supply shocks such as disruptions in global production and distribution chains and the sudden depreciation of the exchange rate by close to 30% from the second half of February 2020 to April, when it reached its lowest level, resulted in a 3.80% annual core inflation recorded in December 2020. Non-core inflation closed that year at 1.18%. With these results, annual headline inflation ended 2020 at 3.15%.

Therefore, in 2020 the shocks triggered by the pandemic affected inflation in opposite directions and tended to neutralise each other. The effect of the sharp depreciation would subsequently weigh on the inflationary outlook. This was one of the factors which, combined with other risks to inflation, limited the space for monetary accommodation during the easing phase of the pandemic, producing a

[18] In December 2016, headline inflation was 3.36% while core inflation reached 3.44%.

different trade-off to the one faced by advanced economies and therefore requiring a more prudent monetary policy stance.

The surge in inflation observed since 2021 has been driven by various factors:

i. First, from an aggregate demand perspective, considerable monetary and fiscal stimulus in advanced economies resulted in a vigorous increase in demand, particularly for merchandise, in a context in which consumer behaviour was already characterised by a reallocation of expenditure away from services. Moreover, global economic activity recovered quickly, amplifying the abrupt increase in demand.

ii. Supply has been affected by widespread disruptions in production and distribution networks due to the restrictions on the operation of businesses and interruptions in the production process as a result of the measures adopted to contain the spread of Covid-19. In addition, the unsynchronised reopening of economies also contributed to the scarcity of certain inputs and generalised increases in input prices and operation costs.

The relatively inelastic supply was not capable of adjusting at the same pace as demand, as the latter was expanding very dynamically. This led to a severe imbalance between supply and demand in several world markets, which characterised the period of economic recovery, resulting in significant inflationary pressures. These pressures prompted the beginning of an unprecedented hiking cycle in both AEs and EMEs.

All of the above exerted pressure on the prices of both merchandise and services in Mexico such that annual core inflation closed 2021 at 5.94%. In turn, annual variations in the prices of energy and fruits and vegetables, as well as the prices of livestock products, remained high during most of 2021, driving annual non-core inflation to 11.74% in December of that year. Due to the above, annual headline inflation closed 2021 at 7.36%.

In 2022, inflationary pressures associated with the geopolitical conflict in Ukraine that began in the first quarter of that year added to the shocks derived from the pandemic, which continued to affect inflation. The military conflict brought heightened uncertainty, exacerbating some of the disruptions in supply networks and further increasing the already high prices of several products, particularly food commodities, fertilisers and energy. In this context, in 2022 inflationary pressures turned out to be deeper, longer-lasting and more widespread than anticipated.

However, in the final months of the year, some of the factors that had exerted pressure on inflation began to show signs of subsiding. In particular, supply chain operations improved and the prices of certain commodities stabilised and, in some cases, fell. In this context, annual headline inflation reached 8.70% in August 2022, then decreased over the last few months of the year, reaching 7.82% in December. Core inflation followed a 24-month upward trajectory, which was interrupted in December 2022 when it decreased to 8.35%. In turn, non-core inflation reached 10.65% in August 2022, its highest level that year. It eventually settled at 6.27% in December. Hence, the aforementioned moderation in headline inflation was largely due to the decrease in the non-core component.

Given the atypical nature of the shocks derived from the pandemic and, later, from the geopolitical conflict in Ukraine, monetary policy management in Mexico has been particularly challenging, as the Bank of Mexico has faced an extremely complex and uncertain environment.

The Bank of Mexico hiked rates for the first time well ahead other central banks, mainly those of advanced economies and most EMEs, as the Governing Board determined that the shocks affecting inflation posed a risk to the economy's price formation process. Actions like this reflect the Bank's commitment to its price stability mandate and underpin its credibility, given that the latter is endogenous to the Bank's decisions.

Since the Governing Board decided to start raising the policy rate in June 2021, it has responded to either existing or new inflationary shocks by setting a reference rate that is consistent, at all times, with both an orderly and sustained convergence of headline inflation to the 3% target within the monetary policy horizon and an adequate adjustment of the economy and financial markets.

At each of its meetings in June, August, September and November 2021, the Governing Board increased the reference rate by 25 basis points. It then raised the rate by 50 basis points at its meeting in December 2021, as well as at those in February, March and May 2022. At each of its meetings in June, August, September and November 2022, it raised the reference rate by 75 basis points. Since the adoption of the definition of the overnight interbank interest rate target as the Bank of Mexico's policy instrument in 2008, the inflationary environment had not required the Bank to hike by 75 basis points. Given the intensification of inflationary pressures and the greater challenge that inflation control has presented, the pace of policy rate hikes was increased twice during this tightening cycle. Forceful actions were thus adopted, making it possible to achieve a restrictive monetary policy stance as required by the inflationary outlook.

At the December 2022 meeting, in response to a slight improvement in the inflation outlook and considering the cumulative increases in the reference rate throughout this tightening cycle, the Governing Board decided to reduce the rate of increase from 75 to 50 basis points. This decision reflected a delicate balance. On the one hand, some inflationary shocks had started to show signs of moderation. Annual headline inflation had also decreased, mainly due to the decline in the non-core component. On the other hand, up until November, core inflation had continued to rise, though later adjustments had been smaller than those recorded in the months before. In a still complex environment and with a balance of risks for inflation biased to the upside, the additional increase of 50 basis points in the December decision helped to further strengthen the monetary policy stance.

Thus, from June 2021 to December 2022, the Bank of Mexico increased the target for the overnight interbank interest rate by a cumulative 700 basis points, taking the reference rate to 10.50%. Had the Bank not acted in such a forceful way under these exceptional circumstances, the price formation process in Mexico would have been put in a much more complex situation, which would have made it more challenging to reduce inflation in Mexico in the future.

These actions, which refer not only to the increases in the reference rate but also to communications through the Bank's different channels, have sought to keep long-term inflation expectations anchored as well as foster the orderly function of domestic financial markets, including the foreign exchange market.

Among the most relevant measures implemented to improve the Bank's communications are those related to the publication of inflation forecasts. In August 2021, the Bank started to include point values for headline and core annual inflation

forecasts for the following eight quarters in each *Monetary Policy Statement*.[19] Given the environment of high uncertainty, which led to important revisions between monetary policy decisions, this has allowed the public to access more information about the inflation forecasts considered by the Bank in each decision. This information has thus been useful in explaining to the public the Bank of Mexico's monetary policy actions under an IFT regime framework in the face of extremely complex economic conditions.

In 2022, the Bank of Mexico also began to provide forward guidance regarding its future monetary policy decisions. In an extremely complex and uncertain inflationary environment, the central bank emphasised through these communication actions that forceful measures were required to achieve inflation convergence over the forecast horizon. In this way, the Bank of Mexico reinforced its commitment to its primary mandate of price stability, helping to anchor inflation expectations.

In sum, through its monetary policy actions and communications, the Bank of Mexico strengthened its monetary policy stance as required by the inflationary environment. Yet, core inflation must still be monitored in order to achieve the inflation target of 3% within the forecast horizon in the face of an economic environment that remains extremely complex and therefore still presents challenges ahead.

Policy lessons for the current environment

Since the formal adoption of the IT regime in Mexico in 2001, this framework had not been exposed to the inflationary pressures that emerged during the highly atypical episode of the Covid-19 pandemic and the war in Ukraine, whose effects are still felt in the economic environment. Some policy lessons can be drawn from this episode as it has represented a stress test for the IT regime in Mexico and in the region.

a) Keeping inflation expectations well anchored

The current inflationary episode has provided unprecedented evidence on central banks' actions to keep inflation expectations well anchored, particularly long-term ones. This is a precondition for a sustained reduction in inflation since central banks' credibility is endogenous to the policy response implemented to achieve price stability.

When shocks that drive inflation upwards occur, it is common for short-term inflation expectations to be adjusted to the upside. However, to the extent that medium- and longer-term expectations remain anchored, observed inflation will tend to decrease as the shocks dissipate, even if short-term expectations have increased.

In the face of several widespread, large and long-lasting supply shocks, such as those derived from the pandemic and the war, the risk that economic agents adjust their medium- and long-term inflation expectations upwards is significantly high. In this scenario, monetary policy may respond when facing the risk that said expectations will become de-anchored to keep them stable.

[19] Later, in December 2021, it started publishing the annualised seasonally adjusted quarterly forecast for headline and core inflation.

In this context, as mentioned above, the Bank of Mexico has reinforced its commitment to its constitutional mandate to pursue the stability of the national currency's purchasing power throughout this tightening cycle. The central bank's actions have aimed to avoid a de-anchoring of longer-term inflation expectations, which would have entailed a higher and more persistent inflation. Increases in private sector specialists' expectations for headline and core inflation for the next five to eight years have been relatively moderate. However, they have remained above the 3% target, and their distribution has shown some bias towards relatively higher inflation levels, which is a warning sign for this central bank and implies important challenges for monetary policy.

However, in an inflationary environment that will remain quite complicated, central banks face the challenge of avoiding a de-anchoring of both medium- and long-term inflation expectations. The latter would keep inflation at high levels even after shocks dissipate. Given this, analysing the main determinants of medium- and long-term inflation expectations in events such as the Covid-19 pandemic and its aftermath may shed light on the extent to which monetary policy actions can mitigate and even offset the effects of long-lasting shocks to inflation. Moreover, EMEs like those of Latin America are likely to serve as a good case of study because supply shocks are typically the rule in these economies rather than the exception. Nevertheless, it is important to note that the depth, generalised nature and duration of these shocks have been completely new factors.

b) Sound macroeconomic fundamentals in the face of a complex and uncertain environment

Sound macroeconomic fundamentals are crucial in a complex and uncertain environment. Reminders of this came in the form of the unprecedented inflationary episode caused by the pandemic, the measures to contain it, and the war, as well as the monetary tightening cycles of systemically important economies like the United States.[20] The latter typically present significant challenges for EMEs like Mexico, as the hiking cycles of the federal funds rate tend to be associated with capital outflows and exchange rate pressures. The current tightening cycle in the United States has come with increases in long-term interest rates worldwide and a generalised appreciation of the US dollar.

The Mexican economy has been able to strengthen its policy framework over time. Stronger macroeconomic fundamentals have been mapped into a relatively better situation as compared with previous episodes. It is currently in a better position than in the past to face risks associated with an external environment characterised by stringent financial conditions. This is due to the country's sounder macroeconomic fundamentals relative to other economies, which include the following: (i) a well-capitalised and liquid banking system; (ii) sustainable external accounts; (iii) fiscal discipline; (iv) an adequate level of international reserves; and (v) a free-floating exchange rate regime.

Along with said fundamentals, the Bank of Mexico has, as previously mentioned, implemented a prudent and timely monetary policy focused on price stability. Hence,

[20] Ahmed et al (2021) study EMEs' different responses to US monetary changes depending on the anchoring of their inflation expectations, potential currency mismatches and currency of exports. Their results indicate that well-anchored inflation expectations, together with strong balance sheets and exports priced in foreign currency, insulate the economy from foreign monetary policy shocks, particularly if said shocks are driven by a more hawkish stance.

the monetary policy actions implemented by this central bank have led to relatively high spreads of domestic currency volatility-adjusted interest rates between Mexico and the United States. In this context, domestic financial markets have generally operated in an orderly manner during this episode, despite exhibiting some bouts of volatility. As for the exchange rate market, the Mexican peso has shown a more resilient and orderly performance with respect to the vast majority of EMEs' currencies. Looking forward, the economic outlook is expected to remain highly complex and uncertain.

Under these conditions, it is essential to maintain solid macroeconomic fundamentals, which are also conducive to a credible monetary policy framework and, more generally, to a credible macroeconomic policy regime.

c) Inflation dynamics – dependency and judgement in an atypical, uncertain environment

The pandemic and, later, the war were reminders that central banks must continue following a flexible approach. Moreover, awareness of the changing environment with regard to their actions, analysis and communications must continue prevailing.[21] Given the exceptional shocks that the economy faced throughout this period of inflationary pressures, it was very difficult for central banks, the Bank of Mexico included, to assess the evolution of inflation. With the intensification of pre-existing shocks and the emergence of additional ones, inflation surprised to the upside on several occasions.

Given the nature of the pandemic-induced crisis and the fact that the available economic analytical tools were not designed to fully assess the effects of such an event on the economy, central banks have required a policy response that is cautious, flexible and driven by inflation dynamics. In terms of analysis, the situation has made it necessary to introduce new variables and novel data, such as freight costs, into economic models.

Monetary authorities have faced an extremely uncertain outlook for inflation, in which it has been affected by shocks originating during both a health emergency and a geopolitical conflict. Considering the atypical nature of these shocks, it is difficult to assign probabilities to the ways in which they could evolve, as we already found over the last two years. For this reason, in a still highly uncertain environment, it is essential that central banks maintain flexibility, continue to act prudently and make decisions based on inflation and its assessment. The use of well-informed and disciplined judgement complementing rigorous analysis has been and will continue to be important.

Final remarks

The inflation targeting regime in Mexico, which has evolved into an inflation forecast targeting regime, has yielded high returns in terms of its fundamental role in controlling inflation in Mexico. Crucially, this regime stands on the autonomy that the

[21] See Gopinath (2022) for a discussion on the slope of the Phillips curve in the face of the pandemic and the war. See also the survey of forecasting issues during Covid-19 pandemic times presented by Ho (2022).

Mexican Constitution grants to the Bank of Mexico. However, autonomy is of even broader importance, as it overcomes the phenomenon of fiscal dominance in the inflationary process of the economy. Given the highly adverse effects of inflation on the most vulnerable sector of the population, both autonomy and the inflation targeting regime are crucial to the achievement of a price stability environment.

Although the first two decades of the 20th century saw clear progress in inflationary control in Mexico, with tangible benefits for the population, central banks are currently facing a challenging environment. This is characterised by the presence of shocks caused by the pandemic and the geopolitical conflict, which have been deeper, longer lasting and more widespread than anticipated, driving inflation in several economies to levels not seen decades ago.

These inflationary conditions have proven to be an exceptional test for the inflation targeting framework. In the case of Mexico, a restrictive monetary policy was achieved through adjustments to the policy rate of greater magnitude than those that had historically been implemented by the Bank of Mexico, as well as through a communication strategy that reinforced the central bank's commitment to achieving its mandate. In this context, medium- and long-term inflation expectations have adjusted only moderately, while domestic financial markets have functioned in an orderly fashion, in which the resilient performance of the national currency stands out.

As the economic environment is still very uncertain, central banks must be prudent and must remain watchful for upcoming challenges. The approach that central banks should follow is one in which caution and flexibility continue to prevail. Caution is required to carefully analyse any additional information that is obtained, while flexibility is required to adjust the monetary stance in line with the scenario that materialises. Moreover, it must be recalled that central banks' credibility is endogenous; therefore, it is built up based on actions aimed at achieving price stability.

Cooperation with the BIS Office of the Americas will remain important for central banks in the region in the face of the economic environment that will likely prevail in the upcoming years, in which topics such as the energy transition and reconfiguration of global supply chains will be subject to policy discussions. In this vein, although the Mexican economy has benefited from a solid macroeconomic framework, strengthening it requires daily work.

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Annex

Changes to Bank of Mexico monetary policy communications framework — Table 1

1995	✓	Establishment of the "accumulated balances regime" for the conduction of monetary policy.
1999	✓	Adoption of a medium-term inflation objective.
2000	✓	Bank of Mexico starts publishing a press release that announces changes to the operational objective in the conduction of monetary policy.
	✓	Bank of Mexico starts publishing a quarterly inflation report.
2001	✓	Inflation targeting regime is formally adopted by Bank of Mexico.
2002	✓	Permanent 3% inflation target is adopted, to start in 2003.
2003	✓	Calendar with pre-established dates for monetary policy decisions is released.
	✓	The publication of a monthly press release on monetary policy is implemented, with the possibility of an additional mid-month report to be published if the monetary policy stance is modified.
	✓	Adoption of an "accumulated daily balances regime" for the conduction of monetary policy.
2006	✓	Decrease in monetary policy decisions from 23 to 12 per year.
2008	✓	Decrease in monetary policy decisions from 12 to 11 per year.
	✓	Adoption of monetary policy conduction through interest rate operational objectives
2010	✓	Use of fan charts to announce inflation and economic activity forecasts in issues of the Quarterly Report begins.
2011	✓	Start of the publication of minutes of the monetary policy decision meetings.
	✓	Decrease in monetary policy decisions from 11 to eight per year.
	✓	Transmission of Quarterly Report executive presentation and subsequent press conference starts.
2017	✓	Central trajectories of inflation and economic activity forecasts are added to fan charts.
2018	✓	Start of publication of point values for median forecasts of annual inflation in the Quarterly Report.
	✓	Adoption of policies to obtain public commentary on general policy proposal projects before they are issued by Bank of Mexico, in accordance with its legal powers.
	✓	Voter identities in monetary policy decisions are included in the MP decision meeting minutes, with the inclusion of a motives paragraph in case of dissent.
	✓	Simultaneous publication in English and Spanish of the monetary policy press release and the minutes of the monetary policy decision meetings.
	✓	Transcripts of Governing Board monetary policy decision meetings are set to be published three years after each meeting takes place.
	✓	Speeches and public presentations by Governing Board members are made available to the public.
2020	✓	General Communication Criteria for Governing Board members and Bank of Mexico executives are updated and published for the first time.
	✓	The monetary policy press release and the corresponding meeting minutes are shortened.
	✓	The quorum present in each monetary policy decision meeting is included in the monetary policy press release.
2021	✓	Publication of the Bank of Mexico headline inflation and core inflation forecasts and of the annualised seasonally adjusted quarterly headline inflation and core inflation forecasts for the following eight quarters with each monetary policy decision.
	✓	Publication of the individual vote by each member of the Governing Board in the monetary policy press release, rather than its publication for the first time in the minutes of the monetary policy decision meeting.
2022	✓	Publication of next year's monetary policy calendar moved up from the July–September Quarterly Report to the April–June Quarterly Report.

Source: Bank of Mexico.

Twenty years of inflation targeting in Peru: lessons and challenges ahead[1]

Julio Velarde and Carlos Montoro

Abstract

In late 2001, the Central Reserve Bank of Peru (BCRP) embarked on the path of an inflation targeting (IT) regime, marking Peru as the first bi-monetary economy to adopt this monetary policy framework. In this undertaking, the BCRP considered the inclusion of other alternative tools such as FX intervention and reserve requirements, supplementing the conventional use of the interest rate. This range of tools has aided the BCRP in executing a counter-cyclical monetary policy. Simultaneously, it has helped moderate fluctuations in the credit cycle and alleviate risks emanating from excessive exchange rate volatility in a context of financial dollarisation.

Three pivotal episodes marked the initial two decades of IT implementation, each posing significant challenges for shaping monetary policy amidst pronounced macroeconomic volatility: the commodity super-cycle (2004–14), the Great Financial Crisis (2008–09) and the Covid-19 pandemic. Also significant was the launch of a de-dollarisation initiative in 2013, which has been instrumental in mitigating financial stability risks associated with financial dollarisation.

Looking ahead, the primary challenges for the BCRP include: controlling inflation in the post-pandemic era, navigating potential fiscal dominance risks on a global scale, adapting to digital innovations within the payment and monetary system (including central bank digital currencies, or CBDCs), gauging the impacts of monetary policy on income distribution, and discerning the role that central banks may assume in responding to climate change.

