

# Macroeconomic and financial volatility and macroprudential policies in Chile<sup>1</sup>

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## Abstract

This note discusses the elements of prudential financial policies and supervisory practices in Chile that can be considered macroprudential. While showing similar macroeconomic volatility as that of the median of emerging market economies (EMEs), financial volatility, at least in two of the metrics discussed in this note, is noticeably lower in Chile than in other EMEs. We argue that this is due to the lessons learned from the severe banking crisis of the early 1980s, which resulted in the adoption of regulations and supervision practices incorporating elements highly sensitive to macro factors. From the viewpoint of the central bank, two of its policy elements can be labelled macroprudential: first, a coherent monetary policy framework featuring a flexible exchange rate regime, which has helped to protect the financial sector from external shocks; and second, the monitoring of aggregate systemic financial risks, which are communicated to the Financial Stability Council and to the public at large via the *Financial Stability Report*.

Keywords: financial stability, macroeconomic volatility, macroprudential regulation

JEL classification: E32, E63, F32, G18, G21

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## Background: macroeconomic volatility and financial stability

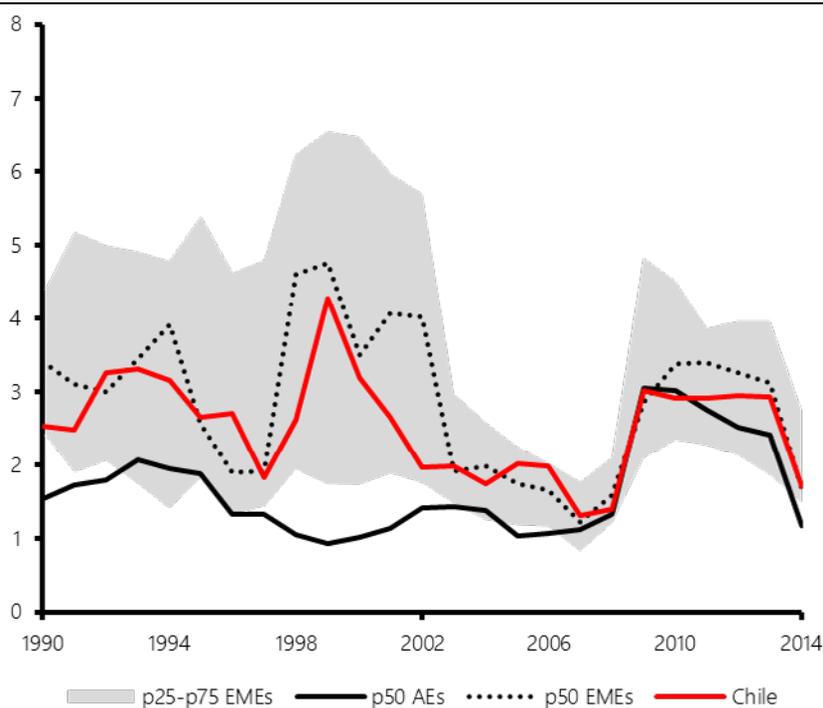
Historically, emerging market economies (EMEs) have endured high macroeconomic volatility. The causes of such volatility have included fluctuations in commodity prices and a loss of access to international financial markets.

Chile has been no different. In fact, over the last few decades its macro volatility<sup>5</sup> has followed closely the median of EMEs' macroeconomic volatility measures (Graph 1). The evolution of this metric has been highly cyclical, reflecting, for the most part, the impact of global shocks, such as the Mexican and Asian financial crises of the 1990s, and more recently the Global Financial Crisis (GFC) of 2007-2009. Macro volatility in EMEs was clearly higher than in advanced economies (AEs) in the 1990s. During the decade previous to the GFC, the trajectory of macro volatility in EMEs was converging with that of AEs. After the GFC, however, it increased sharply and simultaneously in both AEs and EMEs. In this episode, volatility was transmitted from AEs to EMEs. In the aftermath of the crisis, macroeconomic volatility has remained higher in EMEs than in AEs, but their trajectories have nevertheless been similar.

### Volatility of GDP growth

Five-year rolling standard deviation of annual GDP growth

Graph 1



Note: Distribution is based on a sample of 37 countries. Emerging economies include: Argentina, Brazil, Chile, China, Czech Republic, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Poland, Russia, Thailand and Turkey. Advanced economies include: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States.

Source: Own calculations based on data from the World Bank.

<sup>5</sup> Volatility is defined by Blanchard and Simon (2001) as the standard deviation of annual growth over a rolling window of 20 quarters of GDP for macro volatility and of bank credit for financial volatility.