Introduction

At the turn of the century, after an episode of hyperinflation (1988–90) followed by a period of stabilisation (1990–2001), inflation in Peru converged to international levels. In this context, in December 2001 the Board of the Central Reserve Bank of Peru (BCRP) initiated formal procedures for adopting an inflation targeting (IT) framework with the purpose of keeping inflation expectations anchored to a target band, strengthening the interest rate transmission mechanism, and controlling risks

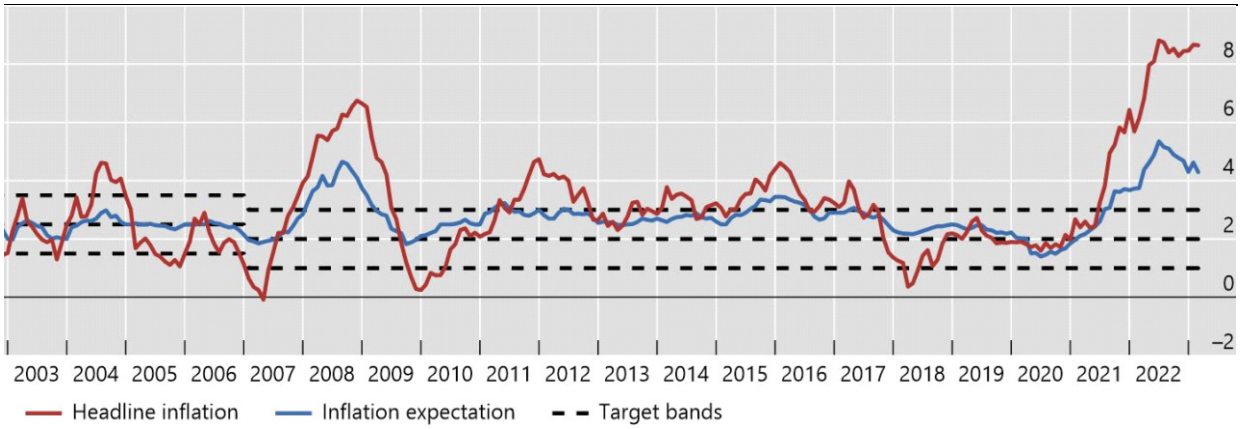
[1] Based on Chapters 14 and 15 of Vega and Zegarra (2022).

associated with financial dollarisation. In February 2002, the inflation target of 2.5% with a ±1% tolerance band was officially announced.[2,3]

The current inflation target is a 1–3% band with a 2% midpoint. The band provides the BCRP with sufficient room for manoeuvre given the size and volatility of supply shocks affecting inflation. Since adopting IT, the BCRP has succeeded in keeping inflation expectations anchored, with some temporary deviations from the band. However, even though inflation has consistently stayed in the single digits, Peru is currently experiencing its longest and most persistent deviation episode, mainly associated with international food and energy supply shocks (initially generated by post-pandemic recovery).

Headline inflation and inflation expectations 12-months ahead

Year on year changes, in per cent — Graph 1



Note: Inflation (yoy, %) – December. 2002: 1.5%, 2003: 2.5%, 2004: 3.5%, 2005: 1.5%, 2006: 1.1%, 2007: 3.9%, 2008: 6.7%, 2009: 0.2%, 2010: 2.1%, 2011: 4.7%, 2012: 2.6%, 2013: 2.9%, 2014: 3.2%, 2015: 4.4%, 2016: 3.2%, 2017: 1.4%, 2018: 2.2%, 2019: 1.9%, 2020: 2.0%, 2021: 6.4% and 2012: 8.5%.

Source: Central Reserve Bank of Peru.

Together with the adoption of IT, the development of markets for central bank securities (BCRP Certificates of Deposit, or CDBCRPs) and domestic currency sovereign bonds (BTPs) increased the depth and liquidity of the fixed income market. In particular, the creation of a yield curve improved the transmission of monetary policy by providing a benchmark for credit and deposit operations at longer terms and creating the conditions for the issuance of private debt securities. Average BTP duration increased from 3.4 years in 2004 to 16.5 years in 2009 and 9.7 years in 2022. Private sector bonds are now issued with maturities of up to 30 years.

Given that the BCRP is not a lender of last resort in FX, the materialisation of risks from partial financial dollarisation (ie abrupt exchange rate fluctuations and volatile capital flows) could compromise financial stability and weaken confidence in the local currency. Moreover, in a dual-currency environment with shallow financial markets,

[2] The inflation target was initially set at 2.5% at year-end, with a tolerance margin of ±1%. In January 2006, the BCRP established a year-on-year monthly rolling target. In February 2007, the target was reduced to 2%, with a tolerance margin of ±1%, to further strengthen confidence in the domestic currency. Finally, in March 2014, the BCRP changed the inflation target to a 1–3% target band, which remains in force to date. For more details, see BCRP (2007; 2014).

[3] Prior to formal adoption of IT, the BCRP had announced target bands starting in 1994. These target bands narrowed each year to gradually bring inflation down to international levels (Armas et al (2001)).

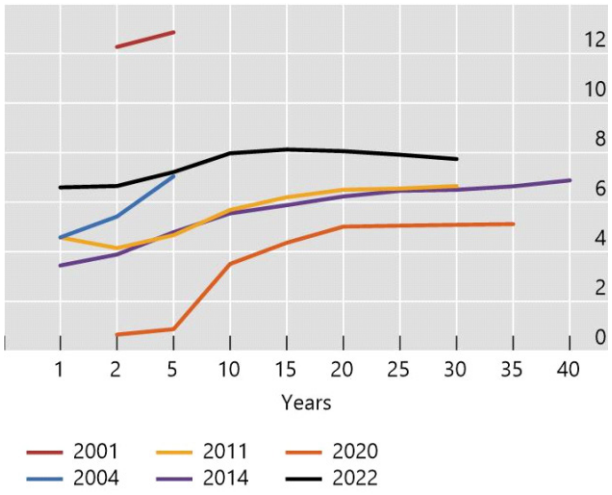
the impact of the policy interest rate on domestic financial conditions is limited. In this light, the BCRP adapted IT to domestic conditions, including through additional instruments, such as FX intervention and reserve requirement rates (RRRs), to complement its policy rate.

Yield curves

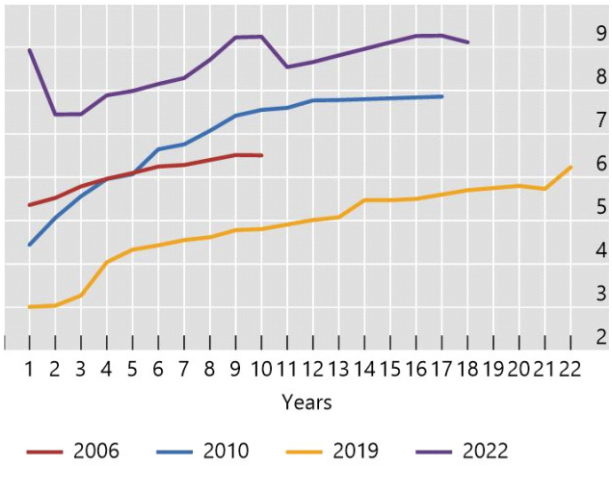
In per cent

Graph 2

A. Government local currency bond yield curve



B. Private sector local currency yield curve



Note: It includes bonds with ratings of A, AA and AAA.

Source: Ministry of Economy and Finance (MEF) and Superintendence of Banking, Insurance and AFPs (SBS).

The BCRP's FX intervention aims to reduce exchange rate volatility – without affecting its long-term trend – to: (i) limit balance sheet effects associated with financial dollarisation; (ii) provide FX liquidity to the financial system in times of stress; (iii) moderate credit cycles associated with capital flow fluctuations; (iv) build FX reserves as insurance against episodes of financial turbulence; and (v) ensure the market functions smoothly.

Lower exchange rate volatility also enhances monetary policy transmission and reinforces confidence in the local currency, thereby contributing to low and stable inflation. Thus, FX intervention may become more frequent under heightened exchange rate volatility triggered by global or domestic developments such as the Great Financial Crisis (GFC) in 2008, China's financial turbulence episode (2015–16), the Covid-19 pandemic (2020–21), and Peru's period of political uncertainty (2021–22).

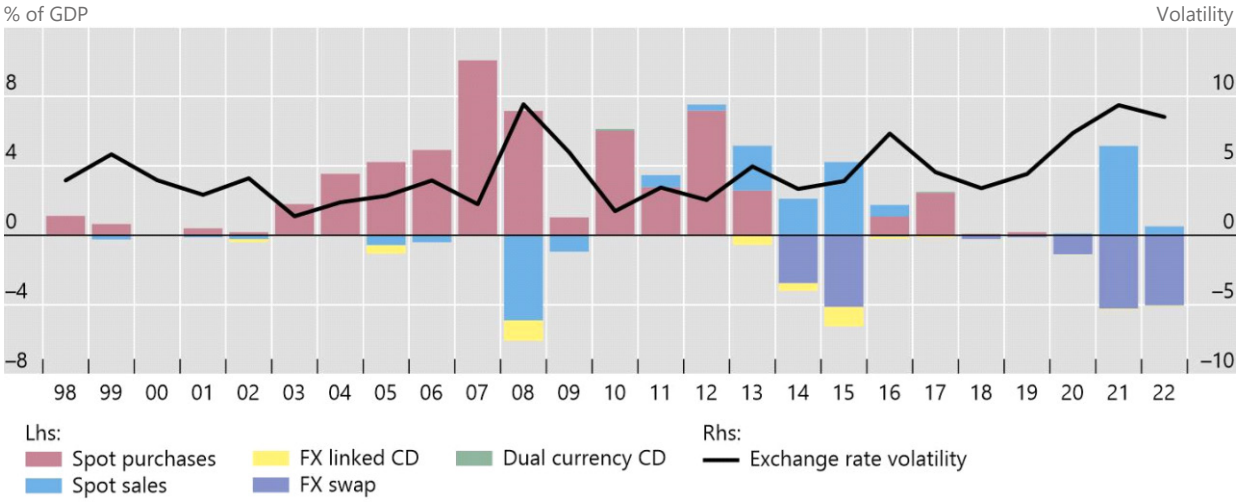
Since the early 1990s, FX interventions have been conducted through the purchase/sale of dollars (USD) in the spot market. At the same time, FX purchases expand the monetary base through the injection of domestic currency (PEN). In parallel with the development of the local FX derivatives market, FX interventions also began to be conducted through alternative instruments such as FX-indexed BCRP securities (CDR BCRPs) starting in 2002, FX swaps starting in 2014, and BCRP securities payable in USD (CDLDs) starting in 2016.

The BCRP uses RRRs on both domestic currency and FX liabilities to ensure adequate levels of liquidity in the financial system. In addition, the central bank sets RRRs countercyclically to moderate the credit cycle and discourage financial intermediation in USD. The BCRP also sets higher RRRs on FX liabilities so that

financial institutions internalise the risks associated with the absence of an FX lender of last resort. The BCRP has used this instrument (applying additional RRRs) to limit speculation on short-term capital flows, to promote the de-dollarisation of credit and limit speculation in the exchange market through derivatives.

BCRP intervention in the FX market

Graph 3



Note: Data as of December 2022 (end of period balances for derivative instruments).

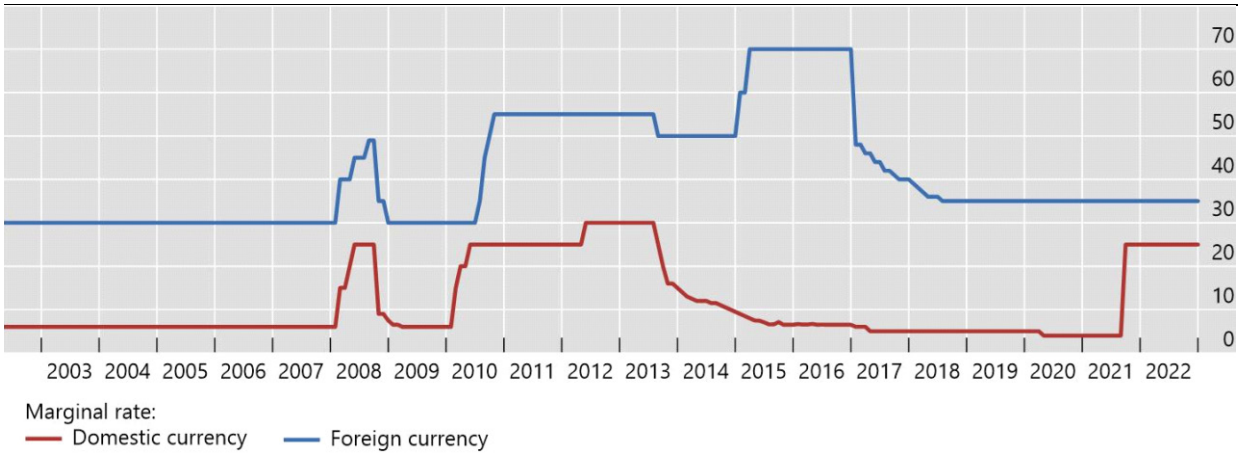
Source: Central Reserve Bank of Peru.

RRRs indirectly influence the cost of financial intermediation by widening the margin between lending and borrowing rates and reducing the money multiplier. Thus, higher RRRs imply a lower lending capacity for the same level of funding, ie banks opt for higher lending rates, lower borrowing rates, narrower financial margins, or any combination of these in order to comply with higher RRRs. Additionally, RRRs on FX liabilities help secure adequate FX bank liquidity for addressing sudden capital outflows or domestic liquidity shocks.

Reserve requirement rates

In per cent

Graph 4



Source: Central Reserve Bank of Peru.

Other countries in Latin America and the Caribbean (LAC), like Colombia and Brazil, have also used RRRs countercyclically as a complement to the interest rate, particularly in the face of significant capital flow movements. Montoro and Moreno (2011) argue that the reasons behind RRR use are: (i) unlike interest rates, RRR increases can tighten financial conditions without attracting capital flows; (ii) RRRs can strengthen the effectiveness of the interest rate as a monetary policy instrument; and (iii) RRRs can be used to meet financial stability and/or macroprudential policy objectives.

During Peru's two-decade experience with the IT framework, the BCRP has adapted it in sync with evolving conditions by creating new instruments and introducing improvements in communication. BIS-BCRP relations have been key to this process. The BCRP was initially invited to attend BIS meetings with central bank peers in the aftermath of the Asian and Russian crises of the late 1990s.[4] After gaining full membership in 2012, the BCRP stepped up its participation in BIS research networks, conferences and working groups (including activities organised by the BIS Americas Office in Mexico City).

In particular, BIS research has provided valuable input to international discussions on the monetary policy frameworks adopted by emerging market economies (EMEs) such as Peru. As discussed in BIS (2019), instead of following textbook prescriptions advocating free floating, EMEs have adapted IT implementation to include FX intervention in view of significant challenges due to excessive capital flow (and associated exchange rate) volatility. Recently, the International Monetary Fund (IMF) incorporated this new standard into its Integrated Policy Framework,[5] recognising the need for a policy toolbox for addressing the impact of external macroeconomic and financial shocks on EMEs.

IT implementation in Peru

The first two decades of IT implementation in Peru entailed considerable challenges in monetary policy design amidst multiple episodes of significant macroeconomic volatility, such as the commodity super-cycle (2004–14), the GFC (2008–09) and the Covid-19 pandemic. These events prompted the BCRP to create new instruments and change the size and composition of its balance sheet to enhance the transmission of monetary policy to the financial system. The BCRP also implemented new monetary strategies such as the de-dollarisation programme started in 2013, which has helped to mitigate financial stability risks associated with financial dollarisation.

The commodity super-cycle, the GFC and the BCRP response

Pre-crisis exuberance

The 1990s reforms and a favourable external environment for commodity-exporting countries were the pillars of Peru's high growth between 2001 and 2009 (5.4% per year on average). High commodity prices and large capital inflows propelled growth

[4] Chief Economist Renzo Rossini first represented the BCRP as a guest at the BIS Working Party on Monetary Policy in Latin America in 1998, and General Manager Javier de la Rocha attended the BIS Emerging Markets Deputy Governors Meeting the following year.

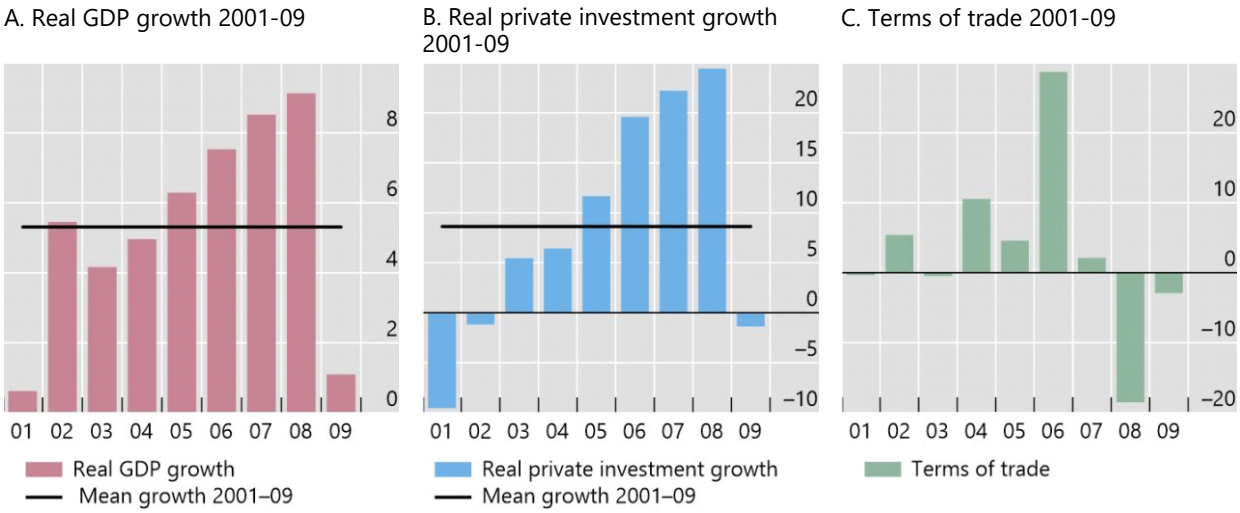
[5] See IMF (2020) and Adrian and Gopinath (2020).

and private investment. Capital inflows facilitated low-cost financing, which in turn boosted aggregate demand, appreciated the currency and further reduced financing costs. Against this backdrop, the credit-to-GDP ratio increased from 20% to 29% between 2004 and 2008. In 2008, even though economic activity in the fourth quarter of the year was affected by the impending GFC, GDP and private investment grew by 9.8% and 25.8% in real terms, respectively.

Pre crisis local conditions

In per cent

Graph 5



Source: Central Reserve Bank of Peru.

In a context of mounting food and energy prices and a surge in aggregate demand fuelled by external factors, inflation began to accelerate in mid-2007. In response, the BCRP increased the reference rate from 4.5% to 6.5% between June 2007 and September 2008 and raised RRRs on both domestic currency (from 15% to 25% between March and April 2008) and FX (from 30% to 49% between February and July 2008) to moderate credit growth.

At the same time, the reference rate hikes and the appreciation of the currency created incentives for carry trade operations. In early 2008, strong capital inflows from non-resident investors poured into CDBCRPs, generating further appreciation pressures and boosting aggregate demand.

In these circumstances, the BCRP established measures to limit non-resident investors' speculative activities. This was done via BCRP instruments (designed solely for monetary management purposes) that were geared toward reducing interest rate pressures that distorted the yield curve. In January 2008, CDBCRPs were replaced by securities issued in primary auctions restricted to domestic financial institutions (CDBCRP-NRs). In the same month, the BCRP established a fee (4% of transaction values) for the registration of transfers of ownership of BCRP securities to limit the participation of non-resident investors in monetary instrument markets. In April 2008, the BCRP established a 120% RRR on non-resident deposits in domestic currency.

The BCRP also carried out FX interventions in the spot market to reduce excessive exchange rate volatility. Between 2005 and August 2008, increased FX intervention in the spot market boosted net international reserves (NIRs) by around USD 25.4 billion (from USD 12.6 billion to USD 34.7 billion).

Monetary policy response to the GFC

In September 2008, the bankruptcy of US investment bank Lehman Brothers unleashed the most serious global disruption since the Great Depression of 1929. Amidst the collapse of international financial markets, both emerging and industrialised economies experienced a sharp slowdown. The crisis also triggered massive capital outflows away from EMEs and contracted the prices of Peru's main exports, leading to a 12% depreciation between September 2008 and February 2009.

Despite this crisis context, Peru's growth in 2008 reached 9.8% (the highest in 14 years), completing 10 consecutive years of expansion. However, growth slowed to 0.9% in 2009 as the crisis set in. Inflation surged to 6.65% in 2008, mainly reflecting a 9.7% increase in food prices caused by domestic and imported supply shocks. Inflation pressures associated with imported food prices began to subside in the last months of 2008 due to a rapid correction of international commodity prices in a context of global economic deterioration.

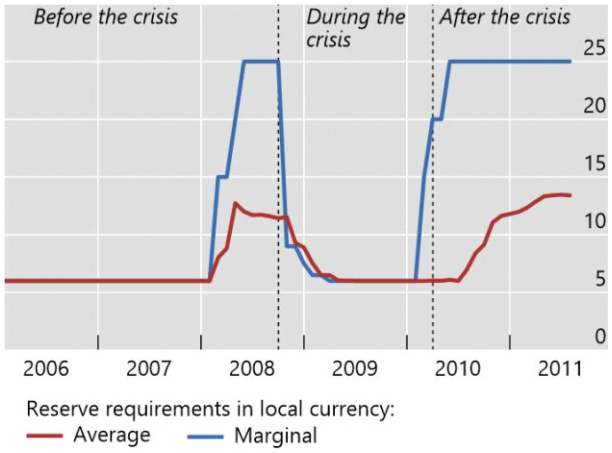
In the thick of the GFC, BCRP policies aimed at keeping monetary and financial markets (especially credit operations) running smoothly. This implied preventing: (i) liquidity shortages (in both domestic currency and FX) that could hamper financial intermediation; (ii) adverse effects on firms and household balance sheets as a result of sharp depreciation, which in turn could potentially generate recessionary pressures; and (iii) an excessive steepening of the yield curve in the money market (unrelated to the expected evolution of the reference rate), which could weaken the interest rate channel of monetary policy.

Along these lines, monetary policy initially focused on preventing spillovers from external conditions to local financial markets. Thus, between September 2008 and February 2009, the BCRP aimed at maintaining credit flows by securing adequate liquidity and reducing volatility in financial and FX markets. During this period, the BCRP injected liquidity into the economy by conducting repo operations of up to one year and cutting the marginal RRR on domestic liabilities from 25% to 6.5%, in addition to further liquidity created as BCRP securities matured. In all, the BCRP provided liquidity amounting to 9.3% of GDP (PEN 34.8 billion).

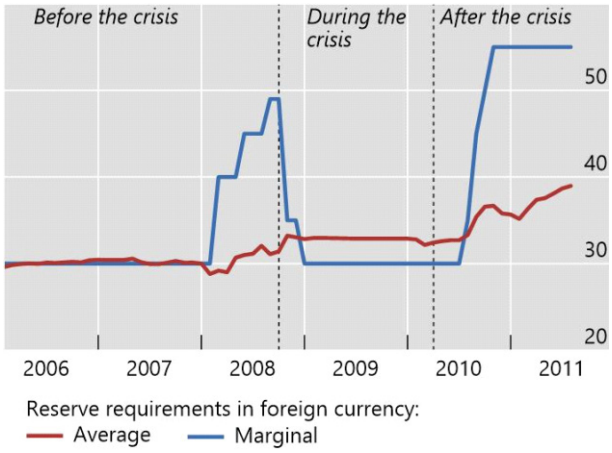
RRR adjustments in response to the crisis

% of obligations subject to reserve requirements — Graph 6

A. Reserve requirement rate in domestic currency



B. Reserve requirement rate in foreign currency



Source: Central Reserve Bank of Peru.

In addition, the BCRP provided FX liquidity by exempting long-term (two years or more) external debt from RRRs; reducing the marginal RRR on FX obligations from 49% to 30%, thereby reversing RRR increases made over the previous months; and creating repo operations to provide further FX liquidity. In addition, the RRR on non-resident deposits established in April 2008 was reduced from 120% to 35%.

To reduce exchange rate volatility, the BCRP conducted net FX sales amounting to USD 6.8 billion between September 2008 and February 2009 and issued FX instruments (exchange rate-indexed certificates of deposit, or CDR BCRPs) for USD 3.2 billion. This response was made possible by the BCRP's precautionary build-up of international reserves over the previous four years.

After normalising local financial conditions, in February 2009 the BCRP began to reduce its policy rate (from 6.5% to a historic low of 1.25% in August 2009) with a view to facilitating firms' access to financing and encouraging private spending, thereby supporting the reversal of the weak economic cycle that began in 2008 and deepened during the GFC.

In July 2009, inflation returned within the target band in a context of weak economic activity, subsiding inflation expectations, lower imported inflation and a reversal of food price shocks. Year-on-year inflation declined from 6.7% in December 2008 to 1.9% in August 2009.

The BCRP's de-dollarisation programme

Since 2013, the BCRP has aimed to accelerate credit de-dollarisation to reduce risks from sudden depreciation pressures through FX-indebted firms and households. Along these lines, the BCRP established additional RRRs on FX liabilities, aimed at (i) moderating the expansion of USD credit and (ii) encouraging a shift from USD- to PEN-denominated debt. These additional RRRs were applied according to how mortgage and car loans and total USD credit evolved, and came into effect when financial entities failed to reach predetermined targets for FX loans established by the BCRP. They were intended to align incentives for financial entities by favouring domestic-currency loans and facilitating coordination among financial entities seeking to de-dollarise credit. These RRRs made USD credit more expensive for financial institutions, thereby breaking inertial credit practices determined by habit patterns or by borrowers' mistaken perception that USD loans carry a lower credit exchange risk.

These measures helped to reduce dollarisation across credit categories. Total credit dollarisation fell from 49% in September 2013 to 24% in December 2022. During the same period, household credit dollarisation declined significantly. Mortgage and car loan dollarisation fell from 49% to 9% and from 82% to 11%, respectively, as of December 2022.

Several studies – including Castillo et al (2016), Infante (2018) and Contreras et al (2019) – assess the impact of the BCRP's de-dollarisation measures. These works calculate the decline in credit dollarisation at 6–14 percentage points (isolating the effect of other factors such as exchange risk variations) and conclude that the de-dollarisation programme contributed significantly to reinforcing financial stability and the transmission channel of monetary policy. These macroprudential measures are currently still in force, but since the dollarisation rate has decreased significantly, their marginal contribution is now lower.

Dollarisation of credit to the private sector (%)[1] Table 1

	Sep-13	Dec-18	Dec-19	Dec-20	Gap
	(i)			(ii)	(iii)
Household	**29.2**	**11.7**	**10.1**	**7.1**	**-22.0**
Consumption	13.3	7.2	6.8	5.9	-7.3
Car loans	82.0	15.7	16.6	11.0	-71.1
Credit cards	9.5	8.1	8.0	11.6	2.1
Rest	7.8	6.4	5.7	4.5	-3.3
Mortgage	48.6	18.3	15.0	9.0	-39.7
Firms	**59.4**	**41.9**	**40.3**	**33.7**	**-25.7**
Corporate	69.7	52.2	48.6	48.8	-21.0
Large Companies	76.1	58.8	60.2	54.8	-21.3
Medium-sized enterprises	70.7	43.5	41.9	26.1	-44.6
Small business	20.8	7.1	6.5	3.2	-17.6
Micro-business	8.3	6.8	6.3	4.1	-4.2
Total	**49.1**	**30.5**	**28.5**	**23.5**	**-25.6**

[1] Ratios calculated as the exchange rate of December 2022 (PEN 3.81 per USD).

Source: Central Reserve Bank of Peru.

Monetary policy response to the Covid-19 pandemic (2020–21)

At the onset of the Covid-19 pandemic, the confinement measures implemented by the Peruvian authorities were among the most rigorous worldwide. On 16 March 2020, the government introduced strict public health measures, including mandatory social isolation at the national level and a lockdown of multiple activities deemed non-essential, including public works and e-commerce, resulting in a 17.3% contraction in GDP during the first half of the year (and a 30% contraction in the second quarter).

From the beginning of the pandemic, monetary policy adopted an unprecedented expansionary stance – a record low policy rate (0.25%) and massive repo operations with a horizon of up to four years – which was feasible due to the credibility built by the BCRP over 30 years. The authorities implemented fiscal stimulus via a range of policies, including cash transfers to households (2.0% of GDP) and – starting in October 2020 – higher public investment. Increased pandemic-related expenses and lower tax collections due to a contraction in local economic activity resulted in a fiscal deficit of 8.9% of GDP in 2020 (7.3 percentage points more than in 2019 and the largest since 1990). These expansionary monetary and fiscal policies led to greater-than-expected recovery in the last quarter of 2020 (a 1.5% contraction in GDP) and brought economic activity closer to pre-pandemic levels.

As a result of this uneven quarterly performance, 2020 GDP growth was –11.1%, the most pronounced contraction since 1989 (–12.3%), following 21 years of continuous expansion.

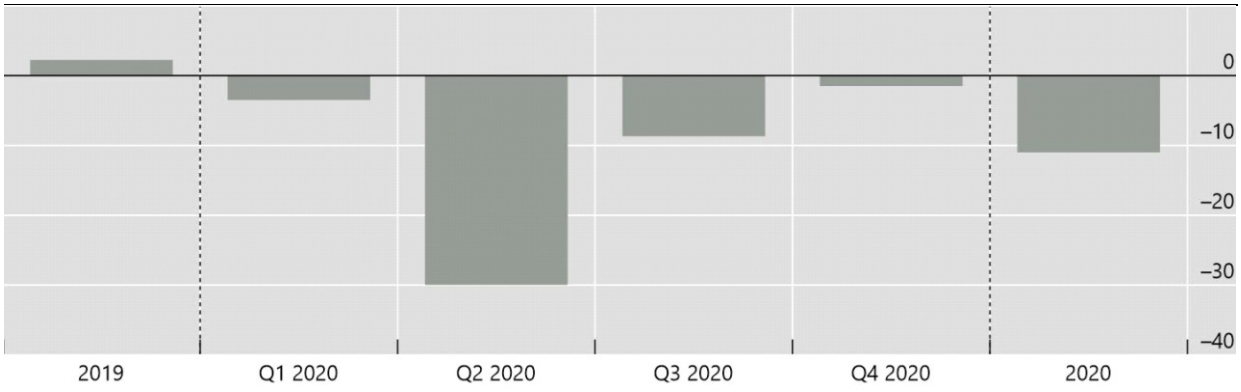
Monetary policy aimed at preserving the payments chain and supporting the recovery of economic activity, mainly by reducing financing costs, providing adequate liquidity to the financial system, and moderating exchange rate and long-term

interest rate volatility. To this end, monetary policy adopted an unprecedented expansionary stance. Given the size of the shock and its impact on the economy, the monetary impulse was amplified via additional quantitative measures.

GDP 2019-20

In per cent

Graph 7



Source: Central Reserve Bank of Peru.

The Reactiva Perú programme

The main challenge during the first half of 2020 was to preserve the payments and credit chains. The Covid-19 breakout was a sudden, transitory and large shock. On the demand side, it triggered a contraction in global demand, which reduced Peru's exports and caused widespread uncertainty among consumers and firms. Moreover, the stringent measures introduced to contain the spread of Covid-19 seriously disrupted the supply chain. This affected household incomes and firms' cash flows, thereby limiting their capacity to meet obligations such as payment of salaries, rents and debts owed to suppliers. This vicious circle of shrinking demand and supply risked prolonging the initial shock and potentially dragging the economy into a depression (ie a long and deep recession with negative inflation rates). If allowed to expand, the ripple effect across the payments chain had the potential to cause massive bankruptcies, in turn leading to an abrupt drop in production, employment and incomes.

Additionally, certain externalities could exacerbate the credit risk associated with a disruption of the payments chain, eg risk-averse financial entities' concerns about their capacity to meet their own obligations could become a self-fulfilling prophecy if they reacted by contracting credit out of fear that debtors might not be able to repay loans. Therefore, government intervention became necessary to prevent a disruption of the payments chain by providing adequate liquidity to the financial system.

In this context, marked by an abrupt drop in economic activity, the authorities introduced a government-guaranteed loan programme (known as Reactiva Perú). Under this programme, the BCRP provided liquidity through repo operations to financial entities that granted these loans and received high-quality assets as collateral, ie the government-guaranteed loan portfolio. The initial horizon for these loans was three years, including a one-year grace period. The programme sought to partially absorb pandemic-enhanced risks by creating incentives for financial entities

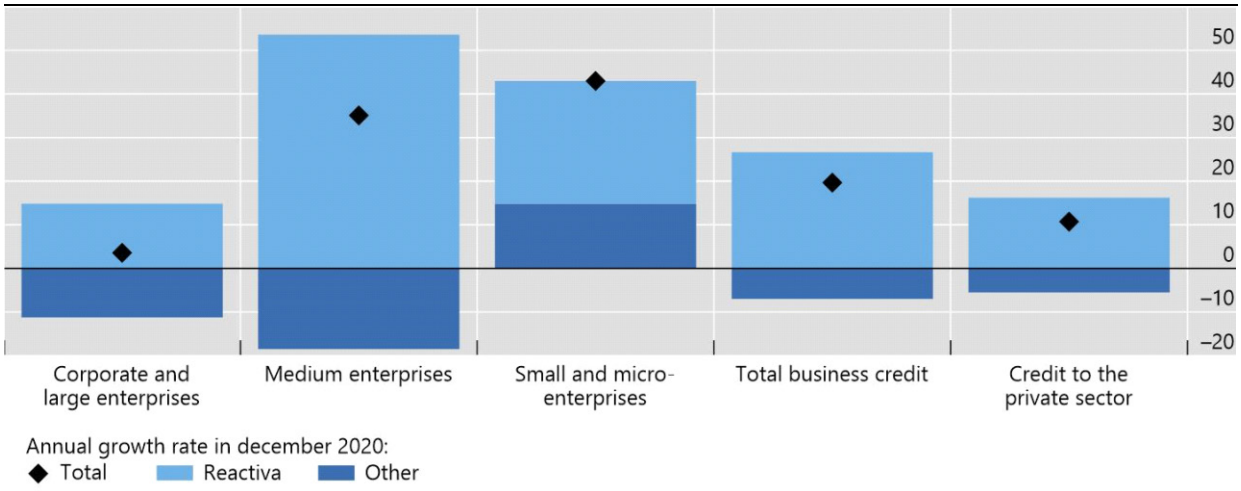
to provide companies with the necessary working capital to cover their obligations during the lockdown, thereby improving their viability and reducing market uncertainty.

The programme provided liquidity quickly to sustain credit flows, thus avoiding a credit crunch and a breakdown in the payments chain. Moreover, the monetary boost promoted a recovery starting in the second half of 2020. Unlike other crisis episodes, such as the September 1998 sudden halt in capital flows induced by the Russian crisis, credit evolved countercyclically. Business credit grew by 22% year on year in 2020, instead of the likely negative growth had the programme not been put in place. This programme was one of the largest of its kind in LAC (around 8.5% of GDP) and had the highest implementation rate – defined as actual execution relative to the initial announcement of the programme (around 90%) – among both advanced economies and EMEs.

Contribution to credit growth

In per cent

Graph 8



Source: Central Reserve Bank of Peru.

The three elements that contributed to the programme's success are simplicity, scope and competition.

- Simplicity: The conditions for accessing the programme were simple and easy to verify, eg loan amounts were proportional to the sales declared to the tax authority (SUNAT) the previous year, and there were no pre-qualification conditions (apart from not appearing on a list of certain prohibited or unlawful activities).[6]
- Scope: Informal businesses were able to participate in the programme. Peru has one of the highest informality rates worldwide (about two thirds of the labour force are informal workers), above economies with similar per capita income levels. Micro-enterprises without sales declarations had access to the programme, with the size of their loans linked to the amount of debt they owed to the financial system (with a ceiling of up to PEN 40,000, equivalent to USD

[6] For more details about the Reactiva Perú programme, see Montoro (2020).

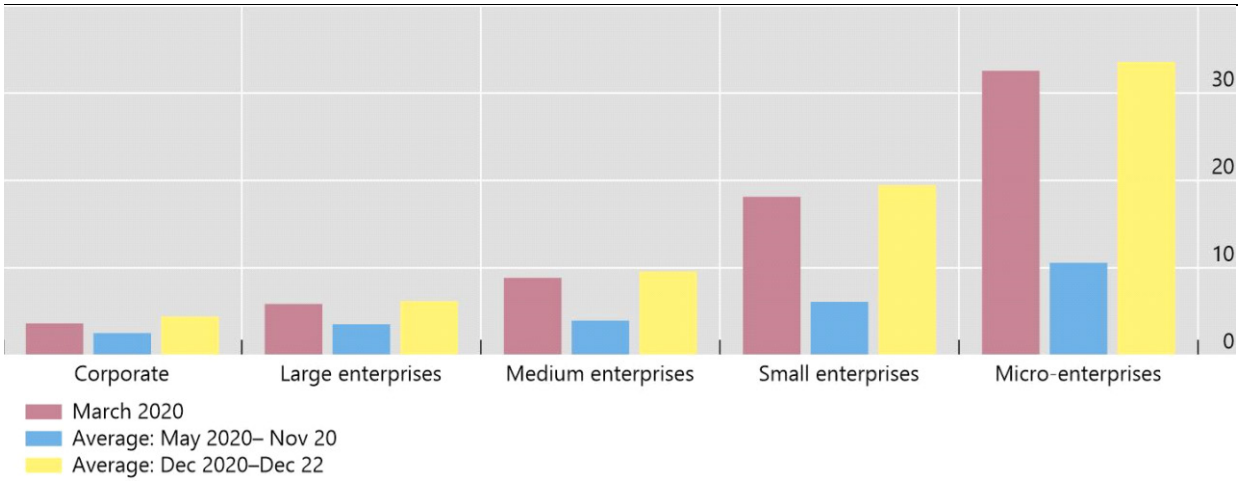
12,000). Out of the half a million companies that received a loan from *Reactiva Perú*, 98% were micro- or small enterprises and 77% did not have sales records.

- Competition: To induce competition among financial entities, the BCRP offered a 0.5% repo rate for a three-year term, allocating resources to the financial entities that charged the lowest interest rates to borrowers. This helped accelerate the pass-through of a policy rate reduction to other interest rates. The latter fell to historic lows, especially for smaller companies with the highest credit risk premia.

Interest rates in domestic currency[1]

In per cent

Graph 9



[1] Annual lending interest rates charged by banks in the last 30 business days.

Source: Central Reserve Bank of Peru.

The BCRP also created two additional liquidity facilities: repo operations conditioned on loan portfolio rescheduling and operations conditioned on long-term credit expansion. The former, created in June 2020, aimed to promote loan rescheduling at lower interest rates and longer maturities. The latter, created at end-2020, aimed to strengthen the transmission of the monetary impulse to long-term interest rates, while expanding long-term credit such as mortgages.

Between March and December 2020, the balance of liquidity operations reached historic highs, from 2.1% of GDP (PEN 14.8 billion) at end-February to 9.1% of GDP (PEN 64.8 billion) as of 31 December. Of the latter, PEN 50.7 billion corresponded to repo operations with government-guaranteed loans. Long-run repo operations were not unprecedented for the BCRP, but their magnitude, the range of collaterals used and the financial features (conditionality on extending new loans or reprogramming) were a new experience. The total balance of liquidity operations as of end-2020 was eight times higher than under the GFC (PEN 7.9 billion) and twice as much as during the 2013–16 commodity price drop and under the de-dollarisation programme (PEN 31.8 billion). One of the advantages of using repo operations is that the withdrawal of monetary stimulus is automatic and determined by the maturities built into such operations.