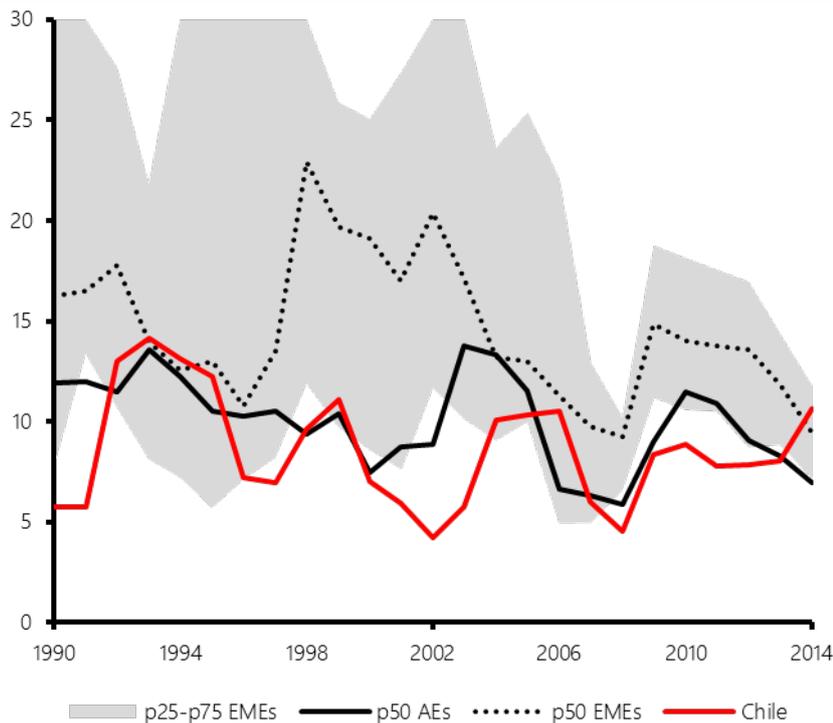
However, in the case of financial volatility the picture is different, particularly with regard to Chile's relative position. While it is true that the median of bank credit growth is more volatile and cyclical in EMEs than in AEs, the behavior of bank credit in Chile shows some idiosyncrasies. First, bank credit volatility is lower than in EMEs and, remarkably, lower than that in AEs for most periods. Second, the impact of global shocks seems to be remarkably milder in Chile than in other EMEs. This does not mean that international shocks had no impact on the Chilean financial system, but it somehow managed to maintain bank credit stable in the economy. Third, the GFC had a milder effect on credit volatility in Chile than in other EMEs and AEs (at least by this metric).

Moreover, it is worth noting that median financial volatility in EMEs generally resembles the median macro volatility of the same group of countries, suggesting a link between both metrics.<sup>6</sup> In the case of Chile, however, the pattern looks rather different. If we compute the correlation between the macro and the financial volatility for each country during the 1990-2015 period, we find that the median correlation in EMEs is 0.75 while in Chile it is 0.45.

## Volatility of bank credit growth

Five-year rolling standard deviation of annual credit growth

Graph 2



Note: Distribution is based on a sample of 37 countries. See note to Graph 1.

Source: Own calculations based on data from the World Bank.

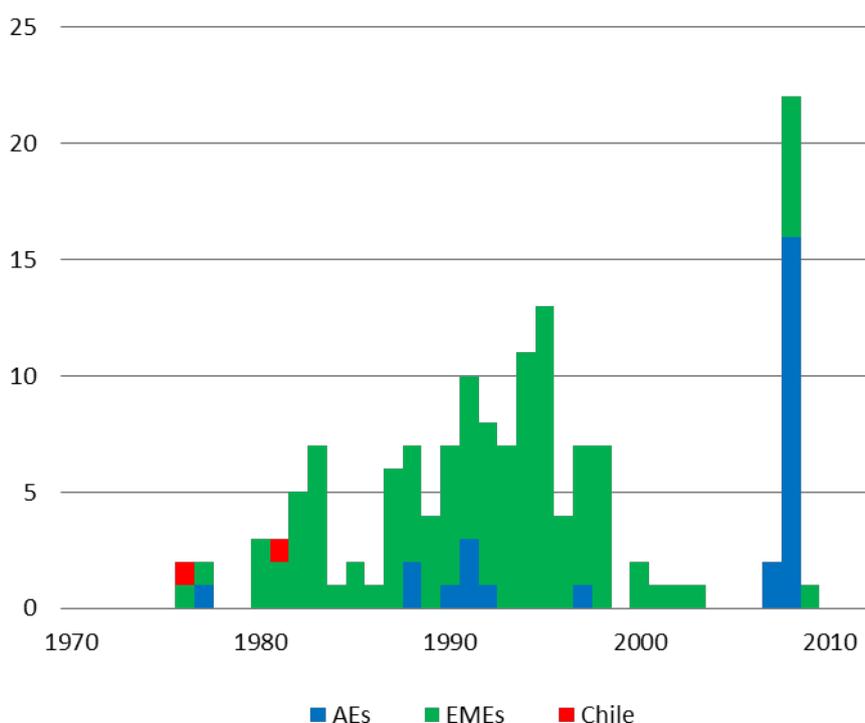
<sup>6</sup> We do not discuss causality in this note. In principle, causality can go either way.