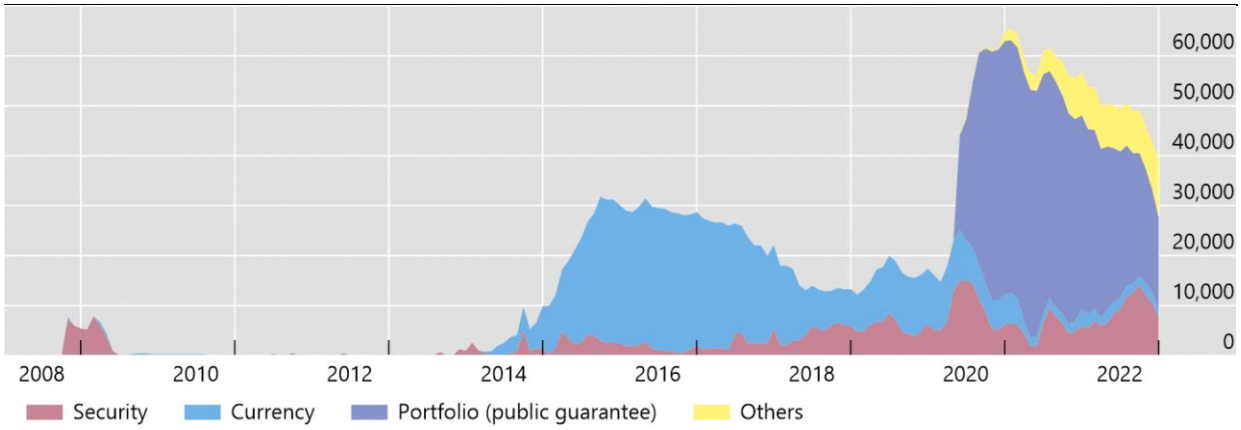
As a result of the BCRP's expansionary monetary policy and liquidity operations associated with the government-guaranteed loan programme, growth of credit to the private sector accelerated from 6.9% in 2019 to 11.8% in 2020. As a percentage of

GDP, the balance of credit to the private sector rose from 43.1% in 2019 to 52.9% in 2020.

Balance of liquidity operations[1]

In millions of soles

Graph 10



[1] As of 30 December 2022.

Source: Central Reserve Bank of Peru.

Inflation rose slightly between 2019 and 2020, from 1.90% to 1.97%, closer to the centre of the BCRP's inflation target band (1–3%), and inflation expectations remained at around 2%. Higher inflation was caused by increasing costs as a result of sanitary measures, supply-side factors affecting certain food prices, and a depreciation of the currency. At the same time, economic performance below potential was reflected in lower core inflation (headline inflation excluding food and energy), which decreased from 2.30% in 2019 to 1.76% in 2020.

Policies for moderating exchange rate and long-term interest rate volatility

The Covid-19 pandemic exacerbated EME currency fluctuations via capital flow volatility in 2020 and the increase in US Treasury bond interest rates in the first quarter of 2021. Additionally, domestic factors, such as political uncertainty associated with the November 2020 presidential impeachment and the 2021 election, put pressure on the exchange rate.

Monetary policy transmission channels weaken when FX and financial markets experience high exchange and interest rate volatility. In addition, given that financial dollarisation still persists in the Peruvian economy, reducing excessive exchange rate volatility helps prevent risks associated with dollarisation (such as FX liquidity risks or credit risks induced by currency mismatches).

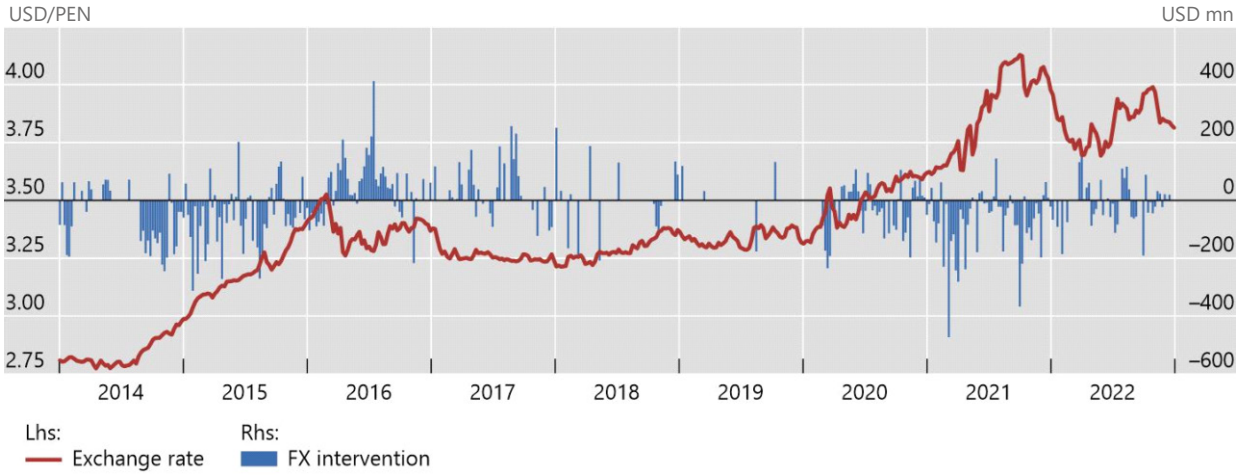
Given Peru's exchange rate performance, the BCRP participated in the FX market using the instruments at its disposal to moderate excessive volatility. Thus, between March 2020 and December 2020, the BCRP sold USD 160 million in the FX market to offset pressures on the currency. The BCRP also placed FX sale derivative instruments (exchange rate swaps and adjustable certificates of deposit) on the market, equivalent to USD 3.7 billion.

In 2021, in a context of great political uncertainty, Peru experienced the largest capital outflow in its history, amounting to 7.4% of GDP (USD 16.6 billion). Although the BCRP carried out FX intervention operations totalling USD 17.5 billion – mainly

through spot market operations (USD 11.6 billion) – to reduce exchange rate volatility, the PEN depreciated by 10% over the year.

Exchange rate and FX intervention[1]

Graph 11



[1] Includes net purchases/sales of dollars in the spot market and net maturity of instruments (CDBCRPs, CDLD BCRPs and FX swaps).

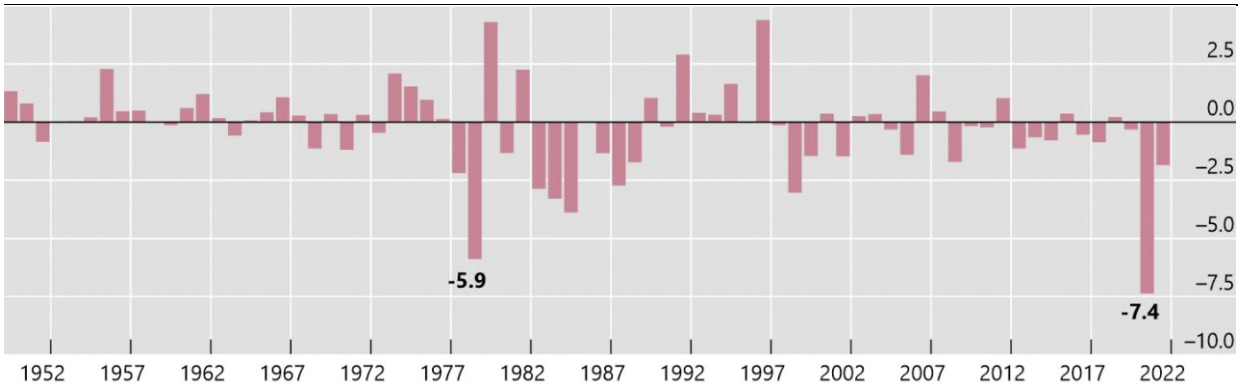
Source: Central Reserve Bank of Peru.

During this period, Congress approved withdrawals from private pension fund managers (AFPs) to attenuate the impact of the pandemic on households. AFPs covered such withdrawals, amounting to 9.4% of GDP (PEN 88 billion) between 2020 and 2022, mainly by selling external assets and BTPs. In response, the BCRP implemented monetary operations with AFPs to ensure financial markets functioned normally and prevent upward pressures on BTP interest rates and the exchange rate, as the hasty sale of BTPs to meet withdrawal requests had the potential to depress BTP prices (ie push interest rates up, with detrimental implications for economic recovery). In this context, repo operations with AFPs, carried out in three stages, amounted to 1.9% of GDP (PEN 17.2 billion).

Short-term capital flows

As a percentage of GDP

Graph 12



Source: Central Reserve Bank of Peru.

The BCRP's response to Covid-19 preserved credit flows, thereby avoiding a breakdown in the payments chain that would have aggravated the economic impact

of the pandemic. Additionally, the BCRP provided the necessary monetary boost to spur an economic recovery starting in mid-2020.

The challenges ahead

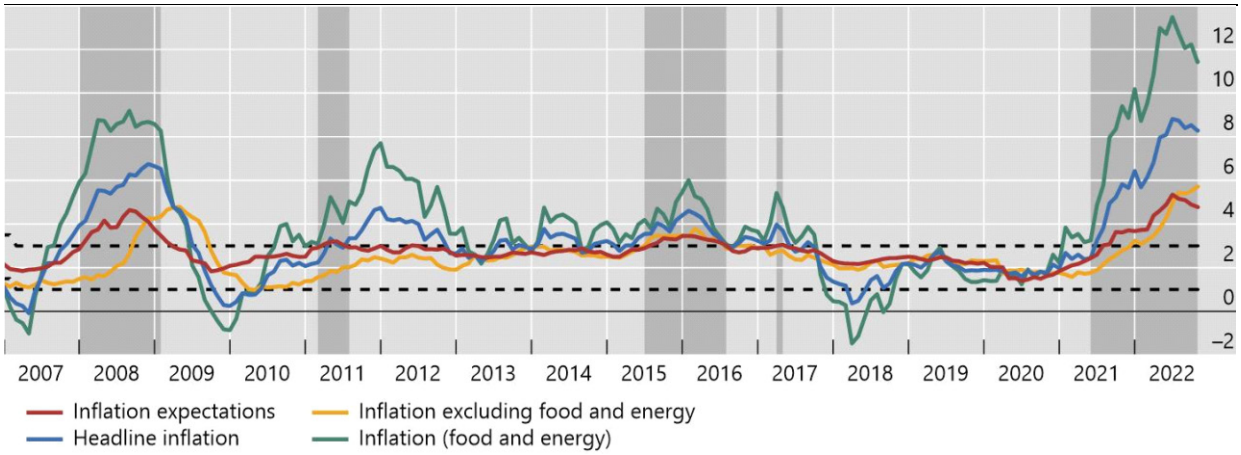
Post-pandemic inflation control

The great immediate challenge for central banks is to control high inflation in the wake of the Covid-19 pandemic. Supply restrictions and a rapid recovery in aggregate demand (after most confinement measures were lifted worldwide) led to a global surge in prices, especially for food and energy. Starting with the onset of the pandemic, maritime transport costs showed a sustained upward trend, which directly affected international prices. There is a risk that inflation expectations may become unanchored and create a 1970s-style inflationary spiral in some developed economies like Japan, Germany, the United Kingdom and the United States.

Graph 13 shows the five episodes in which inflation expectations in Peru deviated from the target band during the last two decades. Most of them had a short-to-medium duration, the current one being the longest since the adoption of IT. The evidence shows that deviations of inflation expectations from the target have generally been temporary and, in the long run, credibility has prevailed, with inflation expectations returning to the target band within the policy horizon (18–24 months).

Episodes of inflation expectations outside the inflation target band (2002-22)

Year on year changes, in per cent — Graph 13



Note: Gray areas represent the periods in which inflation expectations are above the target band.

Source: Central Reserve Bank of Peru.

Episodes of inflation expectations outside the inflation target band (2002-22) Table 2

Episode	Dates	Duration	Max. Inflation Expectations	Max. Total Inflation	Max. Inflation without food and energy	Max. Inflation Food and Energy	Max. Exchange Rate	Max. Depreciation months
Episode 1	Jan 08 – Feb 09	14 months (21 months)	4.6	6.7	4.6	9.2	3.2	11.4
Episode 2	Mar 11 – Jun 11	4 months (16 months)	3.2	4.7	2.6	7.7	2.8	-0.9
Episode 3	Jul 15 – Jul 16	13 months (16 months)	3.5	4.6	3.8	6.0	3.5	15.1
Episode 4	Mar 17 – Apr 17	2 months (9 months)	3.1	4.0	2.8	5.4	3.3	-1.6
Episode 5	Jul 21 – Dec 22	18 months (18 months)	5.4	8.8	5.7	13.5	4.1	15.5

[1] The time for which total inflation remains outside the target band is shown in parenthesis.

Source: Central Reserve Bank of Peru.

In this context, the BCRP's communication policy plays an increasingly important role in reinforcing credibility and underpinning monetary policy transmission.

Fiscal dominance

Higher pandemic-related indebtedness may create fiscal dominance pressures in the coming years. Potential interest rate increases to control inflation may create fiscal pressures through higher debt service costs. Like in the past, fiscal dominance may push inflation upward, accentuate cycles, and deteriorate public services. Experience shows that public education and healthcare deteriorate during fiscal shortfalls, ie the latter imply adjustments in the quality of spending.

Although indebtedness is lower in Peru than in other LAC countries, it is important to remain vigilant regarding this risk due to the magnitude of lingering pandemic-induced deficits and the eventual emergence of spending pressures going forward.

Central bank digital currency (CBDC) and digital payments

In some economies, the volume of cryptocurrency operations exceeds that of domestic currency-denominated transactions. However, cryptocurrency prices are much more volatile, so their use as a means of payment may affect the transmission power of monetary policy. Of particular concern is the case of stablecoins, which are pegged against a hard currency, and can be issued by big tech companies. As extensive cryptocurrency use may put monetary sovereignty at risk, many countries are assessing the issuance of central bank digital currencies (CBDCs; see BIS (2021a)). Additional challenges include securing the proper use and governance of private data, as well as guaranteeing the integrity of payment systems to prevent their use in illegal activities such as money laundering and cyberattacks.

Meanwhile, prior to CBDC issuance, central banks can ride the digital wave created by the pandemic to update their retail payment platforms. In particular, the

BCRP is currently working on a project to improve the interconnection of retail payments, taking note of successful experiences in countries like India and Brazil (Duarte et al (2022)). Such enhancements promote financial inclusion and broaden the transmission mechanism of monetary policy.

Inequality and monetary policy

Central banks help reduce inequality mainly through inflation control. Peru's hyperinflation episode in the late 1980s, caused by fiscal financing via money issuance, hit lower-income segments of the population the hardest, thereby exacerbating inequality.

The debate on the role of monetary policy in this regard has grown more important in recent years. Although the empirical literature on the impact of conventional and unconventional monetary policy on income and wealth inequality yields mixed conclusions, there is a consensus that inequality grows as inflation increases, since the poorest feel the greatest impact.

However, monetary policy alone cannot address long-term inequality trends associated with structural forces like technological innovation and globalisation (which increase the relative demand for skilled workers, to the detriment of those who lose their comparative advantage). Therefore, the power to diminish inequality gaps also lies with structural policies geared towards enhancing productivity, such as education and healthcare (BIS (2021b)).

Climate change and central banks

Climate change is a global phenomenon with multiple consequences. In particular, central banks must follow up on its implications for the economy and the financial system. For example, the frequency and magnitude of adverse natural phenomena affect food production, in turn influencing inflation and central bank decisions. Financial stability may also be compromised, eg if debtors' ability to pay is negatively affected.

This concern motivated the creation of the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) in December 2017, with an aim to contribute, from the financial front to the global response to meet the objectives of the Paris Agreement on environmentally sustainable development. Specifically, the NGFS promotes financial sector best practices to pave the way for developing a climate change-related risk management framework and mobilising capital for green and low-carbon investments.

In this context, a main challenge is incorporating climate change risks into central banks' operations and assessing their implications for monetary policy decisions.

Conclusions

Peru's IT framework, which is geared towards achieving an inflation target and controlling risks associated with financial dollarisation, has secured monetary and financial stability over the last 20 years. During that time, multiple domestic and external events have put it to the test and created opportunities to enhance its capacity to underpin the credibility of the local currency and contribute to financial stability. Moreover, the conduct of monetary policy, together with multiple instruments and measures aimed at reducing financial vulnerabilities (such as the de-dollarisation programme and the response to the Covid-19 pandemic), has kept market expectations anchored to the target band. The fact that BCRP autonomy has been key to this outcome shows that institutional stability is crucial for achieving high long-term growth.

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Effective dialogue and well anchored inflation expectations: essential tools for navigating challenging times

John C. Williams

Abstract

Recent experience has underscored the essential roles that dialogue among central banks and well anchored inflation expectations can play in helping central banks navigate difficult policy challenges. Sharing perspectives with their counterparts helps central bankers better discern, anticipate and respond to shifting crosscurrents in the global economy, while well anchored inflation expectations help limit the effects of shocks on inflation and the economy. Using measures of the sensitivity, level and uncertainty surrounding longer-term inflation expectations, it is shown that, for the United States, the recent news is mostly encouraging – measures of longer-run inflation expectations have remained remarkably stable in recent years at levels broadly consistent with the FOMC's longer-run goal, notwithstanding the recent upsurge in inflation.

Introduction

It is a pleasure to contribute to this volume in honour of the first two decades of the BIS Representative Office for the Americas, and the vital work that the Office performs on behalf of central banks in the Americas. For readers who may not be familiar, the Americas Office provides a forum for discussion and cooperation among central bankers from the region. This starts from the top, with regular meetings of the Consultative Council for the Americas, or CCA, which comprises the central bank governors of eight of the largest economies in the Americas, along with the BIS General Manager and the BIS Chief Representative for the Americas. The Office also facilitates collaboration among senior central bank staff, through supporting consultative groups and collaborative research efforts that span the full range of functions of those eight central banks. And its dealing room, inaugurated in 2020, has quickly established itself as a valued service provider to central banks throughout the region.

I had the pleasure to serve as chair of the CCA from 2020 through 2022. This was a period of great challenges for the central banks of the region, as economies, financial systems and societies struggled with the multifaceted dislocations triggered by the Covid-19 pandemic, and later the spillovers to global markets from Russia's invasion of Ukraine in early 2022. On the policy side, the period was marked by both great innovation and vigorous efforts to reinforce the fundamentals of our policy frameworks for achieving our core missions as central banks.

Against this backdrop, I would like to offer some reflections on two topics that have been top of mind in recent years: the value of engagement among central banks,

especially in times of heightened uncertainty; and the critical importance of anchoring inflation expectations and how we can assess whether central banks are succeeding, especially now, following the large inflationary shocks across the globe in recent years. I would note that the views I offer are my own, and do not necessarily reflect those of the Federal Open Market Committee (FOMC) or anyone else in the Federal Reserve System.

Dialogue among central banks

Central bankers have long understood the value of engaging with colleagues around the world regarding the challenges we face in our respective countries. We as central bankers have many of the same goals, including price stability, vibrant economies and financial stability. And many of the issues we face are not unique to any one of us, but rather share similarities. Moreover, key challenges are often interconnected and common across regions and the globe.

Effective policy requires timely and appropriate action. But it is also vitally important that we clearly communicate our policy strategies and reasoning for our actions as we carry out our mandates. Clear communication reduces the risk of confusion, volatility and spillovers, and helps others prepare for challenges that may lie ahead. This is as true of our communications with fellow central bankers as with the public.

Indeed, experience provides many examples where clear, forceful and credible communications have succeeded in calming unsettled markets, at times even long before announced actions were implemented. For example, at the onset of the pandemic, the breadth and scale of the policy actions announced by the Federal Reserve, with the support of the Treasury Department, favourably impacted US and global markets almost immediately, even though some of these new measures would clearly take some months to implement.

Of course, effective communication is not the same thing as coordination. Each country faces its own set of circumstances, and each central bank is charged with fulfilling its own domestic mandate. But the policies that we each implement can affect our neighbours, and developments outside our borders can impact our ability to achieve our domestic goals. So, for each of us, understanding the challenges our neighbours are facing, and their strategies for addressing them, can be very helpful in plotting our own courses through sometimes quite difficult waters.

That has been particularly true in recent years, as we confronted a unique set of challenges with both global and local dimensions. When the pandemic hit in 2020, a first order of business for many central banks – including the Federal Reserve – was to put in place highly accommodative policies to address the sudden stops in economic and financial activity caused by the health crisis. Using the various tools available to them, central banks lowered borrowing rates and provided liquidity to ensure orderly market functioning and to support the flow of credit to businesses and consumers.

And then, as our economies gained firmer footings, we moved to dial back these accommodative policies, and then to tighten policy to address stronger-than-expected inflation. But at each step of the way, the challenges we faced had important dimensions that extended outside our borders, reflecting disruptions to production and supply chains and markets at both the local and global levels, later exacerbated

by the disruptions to commodity supplies due to the war in Ukraine. Understanding the perceptions and actions being taken by other central banks mattered more than ever.

In this context, the BIS provides indispensable venues for sharing insights, analyses and concerns. The CCA has presented a particularly apt example in recent years. The novel, complex but in many ways similar challenges faced by all central banks in the Americas gave us much to discuss. And discuss we did, meeting much more frequently at all levels in recent years. Our dialogue had benefits both in the moment, to hear how our policies and other factors were affecting economies in the region, and in building the shared understanding and trust that provides a valued asset for the future. Moreover, facilitated by the BIS Americas Office, we have also jointly met with members of the private sector, including bank CEOs and chief economists covering the region, to benefit from their perspectives on the region's economies and financial systems. It has proven insightful for all of us to hear from leaders beyond our own organisations, and the borders of our countries.

While effective dialogue with peers has proven very helpful to central bankers in charting their respective policy courses, well anchored inflation expectations play a crucial role in helping economies get back on course in the face of unexpected shocks, a topic I turn to now.

Anchoring inflation expectations

The critical importance of anchoring inflation expectations in line with central bank objectives is now enshrined as a bedrock principle of modern central banking. When inflation expectations are well anchored, inflation processes tend to be mean-reverting, as firms, workers, consumers and investors see shocks to prices and overall inflation as likely to be idiosyncratic and temporary, and they behave accordingly. Having well anchored inflation expectations thus makes it easier to maintain inflation close to desired levels. Well anchored expectations also provide more scope for central banks to stabilise output and employment, in a complementary manner to their price stability goals, by stimulating activity when the economy is running at a below-potential pace which would tend to bring inflation below target, and tightening when it is running at an above-potential pace that could lead to above-target inflation.

But anchoring inflation expectations requires sustained and consistent policy action, and keeping expectations well anchored is hardly something that central banks can take for granted. In the decades before the pandemic, central banks in the advanced economies and many emerging market economies made great strides in anchoring inflation expectations, coming out of earlier periods of unacceptably high inflation. This progress invariably required sustained monetary restraint to bring inflation to targeted levels and credibly keep it there. And for many emerging market economies, or EMEs, the process also involved shifts toward greater exchange rate flexibility, and away from using the exchange rate as the primary nominal anchor.

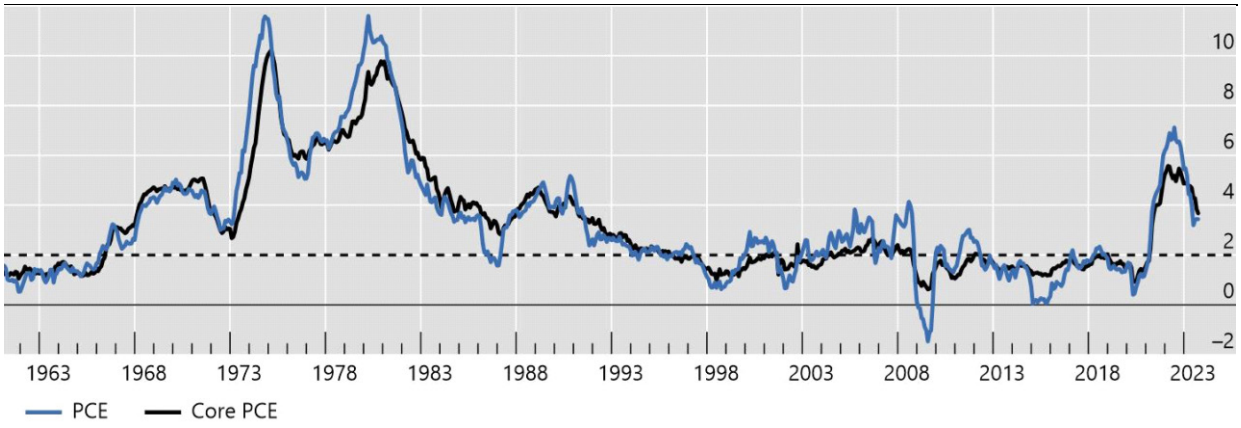
The process of anchoring inflation in line with central bank objectives was aided in many cases by explicit commitments to a longer-run inflation goal. In some cases, such inflation targets were declared early in the disinflation process, well before the targets were achieved. And there is some evidence that declaring a goal early on was

helpful to those economies in the disinflation process, although it did not obviate the need for a period of sustained restraint.

In other cases, a formal target for inflation came later, after substantial progress toward price stability had already been made. In the United States in the 1980s, monetary policy focused on bringing inflation down from unusually elevated levels, but without officially indicating a target level for inflation. By the early 1990s, the United States had largely succeeded, with 12-month core PCE inflation in the subsequent two decades fluctuating in a relatively narrow range, in the vicinity of 2%. In January 2012, the FOMC took an additional step by issuing its Statement on Longer-Run Goals and Monetary Policy Strategy. The statement explicitly set a 2% longer-run inflation goal, as measured by the 12-month change in the PCE price index, and it declared that: "Communicating this inflation goal clearly to the public helps keep longer-term inflation expectations firmly anchored, thereby fostering price stability and moderate long-term interest rates and enhancing the Committee's ability to promote maximum employment in the face of significant economic disturbances."[1]

12 – month inflation[1]

In per cent Graph 1



[1] 12 month changes in the Personal Consumption Expenditures Price Index, and the Personal Consumption Expenditure Price Index, excluding food and energy.

Source: Breau of Economic Analysis; Haver.

The 2% longer-run goal and the importance of well anchored inflation expectations were reaffirmed in the FOMC's updated Goals and Strategy statement released in 2020. The 2020 statement also took note of increased downward risks to inflation associated with the proximity of equilibrium interest rates to the effective lower bound. Indeed, inflation averaged 1.5% in the decade preceding the onset of the pandemic, well below the FOMC's 2% longer-run goal, as can be seen in Graph 1. The updated document stated that "the Committee seeks to achieve inflation that averages 2 percent over time, and therefore judges that, following periods when inflation has been running persistently below 2 percent, appropriate monetary policy will likely aim to achieve inflation moderately above 2 percent for some time."[2]

[1] Board of Governors of the Federal Reserve System (2012).

[2] Board of Governors of the Federal Reserve System (2020).

But while persistently low inflation was a top-of-mind risk in the United States for much of the previous decade, the current decade has brought the opposite challenge: the pandemic and other global shocks contributed to inflation that rose to well above the Federal Reserve's 2% target. Between end-2020 and mid-2022, 12-month inflation in the United States accelerated from a pace of 1.4% to a peak of 7.1%, as measured by the personal consumption expenditures (PCE) price index. The 12-month consumer price index (CPI) inflation rate rose even more dramatically, peaking at over 9%. A significant portion of these sharp increases reflected global increases in food and energy prices, aggravated by the effects of the pandemic and the war in Ukraine. But core inflation, which strips out volatile food and energy prices, also rose significantly, peaking at 5.6% for the PCE index.

In response, the Federal Reserve raised its main policy rate significantly and at a pace not seen in decades, moved to reduce its asset holdings, which it had increased considerably between 2020 and early 2022 when the policy rate was constrained by its effective lower bound, and signalled its resolve to maintain a restrictive stance to bring inflation down to target over time. Encouragingly, the inflation trajectory has turned, with headline 12-month PCE inflation having fallen by more than half from its peak to a still elevated 3.4% as of September 2023. The Federal Reserve has continued to signal its strong commitment to return inflation to target.

Given the inflationary upsurge, it is reasonable to ask to what degree inflation expectations have remained well anchored. To answer that question, we need to be clear about what is meant concretely by well anchored expectations, and how would we know if they are well anchored. In a speech delivered last year,[3] I suggested three criteria for well anchored inflation expectations, based on economic theory.[4] These criteria relate to the "sensitivity," "level" and "uncertainty" around long-run inflation. Let me summarise each of the criteria briefly, before reviewing the available evidence for the United States.

- The sensitivity criterion states that although near- and medium-term inflation expectations may respond to economic shocks, expectations of inflation far in the future should not.
- The level criterion applies the more stringent standard that the level of long-run inflation expectations should be consistent with the central bank's long-run inflation target.
- And the third criterion – the uncertainty criterion – requires that uncertainty about future inflation should increase less than linearly with the forecast horizon.

Applying theory to the real world

This current episode represents a unique opportunity to empirically assess the three criteria for well anchored expectations during a period of high and volatile realised inflation.[5] For the United States, there are several relevant surveys and measures of

[3] Williams (2022).

[4] See Orphanides and Williams (2004, 2005, and 2007). There is a large theoretical and empirical literature on the formation of expectations. See, for example, Evans and Honkapohja (2001), Malmendier and Nagel (2016), Coiboin et al (2022), and references therein.

[5] As discussed in Levin and Taylor (2013), data on longer-run inflation expectations were spotty in past periods of high inflation. This situation has improved markedly over the past 20 years, first with the

inflation expectations which can be used for such analysis. Each has its own strengths and limitations. For example, some surveys focus on the views of professional forecasters, others on firms in the financial industry and/or the broader business sector, and still others on the views of representative samples of households. These surveys also differ in scope and methodology, including with respect to the time frames they inquire about, and in the measures of uncertainty they can provide.

In addition to surveys, market-based measures of inflation compensation derived from inflation-indexed securities and inflation swaps provide useful and relevant information. However, the level and dynamics of derived inflation compensation reflect not just levels and shifts in expected inflation, but also various market and liquidity risk premia, which can vary over time.

In the discussion below, I concentrate on four main sources of survey information: the Survey of Professional Forecasters (SPF), run quarterly by the Federal Reserve Bank of Philadelphia since 1990 and earlier by the American Statistical Association and National Bureau of Economic Research; the Federal Reserve Bank of New York's (FRBNY) Surveys of Primary Dealers and Market Participants (Policy Survey), taken ahead of each FOMC meeting, which capture the views of economic and financial professionals; and the University of Michigan Surveys of Consumers (Michigan Survey) and the FRBNY's Survey of Consumer Expectations (SCE), which each seek to measure the views of a representative sample of households. For comparison, I also draw on measures of inflation compensation derived from financial instruments as proxy measures of the level and dynamics of market-implied inflation expectations.

In moving from theory to an empirical assessment of the sensitivity and level of longer-run inflation expectations, one must specify what forecast horizon corresponds to the "long run". Survey don't typically ask about inflation in the "long run," but rather the inflation rate over a specific time period. A reasonable and often used benchmark of longer-run inflation expectations is to look at inflation five or more years in the future. Such a forecast horizon is sufficiently far in the future that current business cycle dynamics and the effects of monetary policy on inflation can be expected to have played out. However, under some circumstances, this may fall short of the "long run" implied by theory. Moreover, not all available surveys for the United States measure expectations at that horizon.

The sensitivity criterion

Turning to the data, over the past year and a half, available measures of longer-run inflation expectations have been fairly insensitive to the rapid rise in inflation. Graph 2 shows the time series of these measures of longer-run inflation expectations. This includes CPI breakeven inflation rates six to 10 years in the future as implied by nominal and inflation-protected US Treasury securities; median expectations from the Survey of Professional Forecasters (SPF) for inflation measured by the PCE price index six to 10 years in the future,[6] median expectations from the Policy Survey for inflation measured by the CPI Index six to 10 years in the future; and the University of Michigan

appearance of inflation-indexed Treasury securities, and more recently with the introduction of the Survey of Consumer Expectations in 2013, and other surveys of businesses and market participants.

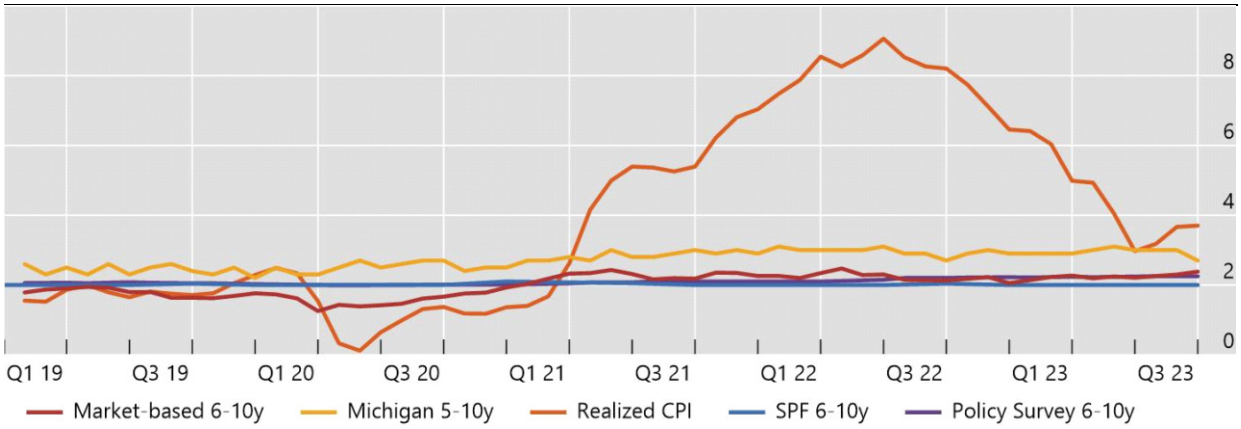
[6] This is constructed by inferring the expectations 6-10 years from matched individual responses for "the next ten years" and "the next five years," then taking the median from the sample. The Blue Chip survey, another surveys of economists and market participants, yields similar results regarding long-term inflation expectations.

survey of inflation expected during the next five to 10 years. Realised trailing 12-month CPI inflation is also shown in the figure for reference.

Longer-run inflation expectations

In per cent

Graph 2



Source: Federal Reserve Board, Federal Reserve Bank of New York, Federal Reserve Bank of Philadelphia, Haver Analytics, University of Michigan.

As seen in Graph 2, longer-run inflation expectations of SPF and Policy Survey respondents have remained remarkably stable over the past two and a half years, although there has been a slight upward drift for expectations as measured by the Policy Survey. The market-based measure and the Michigan survey rose modestly during 2021–22 and as of Q3 2023 are near the top of their historical range. Because the Michigan survey asks about inflation during the next five to 10 years, it is a mixture of short-run and longer-run expectations, which may be related to its modest sensitivity to inflation. Market-based measures include a time-varying risk premium that may explain some of their modest movements over time.[7]

In contrast to longer-run expectations, short-run and, to a lesser extent, medium-run inflation expectations responded to the sharp rise in inflation in 2021–22. The lower portion of Table 1 reports summary statistics for one-year-ahead inflation expectations from the inflations swaps market, the Michigan survey, one- and three-year-ahead expectations from the New York Fed's Survey of Consumer Expectations (SCE), and expectations for average annual CPI inflation for the next five years from the Policy Survey. As can be seen, over the past several years, one-year-ahead inflation expectations have been highly sensitive to incoming inflation during the recent period. This is consistent with past trends as well. The sensitivity of three-year-ahead inflation expectations is far less than that for one-year-ahead expectations. Median and average expectations for the average CPI inflation over the next one to five years from the Policy Survey also rose, but to a lesser degree, peaking at 2.6% late 2022, and declining to 2.4% in September 2023.

[7] Another form of relevant sensitivity analysis is the response of interest rate to economic shocks or news. As discussed in Swanson and Williams (2014), responses of yields to news can be distorted when short-term interest rates are at or near the effective lower abound.

Measures of inflation expectations

In per cent — Table 1

	2014-19 mean	2014-19 90% range	2020	2021	2022	2023 Q3
Longer-run expectations						
Market-based 6-10 years	1.9	1.4–2.4	1.6	2.3	2.2	2.3
SPF 6-10 years	2.1	2.0–2.2	2.0	2.0	2.0	2.0
Policy Survey 6-10 years[1]	2.1	2.0-2.1	2.0	2.1	2.2	2.3
Michigan next 5-10 years	2.6	2.3–2.9	2.5	2.9	3.0	2.9
Short- and medium-run expectations:						
Market-based 1 year ahead	1.6	0.5-2.2	1.0	3.2	4.0	2.4
Policy Survey 1-5 years[1]	2.0	1.9-2.1	1.9	2.1	2.4	2.4
SCE 1 year ahead	2.8	2.4–3.2	2.8	4.5	6.0	3.6
SCE 3 years ahead	2.8	2.5–3.2	2.7	3.6	3.4	2.9
Michigan 1 year ahead	2.7	2.4–3.2	2.7	4.2	5.0	3.3

[1] Data from January 2015 onward.

Sources: Federal Reserve Board, Federal Reserve Bank of New York, Federal Reserve Bank of Philadelphia, Haver Analytics, University of Michigan.

The level criterion

Assessing the level criterion presents some comparability issues. Only the SPF includes a longer-run forecast of PCE price inflation that is directly comparable with the Federal Reserve's target. Other measures of longer-run inflation expectations for the United States do not correspond exactly to the PCE price index that the FOMC has stipulated for its long-run goal. This complicates a direct comparison of these measures with the FOMC's stated goal. For example, "breakeven inflation" measures are derived from inflation-indexed Treasury securities that are indexed to the CPI; these measures also include time-varying risk and term premiums in addition to expectations of inflation.[8] The Policy Survey also refers to CPI inflation, as this permits a more direct comparison with market-based measures of inflation compensation. The situation is more complex with surveys of consumers. The SCE refers to the "rate of inflation," and the Michigan survey refers to "prices in general," rather than referring to a specific price index.

To address the lack of direct comparability of different measures of inflation expectations, I compare readings over the past two years with the levels observed during 2014–19, after the FOMC's announcement of a 2% long-run goal and before the onset of the pandemic in 2020 and subsequent rising inflation in the spring of 2021. In addition, for CPI based measures, one can apply a long-term average differential between CPI and PCE based inflation, on the presumption that this differential might be expected to return to its longer-run average.

Over the two decades ending in 2019, 12-month CPI inflation was on average 0.3 percentage points higher than PCE inflation. Of course, the gap between CPI and PCE 12-month inflation at times can be much larger. Indeed, the gap widened in 2021–22

[8] There is a literature that aims to extract inflation expectations from breakeven inflation rates; see Breach et al (2022) and references therein. These measures of inflation expectations tend to be even more stable than breakeven inflation rates, including during the current episode.

to a peak level of almost 2 percentage points, but the differential narrowed again in 2023 and has averaged 0.3 percentage points year-to-date through September. Hence, to the extent that the typical relationship between PCE and CPI inflation is expected to hold in the longer run, one could interpret an expectation of 2.3% longer-run CPI inflation as being broadly consistent with the FOMC's target of 2.0% on average for PCE inflation.

The level of longer-run PCE inflation expectations in the SPF has consistently stayed very close to the FOMC's 2% goal. The other measures have generally stayed within pre-pandemic ranges, with most recent readings only slightly higher than corresponding average levels from 2014–19. The upper portion of Table 1 provides statistics on these comparisons. Interestingly, during the period of sustained low inflation before the pandemic, the market-based and Michigan measures declined, and their current levels are similar to those seen prior to that decline.

In the case of the Policy Survey, longer-run CPI inflation expectations have moderately increased, compared with the pre-pandemic period, but to a level of 2.2 to 2.3% that is arguably more consistent with the FOMC's 2% PCE target than the 2.1% longer-run CPI inflation expected over the period 2015–19.

The uncertainty criterion

Data limitations make assessment of the uncertainty criterion for well anchored inflation expectations – that uncertainty not increase linearly with the forecast horizon – more challenging. In principle, reported prices on inflation options contracts could be used to infer investors' distributions of beliefs about future inflation.[9] However, there have been virtually no trades recorded in the US market for inflation caps and floors since early 2021. Over that time, the "prices" reported for these options were based on models, not transaction prices, and cannot be used to measure investors' inflation uncertainty during the current episode.