Another indicator of financial stability in the case of Chile is the absence of systemic banking crises since 1982, as stated by Leaven and Valencia (2012) (Graph 3).

In this note, we discuss a number of dimensions of macroeconomic and macroprudential policies that could explain financial stability in the Chilean economy over this period. We refer, in particular, to two features of the country's macro framework that could have contributed to this favourable performance. First, both the General Banking Act and the supervisory approach to banking have strong macroprudential components. Second, the monetary policy framework currently in place, with a focus on a credible inflation targeting regime and a commitment to foreign exchange flexibility, helps in preventing the accumulation of financial vulnerabilities.

Number of systemic banking crises

Graph 3



Source: Leaven and Valencia (2012).

## Pillars of the Chilean (macro-) prudential policy framework

### Macroprudential aspects of Chilean banking regulation

At the beginning of the 1980s, Chile suffered a devastating financial crisis. The origins of the crisis were a mix of an unsustainable macro policy framework and a lack of adequate regulation and supervision over a banking system that had been liberalised and privatised not long before. In particular, an open capital account and a fixed exchange rate had resulted in unsustainable capital inflows in the late seventies. As a

result, banks' credit boomed, generating credit of low quality due to poor assessment procedures and a surge of currency mismatches, both in banks and borrowers' balance sheets. These vulnerabilities lead to the collapse of banks after the fixed rate regime was abandoned, and bringing the economy to an abrupt halt. The crisis had a high fiscal cost and led to a considerable loss of output (Leaven and Valencia (2012)).<sup>7</sup>

In response to the crisis, a new banking law was enacted in 1985 that provided for a comprehensive regulatory and supervisory policy framework. Two features of this law are worth highlighting. First, the law set strict limits on what banks could and could not do. Credit allocation was regulated, with limits on concentrated and related lending. Banks' investments in financial instruments were also curtailed.

Second, this regulatory framework included features that nowadays would be considered macroprudential, including limits to interbank lending,<sup>8</sup> to loan-to-value (LTV) ratios, and to the leverage ratio.<sup>9</sup> In retrospect, this was to be expected, as the crisis of the early 1980s made clear that macro factors were of primary importance for the boom and bust pattern of the financial system.

Since then, regulators have incorporated the assessment of risks stemming from macroeconomic factors into supervisory approaches, and laws and regulations in an effort to safeguard the stability of the banking system. Currency mismatch limits were also set for banks wishing to access international financing. And in the aftermath of the Asian crisis, this concept was modified so that exposure to the currency risk of a borrower was considered when assessing creditworthiness and determining loan provisions. Similarly, while standardised derivatives are permitted, regulation requires authorisation from banking supervisors for more complex ones. Approval is based on the bank demonstrating that it has the capability to handle the associated risks. In practice, most banks use only simple derivatives (mostly FX forwards) while a few make use of options.

Commercial banks are dominant players in the Chilean financial system, with assets amounting to around 123% of GDP at the end of 2016. Given the restrictions on bank activities, commercial banks concentrate on extending loans. As a result, loans accounts for more than 70% of total assets, mostly commercial loans to the private sector (Table 1). The liability side of the banking sector's balance sheet is dominated by demand and time deposits, which account for more than 50% of total funding. Finally, the strict approach to banking regulation is also reflected in the composition of banks' capital, which mainly consists of Tier I capital (Graph 4).

<sup>7</sup> In fiscal terms, the Chilean banking crisis of the early 1980s is one of the costliest crises in Laeven and Valencia's data set (which starts in 1970), with a fiscal cost of 43% of GDP and an increase in public debt of 88% of GDP. On the other hand, the output loss amounted to 8.6%.

<sup>8</sup> Complementary regulation introduced by the Central Bank of Chile sets limits to interbank borrowing.

<sup>9</sup> This law was enacted before the first Basel accord. When Basel I was introduced into law, the limit to the leverage ratio was kept, alongside capital requirements related to risk-weighted assets.