Instead, I will turn to the FRBNY's Policy Survey and SCE. Both surveys ask respondents to assign probabilities of inflation falling in several defined ranges over specified time periods. Since early 2015, respondents to both the Survey of Primary Dealers and the Survey of Market Participants have been asked to provide expected probability distributions for average annual inflation over the next five years, and for the five years after that, ie average annual inflation six to 10 years ahead.[10] The SCE asks its panel of consumers to provide expected probability distributions for annual inflation over the next year, for the year starting 2 years ahead (three-year inflation), and since late 2021, for the year starting four years ahead (five-year inflation).

With these data, three measures of uncertainty can be computed. The dispersion of probability-weighted means from individual responses can be used to track *disagreement* across respondents about expected outcomes. Disagreement is a commonly used proxy measure for uncertainty,[11] but some have criticised it as not necessarily being reflective of true uncertainty at the level of individuals and firms. Using the probability distributions reported by respondents to the Policy Survey and SCE, individual uncertainty can be computed from measures of the breadth of their reported probability distributions. These measures can be averaged to track the evolution of *individual uncertainty* over time.

[9] As discussed in Mertens and Williams (2021).

[10] Respondents to the Survey of Primary Dealers have answered these questions over a longer horizon.

[11] Mankiw, Reis, and Wolfers (2003) and Reis (2022).

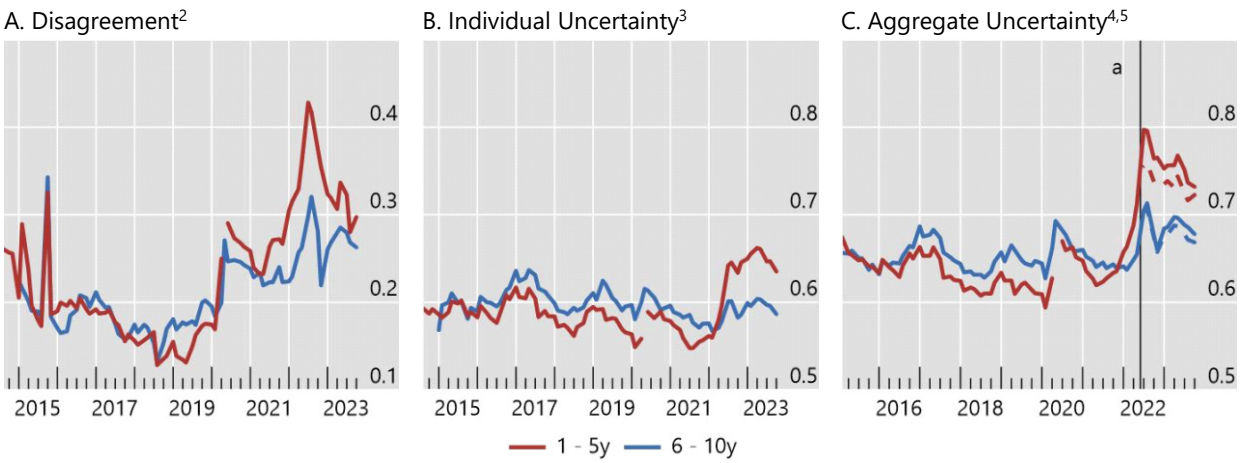
And third, we can similarly construct a measure of *aggregate uncertainty* from an aggregate probability distribution constructed by averaging across the individual probability distributions. The dispersion of this aggregate probability distribution can increase, implying higher aggregate uncertainty, because respondents become more uncertain about their individual forecasts, and/or because disagreement across respondents increases. The available evidence suggests both factors have been at work in recent years in both surveys, especially with respect to nearer-term horizons.

Panels A, B, and C in Graph 3 illustrate the evolution of these measures over time for Policy Survey respondents with respect to expectations for average annual inflation one to five years ahead and six to 10 years ahead. Several features stand out. One is that disagreement among these respondents, shown in Panel A, is quite low in absolute terms and compared with respondents' own average uncertainty (Panel B). However, with the onset of the pandemic and then the 2021–22 inflation upsurge, disagreement rose notably, peaking at nearly twice the pre-pandemic level at the one-to five-year horizon in mid-2022, and has begun to decline somewhat at that horizon as inflation has begun to recede.

Measures of market participants short-to-intermediate and longer-term inflation uncertainty[1]

In per cent

Graph 3



[a] June 2022

[1] The 1-5y inflation question was omitted from the April 2020 survey, creating a series break. [2] Measured as the standard deviation of the distribution of respondent inflation density means. [3] Sample average; individual uncertainty is measured as the standard deviation of a respondent's inflation density forecast. [4] Measured as the standard deviation of the respondents' aggregate inflation density forecast. The aggregate density forecast is constructed from the average across respondents of the individual density forecasts. [5] The questionnaire was modified in June 2022 to increase the number of probability categories. Dashed lines show for illustrative purposes measures using unchanged probability categories from June 2022 onward.

Source: Federal Reserve Bank of New York Surveys of Primary Dealers and Market Participants.

Another notable feature is that while average individual uncertainty ticked up at the one- to five-year horizon, it has remained range bound at the longer six- to 10-year horizon. Reflecting the combination of these two sets of developments, aggregate uncertainty rose substantially following the onset of the pandemic, led by uncertainty at the nearer, one-to five-year, horizon. It is also notable that our estimates of aggregate uncertainty show some sensitivity to the number of probability buckets in the Policy Survey. In April 2022, an additional high and low bucket was added, which resulted in higher estimates of aggregate uncertainty. The

dashed lines show the slightly lower estimates that would have been obtained with the original number of buckets.

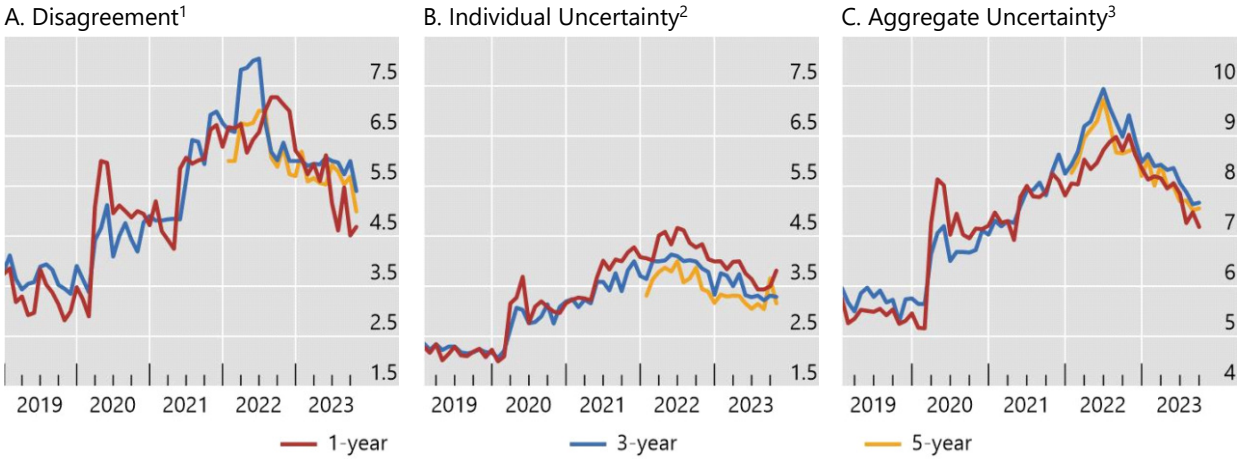
From the perspective of expectational anchoring these results are encouraging, especially the relative stability of the respondents' average uncertainty about six- to 10-year-ahead inflation. And even for the other measures, we do not find that uncertainty increases linearly with the horizon. On the contrary, measures of longer-run uncertainty remained less sensitive to the inflationary shocks of recent years than nearer-term expectations.

As shown in Panel A of Graph 4, disagreement about expected inflation among SCE respondents stepped up notably from 2019 levels following the onset of the pandemic and stayed elevated before rising further in 2021–22, when inflation surged, peaking at roughly twice the pre-pandemic 2019 level. Disagreement about one-year and three-year-ahead inflation showed broadly similar trends, although disagreement peaked somewhat higher for three-year-ahead inflation. Disagreement has largely retraced the rise in 2021–22, but not the initial rise that followed the onset of the pandemic. In recent readings, disagreement is somewhat higher for three-year ahead inflation than at the one-year horizon, somewhat similar to the situation in 2019.

What's behind this upsurge in disagreement? As discussed in research with my colleagues at the New York Fed,[12] there has been a striking increase since 2021 in the share of respondents who expect outright deflation three and five years in the future.[13] At the same time, the share expecting inflation above 4% also grew notably, but part of the increase has since reversed.

Measures of consumers' near-and longer-term inflation uncertainty

In per cent — Graph 4



[1] Measured as the difference between the 75th and 25th percentile of the distribution of respondent inflation density means. [2] Sample median; individual uncertainty is measured as the difference between the 75th and 25th percentile of a respondent's inflation density forecast. [3] Measured as the difference between the 75th and 25th percentile of the respondents' aggregate inflation density forecast. The aggregate density forecast is constructed from the average across respondents of the individual density forecasts.

Source: Federal Reserve Bank of New York Survey of Consumer Expectations.

[12] Armantier et al (May 2022, October 2023).

[13] The University Michigan survey of inflation over the next 5-10 years also showed a rise in deflation expectations in 2022.

As shown in Panel B, individual uncertainty, based on the interquartile range of each respondent's density function, also showed a two-step rise with the onset of the pandemic and then again with the upsurge in realised inflation in 2021–22. But the increase in individual uncertainty was not as pronounced as the rise in disagreement. For individual uncertainty, there is also a clear tiering by time horizon in the increases in uncertainty since early in 2021. Specifically, uncertainty about one-year inflation has been almost always higher than individual respondent uncertainty about three-year ahead inflation. And uncertainty about five-year-ahead inflation has almost always been lower than individual uncertainty about three-year inflation.

Finally, looking at aggregate uncertainty, as measured by the interquartile range from the average density function across respondents, as shown in panel C of Graph 4, several features stand out. One is that while aggregate uncertainty remains well above pre-pandemic levels, the additional upsurge in aggregate uncertainty that began in mid-2021 has largely retraced. Second, for the most part aggregate uncertainty about one-year, three-year, and five-year-ahead inflation has tracked together closely. And third, for a period between mid-2021 and mid-2022, aggregate three-year and five-year inflation uncertainty was higher than for one-year-ahead inflation, but the difference was not linearly proportional to the differences in time horizons.

Interestingly, the Policy Survey and SCE were similar in that disagreement across respondents rose more than individual uncertainty in recent years, and disagreement was the main contributor to changes in aggregate uncertainty. Also in both surveys, individual uncertainty rose more at nearer-term horizons. However, in the SCE, disagreement is a much bigger contributor to the *level* of aggregate uncertainty than for respondents to the Policy Survey.

Summing up

The recent news about the long-run anchoring of inflation expectations in the United States is mostly reassuring: available measures of longer-run inflation expectations in the United States have remained remarkably stable at levels broadly consistent with the FOMC's longer-run goal, notwithstanding the overshoot of the FOMC's inflation objectives over the last two and a half years. That said, both the SCE and the Policy Survey provide evidence of increased uncertainty about longer-run inflation. But this does not appear to be due to unmoored longer-run expectations, given that the measures do not suggest that uncertainty is increasing linearly with the forecast horizon. On the contrary, for many measures, uncertainty about longer-run inflation has increased by about the same degree or less than shorter-horizon measures.

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Central banking in Latin America – the next decade

Alejandro Werner

Introduction

Monetary policy in Latin America has undergone an extremely successful institutional transformation in the last three decades. Most economies in the region were able to contain inflation and sustainably bring it back to close to the levels in advanced economies, establish well-functioning floating exchange regimes and institute inflation targeting frameworks. Important legal reforms laid the foundations for this transformation together with a paramount change in the conduct of fiscal policy. On the back of these changes, inflation in the region dropped from an average of 168% in the 1980s to an average of 5.6% in the second decade of the 21st century. The establishment of a credible monetary framework opened the door for the first time in the region to implement a countercyclical monetary policy, a feature that was widely used during the Great Financial Crisis (GFC) and the global pandemic.

Regional central banks are now facing yet another important test: the global inflationary shock that has affected advanced, emerging and developing economies alike. As a product of both aggregate supply and aggregate demand shocks, world inflation increased by 620 basis points between 2020 and 2022. For some advanced economies, the rate of inflation in 2022 was the highest it had been in the last 40 years. In Latin America, average inflation increased from 2020 to 2022, reaching 14.6%. Although central banks in the region reacted much earlier to the inflation shock than those in advanced economies, and in some countries the initial phase of disinflation has been more pronounced than in advanced economies, there is still a long road ahead before inflation falls sustainably back to the inflation target. Throughout this process, the economies of Latin America will be facing a difficult macroeconomic environment. It is highly likely that, between 2015 and 2025, the region will experience another lost decade in terms of GDP per capita; debt ratios have increased and politics have become more polarised, making it harder to introduce significant fiscal and structural reforms. Other important challenges that central banks in the region will deal with – but which are not addressed in this paper – are the role of central bank digital currencies, regulation of the digital payments system to maximise economies of scale and reduce fragmentation, and cyber security issues for the financial system.

Following this introduction, Section 2 of the paper will present a summary of the most significant monetary and macroeconomic policy accomplishments in Latin America over the last 25 years, and Sections 3 and 4 will highlight some of the challenges that monetary policy still faces and which need to be addressed in the coming years. Section 5 will address Latin America's growth challenge, which could become an important constraint on the future conduct of monetary policy as a determinant of social unrest and political polarisation.

The golden years of central banking in Latin America

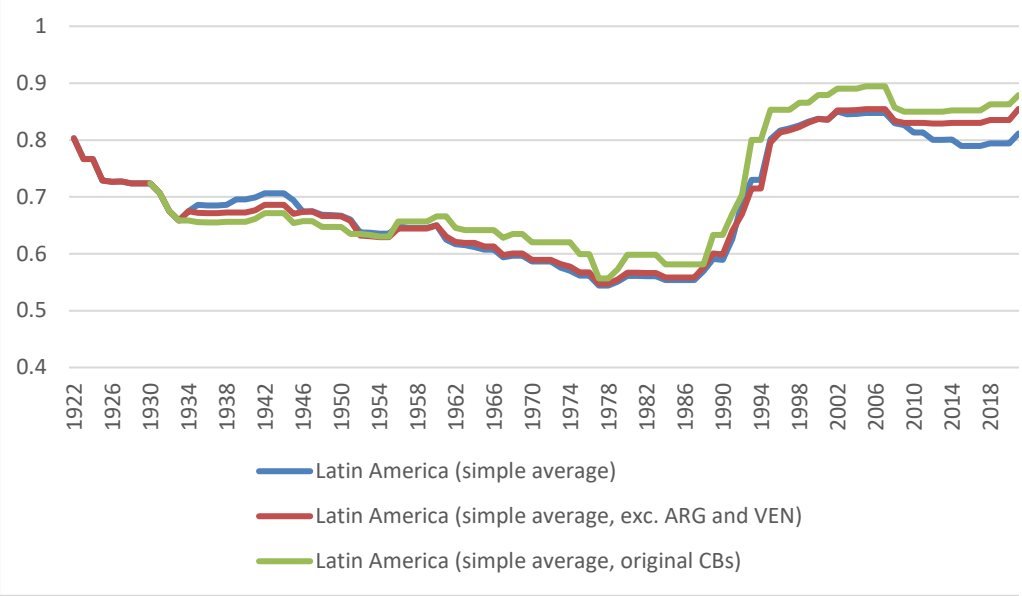
In the late 1960s, inflation in Latin America experienced a significant uptick that continued throughout the 1970s and 1980s, with several countries suffering hyperinflation. Between the late 1980s and the early 1990s, most countries in the region were able to bring inflation down significantly, as shown in Graph 1. However, in 2022, Venezuela and Argentina were still among the five countries in the world with the highest inflation rates.

Graph 1

Declining inflation in Latin America was the product of stabilisation programmes that initially used an exchange rate anchor and included an important fiscal consolidation effort, as well as structural reforms to make economies more competitive. At different points in these stabilisation efforts, countries moved to grant independence to their central banks. The purpose of this reform was to provide a strong institutional shield to nominal stability that would provide significant assurance that the decline in inflation was permanent and, in some cases, would also help in the last stage of inflation reduction. The three main components of this reform included prohibiting central banks from providing financing to the government in order to eliminate a historically significant source of inflation, establishing price stability as the central bank's main mandate, and providing these institutions with governance that isolated them from political pressures. As shown in Graph 2, which plots the Jácome and Pienknagura (2022) index of central bank independence, Latin American central banks became significantly more independent in the 1990s. This index is an extension of the one introduced by Cukierman, Webb and Neyapti (1992), which measures de jure independence, and it fluctuates between one and zero, where the closer the index is to one, the more independent central banks are.

Central bank independence index

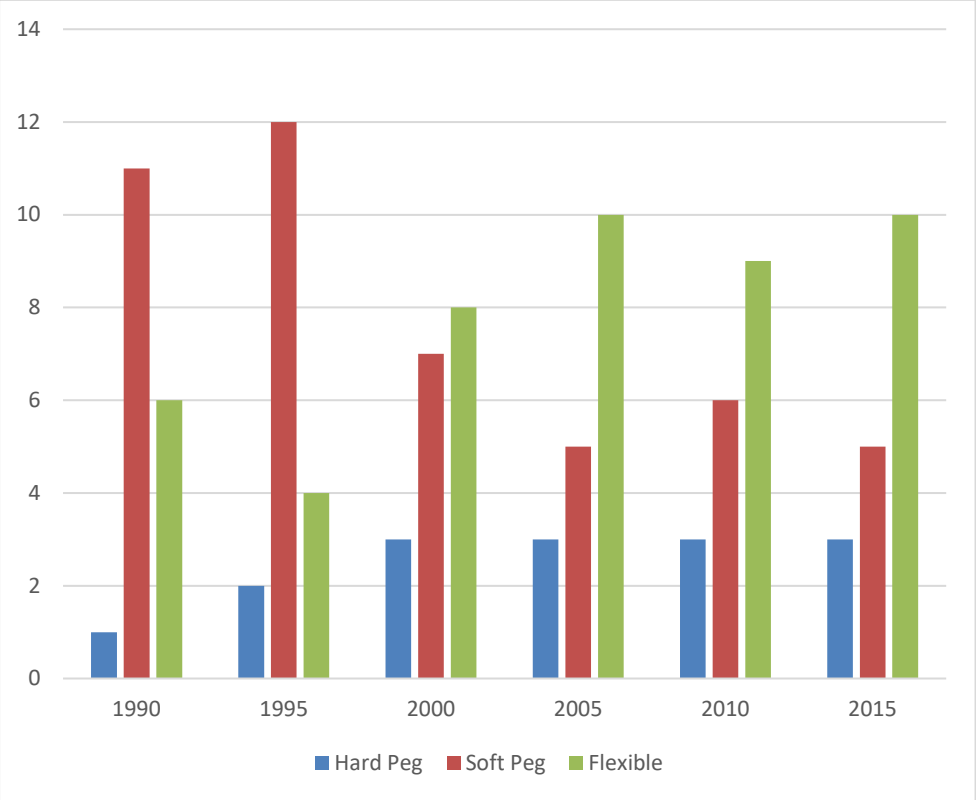
Graph 2



In the late 1980s and early 1990s, the idea of transitioning towards an independent monetary policy with a floating exchange rate and interest-setting central bank committees was not popular. Some countries moved gradually towards floating as they widened their foreign exchange target zones (Chile and Colombia), while others were forced to abruptly adopt floating regimes as a product of currency crises (Mexico and Brazil), but even during these transitions questions remained as to the suitability of floating exchange rates for emerging markets. The experiences of Australia, Canada and New Zealand – small, open, advanced economies with well-functioning floating exchange rate regimes within an inflation targeting monetary framework – served as an important reference for all of these countries. Another interesting experience is that of Peru, which, due to the dollarised nature of its economy, floats its currency, but also maintains a much lower exchange rate volatility within a floating regime through frequent interventions, a high level of international reserves and strong credibility.

Exchange rate regimes in Latin America

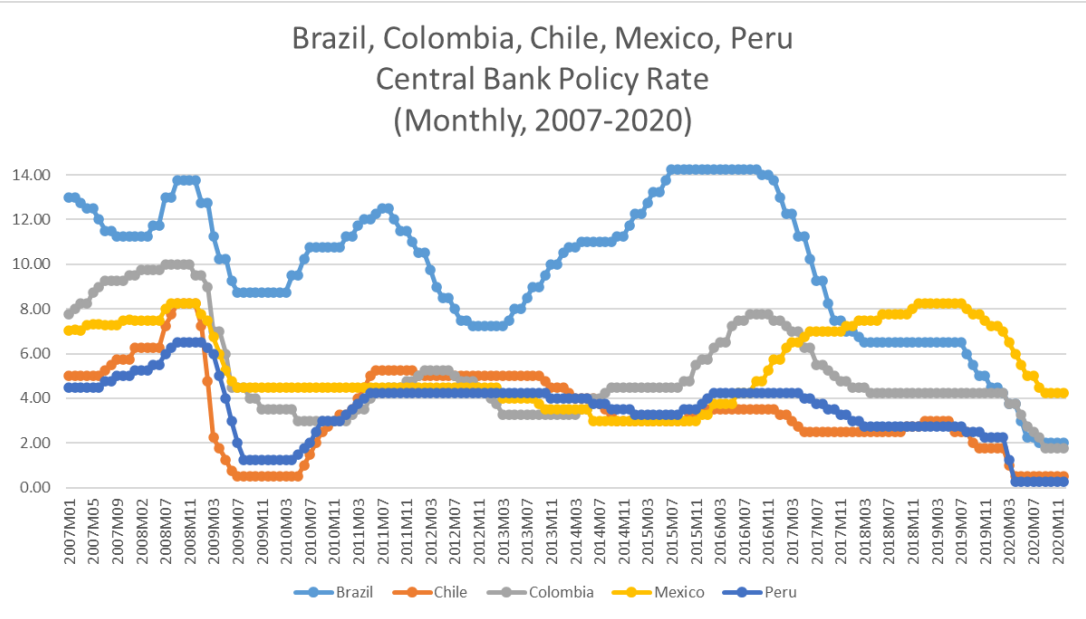
Number of countries Graph 3



The credibility gained after many years of consistent implementation of these frameworks allowed these countries to run a countercyclical monetary policy during the GFC. As can be observed in Graph 4, interest rates were brought down significantly during both the GFC and the Covid-19 crisis.

Brazil, Colombia, Chile, Mexico, Peru
Central Bank Policy Rate

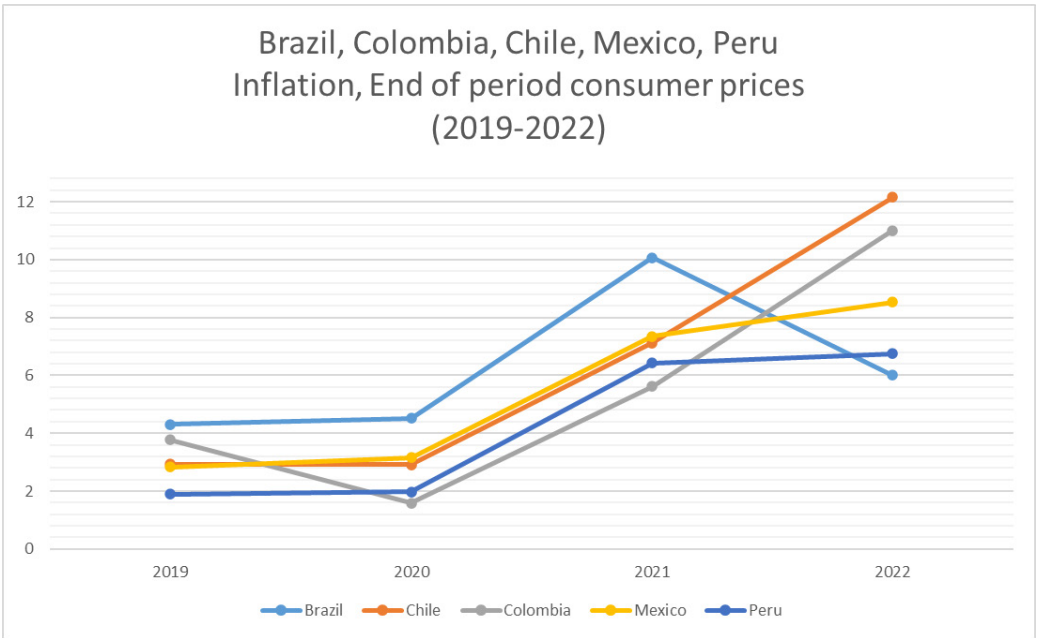
Graph 4



Following the extremely aggressive countercyclical response during the Covid-19 recession, central banks in Latin America are now facing another important challenge: the significant increase in inflation triggered by global dynamics and, in some cases, domestic inflationary pressures. As Graph 5 shows, inflation in Latin America's largest economies rose from around 2–4% in 2019 to around 7.5–12% in 2022. Central banks reacted early, with Brazil leading the inflationary and tightening cycle.

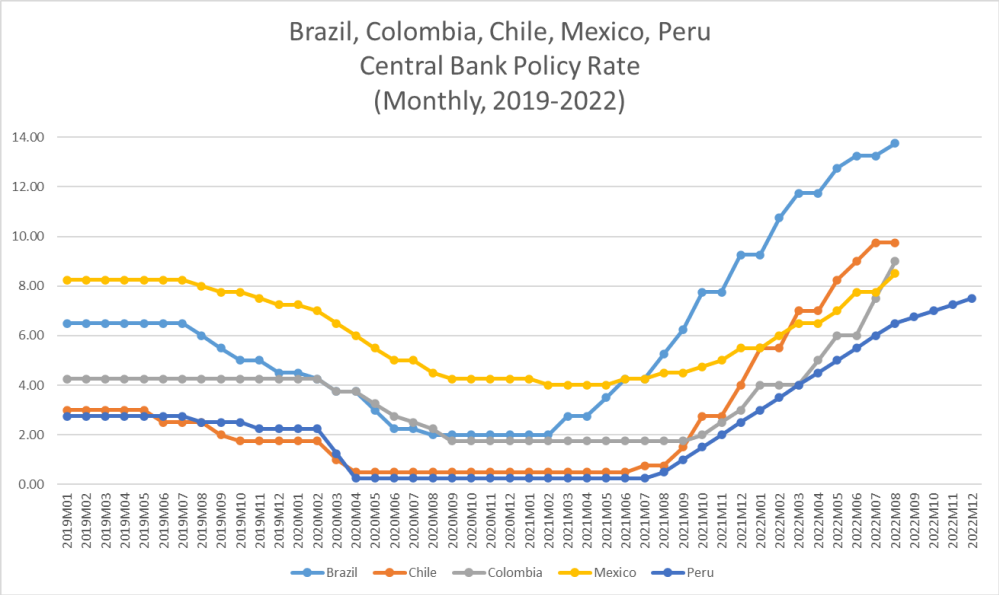
Brazil, Colombia, Chile, Mexico, Peru
Inflation, End of period consumer prices

Graph 5



Brazil, Colombia, Chile, Mexico, Peru
Central Bank Policy Rate

Graph 6



The immediate challenge: bringing inflation back to target

In 2021 and 2022, median inflation in Latin America increased to levels not seen since the 1990s. Central banks reacted quickly, not waiting to see if the supply shock contaminated inflation expectations. The logic was that, given the region's inflationary history, the cost-benefit analysis pointed towards a pre-emptive strike. In addition, some countries were also exhibiting symptoms of overheating, Chile in particular. The policy paid off, as inflation expectations were mostly anchored, and by early 2023 disinflation was clearly in train in Brazil and developing in other countries.

In addition to the original challenge of disentangling the roles that supply and demand shocks were having on inflation and the possibility of inflation expectations becoming unanchored, monetary authorities had to deal with the problem of additional supply shocks affecting inflation with the Russian invasion of Ukraine. What was initially thought to be a two-year process of returning inflation to target has become at least a three-year process due to the additional shocks and a slower decline in world inflation. Moreover, the initial reaction to inflation implied an overreaction in interest rates in order to contain the revision of inflation expectations. So, what does this mean for inflation today as it comes down at a slower pace than originally expected? Should interest rates increase as a result of a higher-than-expected inflation rate? What are the relevant trade-offs between different paths to reductions in interest rates? Should interest rates stay constant but communications signal that they will fall faster once disinflation is clearly underway, or it is preferable to start reducing them early but at a slower pace? Is there still room for a slower reduction in rates since inflation expectations have been well contained and therefore the initial overreaction can be reduced?

The pace of disinflation and the trade-off between increasing rates and maintaining rates at a high level for a longer period.

Technical, policy and political challenges faced by central banks

a) Technical issues

Central banks in Latin America and the Caribbean still need to deepen their understanding of the monetary policy transmission mechanism and some of the key parameters governing the economy. This is due to the short time-series data that central bank staffers have to perform econometrics in order to answer the key questions that guide monetary policy. The ever-evolving nature of the transmission mechanism as stability is achieved and financial markets develop also complicates this identification. In my opinion, the discussion on the neutral real rate can be strengthened in many countries. We still find that many central banks calculate it using a variety of methods and then take an average or produce a range. There is no consideration of the fact that some of those methods are derived from a closed economy model, while others are developed in the context of a totally open economy with complete capital mobility. Theoretically, in a closed economy model, the real interest rate is the endogenous variable that equilibrates the demand for investment with the supply of savings, while in an open economy the interest rate is determined exogenously (up to a risk premium) from financial arbitrage (interest rate parity conditions), with the exchange rate playing the role of the endogenous variable that equilibrates savings and investment. During a period with so many changes in the international neutral real rate, this difference is very important.

With respect to our understanding of the transmission mechanism, more work with sectoral data is needed. Deepening our understanding of interest rates' effects on mortgages, different types of investment and consumption is important. Studies using micro data to understand consumption and investment decisions in the economy are also a priority. Finally, given the important role that expectations play in the transmission mechanism, more empirical work on their determination would be useful.

Another technical challenge faced by central banks is the fine-tuning of their analysis in order to understand the structural changes that regional economies are undergoing due to the pandemic. The first of these challenges is associated with the measurement of potential GDP and the output gap. According to the IMF, average scarring for the region will be approximately 4%. This means that, in the medium term, potential GDP will be permanently lower than what was predicted before the pandemic. Clearly, these estimates were not made with significant input from microeconomic data on the destruction of firms, the degree of educational losses, or the increase in mortality. Our assessment of potential output will guide our view of the output gap and of the degree of slack in the economy. A deeper understanding is needed of the permanent losses triggered by the pandemic, from the loss of human capital to the reduced efficiency of job market matches to other hysteresis effects that present themselves after deep contractions in economic activity. Changes in productivity associated with the accelerated adoption of new technologies, changes in participation rates based on households' lifetime choices and the effects of hybrid work on productivity and labour market dynamics present significant areas of research and uncertainty about steady-state parameters of the economy.

b) Policy issues

As emerging market economies developed their inflation targeting frameworks, they modelled them based on the experiences of small, open, advanced economies that had adopted these models in the past, as well as the example set by the British, which served as the benchmark to which many countries aspired at the time. However, over time, it was clear that the underdevelopment of capital markets in EMEs and the high inflation memory of economic agents were features that made the exchange rate's role more salient through its effects on inflation expectations and financial stability. The preferred instrument for dealing with these challenges in Latin America has been FX intervention. However, the environment in which these interventions have been undertaken is far less formal and does not have as strong an analytical foundation as the framework for how interest rate decisions are made. This is clearly an area where central banks could advance much more in presenting frameworks and policy guidelines under which this second instrument of monetary policy is to be deployed.

Central banks in Latin America intervene in foreign exchange markets for multiple reasons. The IMF has provided a useful taxonomy and review of regional FX intervention policies in Chamon et al (2019), which mentions the following drivers of intervention: accumulation of international reserves, attenuation of financial stability risks, addressing high and fast pass-through from the exchange rate to inflation, and dealing with persistent shocks that can have Dutch disease-type effects or international portfolio adjustment shocks that can have large effects on the exchange rate. Another important factor is how the intervention takes place; we have witnessed a multiplicity of strategies as central banks have acted on the spot and derivative markets and used rules and discretion. Although this is not the place for a thorough review of these policies, the degree of transparency and communication from central banks regarding these policies is significantly lower than that used to explain their actions through the interest rate. In this area, and with the development of the Integrated Monetary Policy Framework by the IMF (2020), there is space for a significant redesign of these policies and important improvements in their communication, which would increase their effectiveness. Moreover, coordination with the fiscal authority might become more important in a world in which debt ratios are increasing; (r-g) is going up as both terms are moving against the government, and fiscal authorities might want to fight the slowdown needed to consolidate the reduction in inflation through a more expansionary fiscal policy.

c) Political economy issues

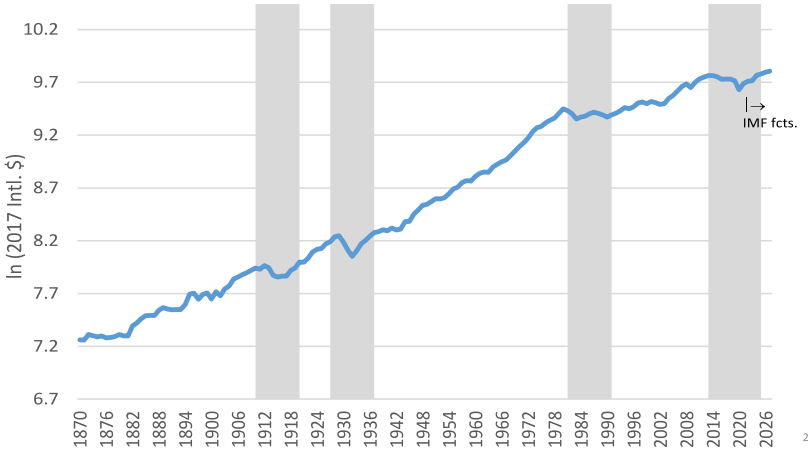
Political economy issues include fiscal pressures for faster reductions in rates. Governments and societies were supportive of tightening when inflation reached extremely high levels, but as inflation drops towards more tolerant ranges, the pressure to declare victory too soon and reduce rates faster will emerge. This will materialise as calls for a looser monetary policy and an upward revision of the inflation targets. Central banks should be prepared to engage in this analytical debate and argue strongly against these short-sighted solutions that would lead to a steepening of the yield curve, an increase in real rates and a decrease in potential GDP for the sake of a short-lived bump in growth.

Latin America's growth challenge

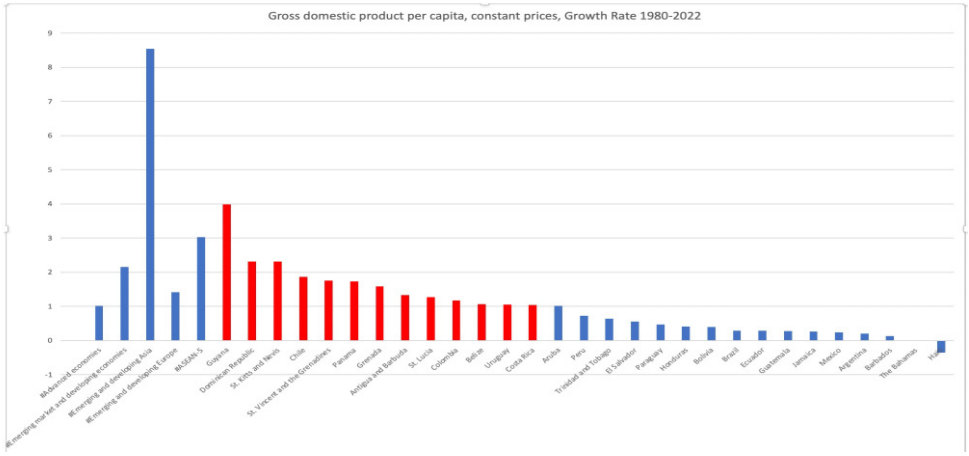
Latin America has experienced an extremely low average rate of growth in the last 50 years. This situation will continue and may worsen in the years to come. Graphs 7 and 8 show how Latin America's GDP per capita growth has slowed significantly since the 1980s and how, in the last 50 years, only a small number of countries comprising only 14% of the region's population have grown at rates higher than those of advanced economies. In addition, according to IMF forecasts, it is highly likely that the effect of the drop in commodity prices in 2014–15, together with the effects of the Covid-19 pandemic, will result in another lost decade in Latin America during 2015–25.

GDP per capita for the historical Latin American aggregate

(Levels in 2017 International $; logs) Graph 7



Only 14% of LA's population lives in countries converging to AE's GDP during 19802022 Graph 8



During Covid, Latam suffered the largest regional contraction and its deepest regional recession in the last 120 years. Graph 9

Exhibit 2: COVID-19 GDP per capita declines in historical country aggregates: 2019 through 2020, and 2018 through 2020

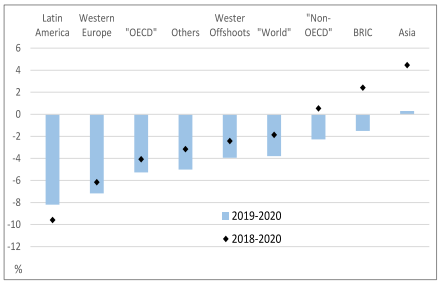
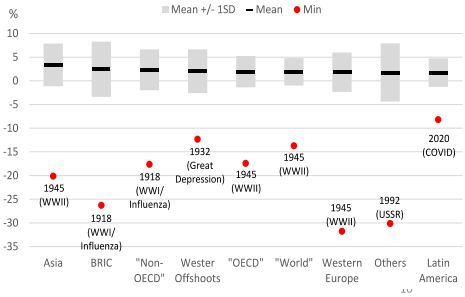
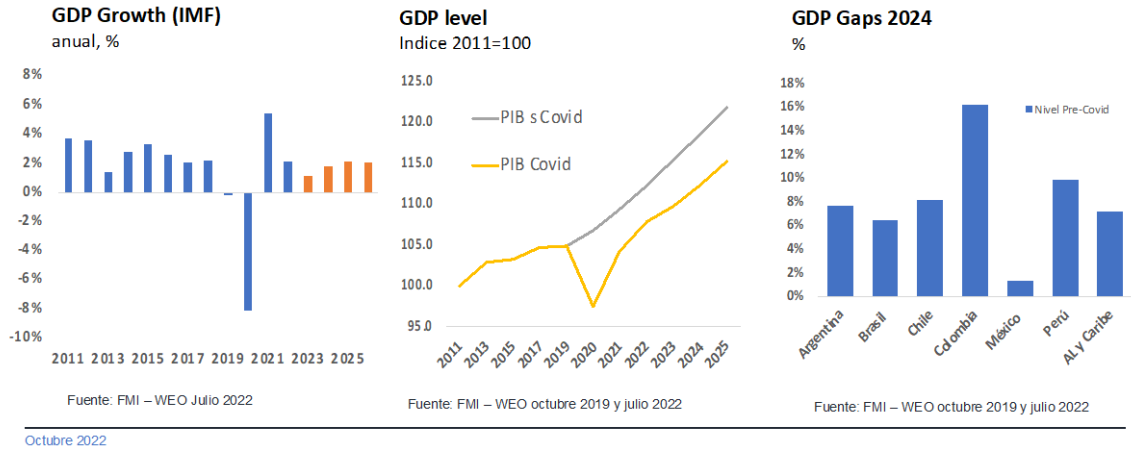


Exhibit 3: 2020 GDP per capita declines in historical country aggregates vs. historical distributions and record minimum yearly changes since 1905



Latin America was the region of the world that experienced the largest decrease in GDP per capita during the pandemic, and it is the only region of the world where the 2020 recession was the deepest on record. The permanent effects of this recession, called "scarring" by analysts, are expected to be significant.

The IMF forecast significant economic scaring from the pandemic Graph 10



A silver lining for many Latin American countries will come from an external environment that could support higher growth. One element of this is the energy transition, as Latin America is a region with abundant renewable energy sources that, with the right regulation, could attract important investments in generating these types of electricity. Many nations in the region are abundant with the key minerals needed to store, transmit and distribute electricity. For example, Argentina, Bolivia and Chile are among the top five countries with the largest lithium reserves. In addition, the need to redesign global value chains in manufacturing as firms consider greater natural disaster risks, geopolitical tensions, higher tariffs and trade disputes has led to the processes known as nearshoring, friend-shoring and ally-shoring, which will benefit some countries in Latin America. For example, the Inter-American

Development Bank (IDB) estimates that this process will increase regional exports by approximately 80 billion dollars, while projections made by other institutions put the number as high as 150 billion. More than half of this effect is expected to be captured by Mexico. If one takes the most optimistic estimates, they represent, at most, 10% of the region's exports. Even so, the estimated impact on the country is significantly smaller than the increase in Mexican exports after NAFTA entered into force. In summary, the nearshoring process represents an important positive shock for the region, but not a transformational event in terms of medium-term growth.

In open, democratic societies like most Latin American countries, the recent economic malaise, together with the political polarisation that many of the region's countries are experiencing, will complicate the consensus building necessary for big reforms that increase productivity and growth, improve income distribution and maintain stability. It is in these difficult political environments that central banks will undertake their main responsibility of bringing back and maintaining price and financial stability. Central banks should continue to clearly communicate the benefits of price stability and the risks of declaring an early victory once inflation is low but not on target. An outcome where central banks declare victory too early will feed into medium-term inflation expectations, raising them higher and increasing their volatility, with important negative effects on long-term interest rates and potential growth.

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A cross-border payments, exchange and contracting platform for the 21st century

Tobias Adrian[1]

Abstract

Cross-border payments can be slow, expensive and risky. They are intermediated by counterparties in different jurisdictions which rely on costly trusted relationships to offset the lack of a common settlement asset as well as common rules and governance. In this chapter, I present a vision for a multilateral platform that could improve cross-border payments, as well as related foreign exchange transactions, risk sharing and, more generally, financial contracting, based on earlier work by Adrian et al (2022). The approach is to leverage technological innovations for public policy objectives. A common ledger, smart contracts and encryption offer significant gains to market efficiency, completeness and access, as well as to transparency, transaction and compliance costs, and safety.

Cross-border payments can be slow, expensive and risky. In today's world of payments, counterparties in different jurisdictions rely on costly trusted relationships to offset the lack of a common settlement asset as well as common rules and governance. Imagine if a multilateral platform existed that could improve cross-border payments, at the same time transforming foreign exchange transactions, risk sharing and, more generally, financial contracting.

A common ledger, smart contracts and encryption offer significant gains to market efficiency, completeness and access, as well as to transparency, transaction and compliance costs, and safety.

This chapter provides an overview of the current landscape and presents a path forward on how a newly designed multilateral platform could enhance cross-border payments and eventually stimulate the provision of key international public goods and infrastructures.

Today's world of payments

Currently, at the domestic level, there exist infrastructure and governance structures that allow the private sector to better provide payment and financial services. At the international level, however, there is a lack of coordination that results in insufficient provision of these public goods and inefficient arrangements for cross-border transactions.

Compounding these issues is the disruption in cross-border payments caused by emerging new technologies that allow transactions to circumvent borders and

[1] These are the views of the author and not necessarily those of the International Monetary Fund (IMF), its Management or its Executive Board. This chapter is based on earlier work by Adrian et al (2022).

regulations, as well as the fears of fragmentation that have arisen with ongoing geopolitical conflicts.

Indeed, the need for better cross-border payments has long been recognised by the international community. In the *October 2020 roadmap for enhancing cross-border payments*, G20 Finance Ministers and Central Bank Governors endorsed a set of 19 building blocks that aim to achieve faster, cheaper, more transparent and more inclusive cross-border payment services. These should be safe and secure, and would facilitate economic growth, international trade, global development and financial inclusion.

With these objectives in mind, the design of a multilateral exchange and contracting platform should improve cross-border transactions in two ways.

First, it should centralise payments and settlement and integrate functionalities needed for cross-border transactions, namely, to streamline compliance, reduce the cost of foreign exchange conversion, and better manage financial risks. Second, it should leverage new technologies to better organise payments and associated financial markets. These new technologies can alleviate the underlying obstacles to trade. They include common ledgers with unique states, programmability that allows for automated financial contracts ("smart contracts") and encryption that ensures privacy. Participants can then interact via a multilateral exchange and contracting system where they can truthfully share information with smart contracts while retaining privacy relative to other parties.

The current landscape is continuously updated by private and public sector innovation. Fast (retail) payment systems are emerging from private bank clearing associations and from central banks (World Bank (2021), Duarte et al (2022)). Fintechs serving households and small businesses start from digital payment functions but build credit and insurance products on top, with synergies in data and financial products. At the wholesale level, large intermediaries like JPMorgan have been developing blockchain-based solutions for instantaneous digital transfers of Treasury and collateral (US money market funds).

The responsibility for tracking transfers and changes in ownership in this landscape rests on multiple brokers and intermediaries that modify their clients' accounts to reflect those transactions. With infrastructures and legacy systems created to facilitate intermediation, the information from these transactions is recorded in several ledgers for each intermediary and each of the clients that enter a transaction. However, these ledgers do not guarantee a unique common underlying state, and limited communication makes reconciliation time-consuming and costly.

For cross-border payments, many of these infrastructures are insufficient or do not exist. Establishing trust and coping with market failures is more difficult and expensive when transactions must be carried out across borders. At the international level, the lack of common governance across borders makes these public goods scarce or non-existent and leads to high risks, high costs and high concentration.

First, there is no common and widely available settlement asset internationally. Banks must rely on foreign banks to access foreign central bank money via nostro/vostro accounts (ie the same account from the point of view of two different banks), or they must set up branches and be regulated in the countries where they want to have access to central bank reserves.

Second, cross-border transactions usually require that an agent in the payment chain make the conversion across currencies. In many cases, this implies risks and high costs, which are among the main drivers of cross-border transaction costs.

Third, compliance with rules for cross-border transactions is expensive. At the international level, there is a lack of common governance for vetting procedures and monitoring. Not only is it expensive to gather these data on customers; it can also be risky to trust financial institutions from other jurisdictions as the soundness of their procedures can be uncertain.

Specialisation in overcoming these three frictions in cross-border payments gives rise to networks of bilateral correspondent banking relationships, international banking and closed loop solutions that have high fixed costs and economies of scale. The result is concentrated market structures and large intermediaries that play a central role in cross-border payments.

A number of public- and private-sector innovations and initiatives have attempted to improve cross-border payments. Standardised messaging made correspondent banking faster and safer (first with SWIFT and, more recently, with ISO 20022). Netting and settlement has been improved for some currencies. Regional payment platforms have been developed, and experimentation in interlinking domestic payments systems is also ongoing. Payment providers have also been developing new services. Solutions that leverage stablecoins for fast and inexpensive cross-border payments have also grown recently.

Currently, there are related ongoing projects and experimentation that also aim to develop solutions for cross-border payments using distributed ledger technologies (DLT). Some of these projects are in the public sector and led by a consortium of central banks, in some cases in collaboration with the BIS Innovation Hub, while others have been launched by the private sector.

We can build on all these initiatives – and go further.

Tomorrow's world of payments

In a recent working paper (Adrian et al (2022)), we outline a vision for a new platform to facilitate cross-border payments, currency exchange and financial contracting – dubbed the "X-C platform" or just "X-C". X-C has a centralised, multi-currency foreign exchange trading environment and also allows for the introduction of contracts and policies to manage foreign exchange risks.

Our focus with X-C naturally goes beyond just payments, as we include other functions that are needed for competitive and efficient cross-border payments outcomes. The idea is to create markets that are currently missing, establish infrastructures to fill in gaps in financial access and reduce inefficiencies in cross-border payments. To do so, we are explicit about economic frictions, and we lay out the technological requirements for the solutions we propose. This gives a blueprint for the design of the platform, its infrastructures and its functions.

A first key aspect of the design is that organising cross-border transactions on a multilateral platform like X-C could improve efficiency by reducing transaction chains, settlement risk and the costs of foreign exchange transactions. This hinges on an architecture that would provide key public goods such as (i) a common infrastructure with rules and governance that would shorten transaction chains and give legal certainty to participating agents; (ii) common settlement assets issued by central banks to reduce settlement risk; and (iii) a trading environment to trade these different settlement assets on the platform.

A second key aspect of the design is combining the separate features of new technologies that X-C would require to address market failures and inadequate contracts. These features are one common ledger, programmability and cryptography. The X-C platform uses the common ledger to build markets and keep track of ownership of participants' transactions. The ledger is built to be able to interact with computer code. Smart contracts can read, execute and modify entries in the ledger and automatise financial contracts. Cryptography allows smart contracts to be executed without revealing information to relevant parties.

Each of these three features is used to address different fundamental obstacles to trade that limit contracts. Limited commitment due to the potential reneging of contracts can be addressed with cryptographic commitments such as atomic swaps (ie the exchange of money and assets from separate blockchains) and automatic transfers. Untrusted messages, where agents are suspicious about whether the other party complies with rules, can be tackled with domestic certification combined with cryptography to preserve data sovereignty and privacy. Unobserved states that generate financial risks can be addressed by aggregating information from privacy-preserving messages. Unobserved actions like front-running (Auer et al (2022)) can be tackled with contracts executed by programmed rules. The design is anchored on contract theory and market design – how agents should interact to best overcome market failures, what they should trade and how markets should be organised for best results.

In the current cross-border payments landscape, large institutions act as dealers and need to cover the cost of holding currency inventories. There are further markups to cover foreign exchange and counterparty risk. The market power from concentration also results in even higher markups. X-C's design aims to increase competition, lower spreads and reduce risks by providing infrastructure, contracts and markets for just-in-time liquidity transfers for previous contract commitments; a centralised multi-currency market; and instruments and markets for better hedging of risks.

Settlement risk is eliminated by immediate guaranteed settlement at a certain point in time or guaranteed contracted settlement at future designated dates and states. This is why we call this a "dynamic ledger", in which messaging, settlement and committing contracts become linked. Digital monies issued by central banks ("certificates of escrow") on X-C can then be used for programmable final settlement in participant countries' currencies. Thus, cross-border transactions using X-C are final and irrevocable.

To deal with data, retain privacy and comply with domestic and international regulations, X-C leverages cryptography to enable regulators and compliance officers to conduct checks, monitor and audit in a privacy-preserving fashion. Financial integrity checks and capital flow management encompass two sets of rules and regulations that can make cross-border payments slower, riskier and more expensive. X-C can help reduce costs and risks by automating compliance with these rules while preserving privacy.

Strong privacy can be retained while preventing untraceable transactions by leveraging "credential providers" and control agencies together with cryptographic proofs (eg zero-knowledge proofs) and checks. This makes it possible to decouple controls and user authorisation from transaction submission and execution.

The functionalities of X-C allow it to manage information generated at the local level efficiently and in a way that preserves privacy. They also allow it to identify and

vet the individuals or firms that X-C's participants may want to serve. For example, a transaction order can read a list of sanctioned individuals and attach a cryptographic proof that the individuals participating in a transaction were vetted and are compliant with, for example, anti-money laundering/combating the financing of terrorism (AML/CFT) rules.

Another consideration is how to organise spot and derivative foreign exchange markets so as to improve market liquidity and better manage risks. Foreign exchange spreads play a large role in cross-border payment fees and are usually a result of wholesale market underdevelopment. A better trading infrastructure, better risk management and a more predictable policy environment can contribute to lower foreign exchange trading risks and better functioning for foreign exchange markets.

Currently, foreign exchange trade is mostly carried out through a set of major banks who carry different currency inventories and act as oligopolistic intermediaries. This requires large balance sheets, resulting in imperfect competition and price distortions. When markets are decentralised or shallower, market power and distortions tend to be greater. The centralisation of information and exchange of foreign exchange trading can help improve markets by increasing transparency and creating incentives to increase competition. It allows for visibility on prices and the quantities that are being actively traded. It also makes it possible to eliminate settlement risk from transactions.

X-C distinguishes itself from other proposals by organising foreign exchange trade in a multi-currency environment that uses market design theory. Intermediaries act as broker-dealers and compete to attract trade from clients. In addition, multi-currency auctions are introduced as a robust solution that generates competitive outcomes and can be implemented entirely through smart contracts where no third-party auctioneer is needed.

X-C also distinguishes itself by enabling participants to hedge foreign exchange risks via forward or contingent contracts by allowing on-platform foreign exchange derivative contracts and markets for those. Agents can also enter contracts that mutualise idiosyncratic risks but are contingent on aggregate shocks. Smart contracts take as inputs the messages of all the agents with private shocks and implement a cross-agent allocation.

X-C's dynamic ledger can help control and manage financial stability risks from these derivative contracts without requiring full escrow or collateral. The dynamic ledger goes beyond preventing double spending of funds and avoids the double commitment of the rights to future funds that have been contracted with others. As smart contracts are part of the ledger, these can be made to be consistent with each other.

X-C can be used to implement policies using smart contracts. It also allows for the possibility of representing additional assets on the platform's ledger, which can be useful for policymaking as well. This makes it possible to implement domestic or multilateral safety nets, create foreign exchange intervention rules and implement them on the platform, and coordinate policies among different central banks.

With escrow accounts on the platform, each central bank can trade in spot auctions and other markets. This shortens payment chains; reduces balance sheet interconnections and makes transactions faster, cheaper and safer than bilateral private claims. Not only can each central bank allow their regulated intermediaries to convert central bank reserves to certificates of escrow and vice versa, but they can also expand their balance sheet directly through trade on the platform.

Smart contracts can also be used to deploy cross-country liquidity. Participating central banks could establish borrowing and lending arrangements in which they can get certificates of escrow from another central bank participating in the platform and use them to provide liquidity to its domestic private platform participants. Cross-border liquidity provision arrangements could include liquidity bridges (used on a relatively routine basis), currency swaps (used under exceptional circumstances) or regional financial arrangements.

Cryptography is needed to preserve data confidentiality and market integrity at the macro level as well. This would allow central banks to keep their foreign exchange positions, policy and reserve goals to themselves but still use that information to tailor swap line contracts and to achieve a degree of policy coordination.

Foreign exchange intervention rules can also be implemented on X-C. Intentions embodied in messages and actual bids from central banks can be aggregated in a confidentiality-preserving fashion. Each participating central bank can communicate its preference for volatility bands for foreign exchange rates that reflect its policy choices given its risk aversion and reserve commitments. For example, a central bank can input contingent bids in auctions. These input parameters are not known to anyone, but a smart contract can find the best bands that satisfy all central banks and their reserve commitments and automatically intervene when these volatility limits are reached. This would be an improvement on how swap lines are currently used.

This use of X-C's multilateral confidentiality-preserving bidding schemes could provide additional coordination tools and build trust among central banks, thus expanding access to international financial safety nets.

Conclusion

In conclusion, a new multilateral exchange and contracting platform that centralises payments and settlement and that integrates functionalities needed for cross-border transactions, as outlined above, would help streamline compliance, reduce the cost of foreign exchange conversion and better manage financial risks. New technologies can be leveraged to better organise payments and associated financial markets and allow for the design of a multilateral exchange system where participants can truthfully share information with smart contracts while retaining privacy relative to other parties.

While new technology and appropriate economic design can go far in improving cross-border transactions, there are hurdles that require multinational coordination at the legal and political levels. These include governance agreements and aligned AML/CFT, legal and regulatory frameworks. More reflection will also be needed to ensure platforms' operational stability given their systemic nature. Finally, further work is needed to ensure regional platforms are interoperable, which will help counter geopolitical fragmentation.

Other important questions arise in terms of the role of the public sector (both country authorities and international organisations) in operating and developing platforms. Given mandates related to public policy goals, the public sector faces better incentives for developing public goods – but these public goods will only be widely adopted when their use aligns with the incentives of private sector providers and users. The role of the private sector in ensuring adoption and sustainable business models should also be further explored.

While these are all difficult issues, the prospect of a solution where technological innovations are leveraged by the public sector for public policy objectives is one that should spur the ingenuity needed to address these challenges.

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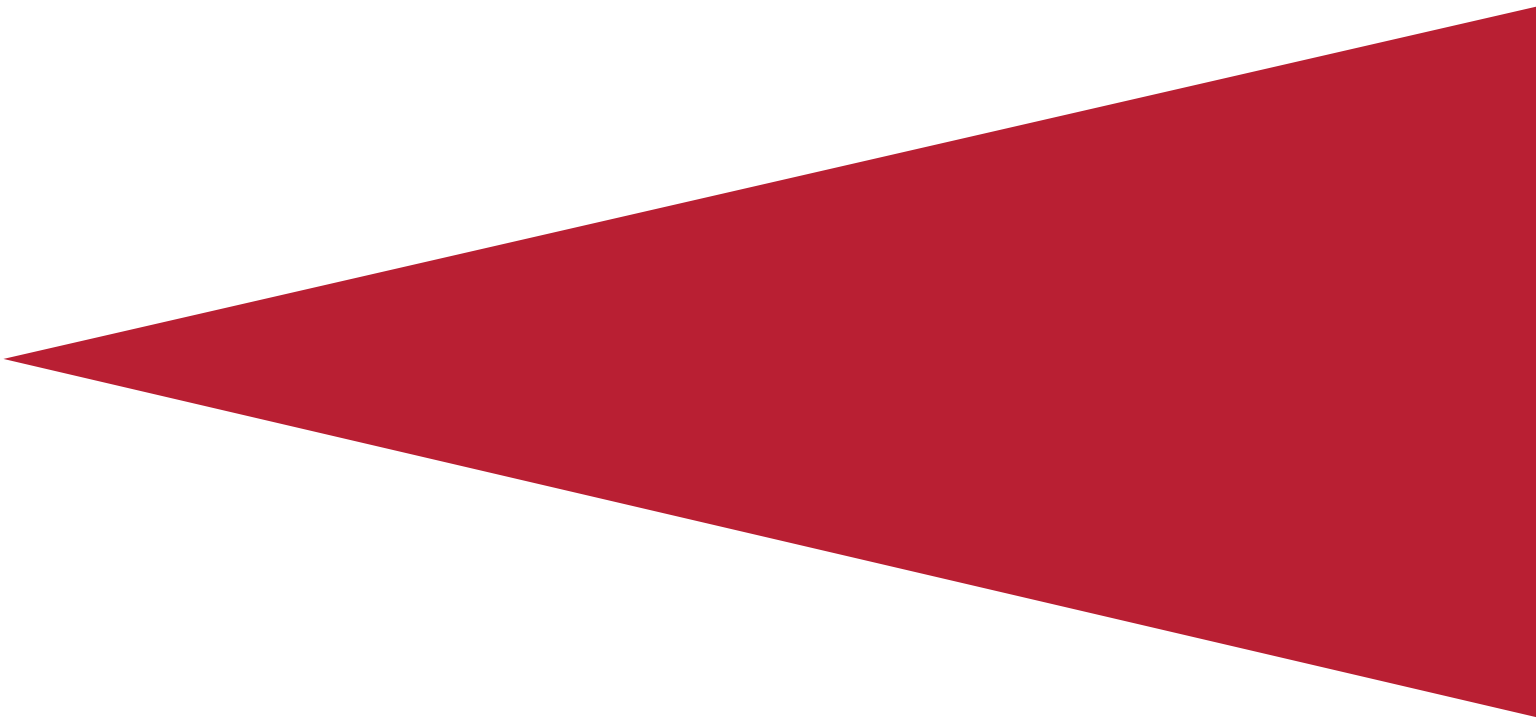

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