## Asset and liability structure of the banking sector in Chile

In per cent

Table 1

Assets	Dec-2008	Dec-2015	Liabilities	Dec-2008	Dec-2015
Cash	4	6	Demand deposits	13	19
Consumer loans	7	7	Time deposits	47	39
Commercial loans	39	39	Foreign liabilities	7	5
Mortgage loans	16	19	Debt securities	8	18
Foreign trade	8	5	Derivatives	6	6
Securities	11	9	Other liabilities	12	6
Derivatives	7	6	Capital and reserves	8	8
Other assets	9	9			
<b>Total assets</b>	<b>100</b>	<b>100</b>	<b>Total liabilities</b>	<b>100</b>	<b>100</b>

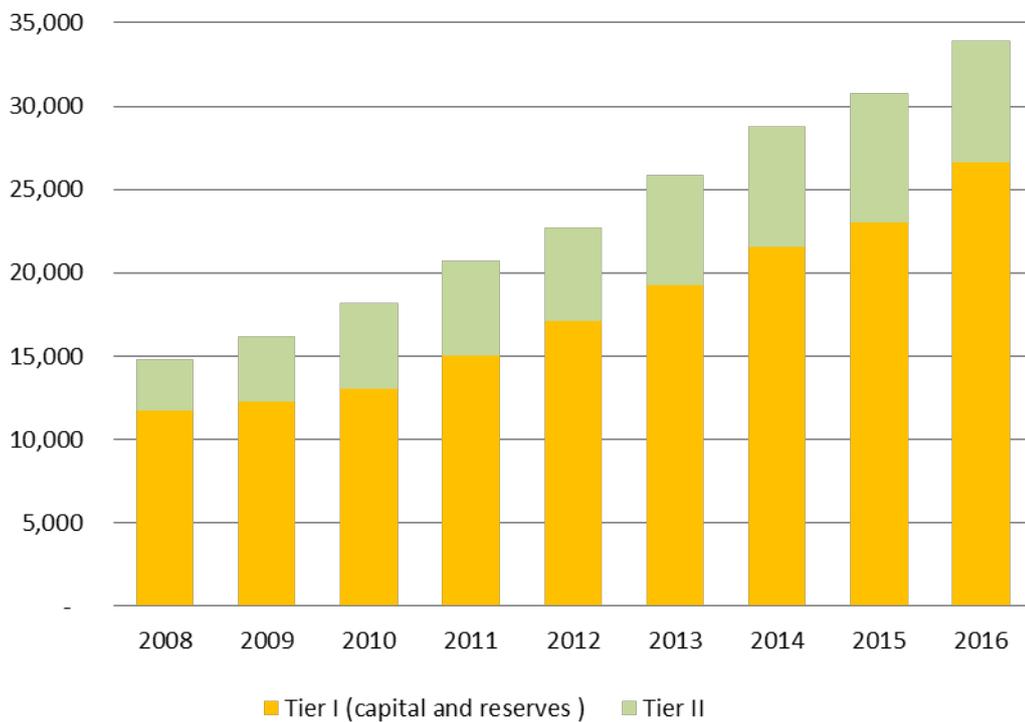
Note: Total assets are netted of provisions.

Source: Own calculations based on information from the Superintendence of Banks and Financial Institutions (SBIF).

## Composition of bank capital in Chile

In nominal dollars

Graph 4



Note: Tier II includes subordinated bonds, additional provisions and non-controlling interest.

Source: Central Bank of Chile.

As previously mentioned, the current banking act includes a number of (macro-) prudential instruments as part of the regulatory toolkit. Some of them are

similar to those proposed and adopted more recently by other countries in response to the GFC.

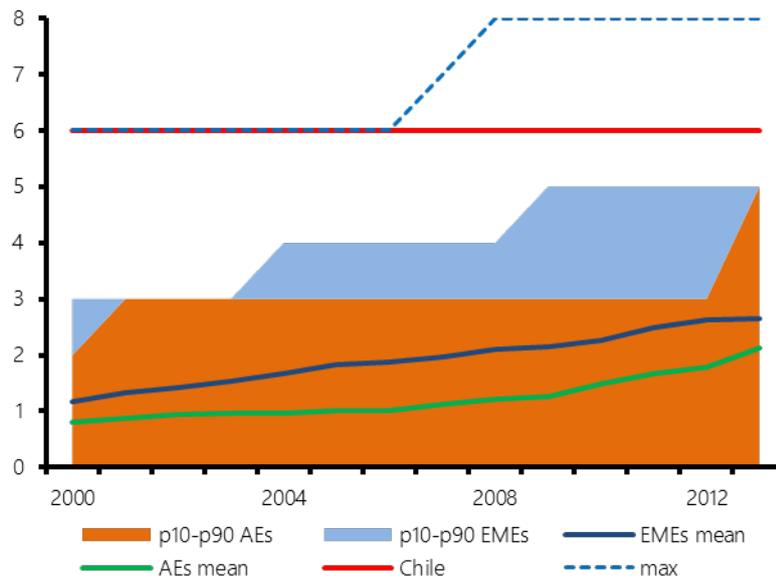
Cerutti et al (2017) survey the existence of 12 macroprudential instruments in a sample of 95 countries.<sup>10</sup> They find that countries have increased the number of instruments they use, with EMEs taking the lead (Graph 5). While the 90th percentile of EMEs increased the number of instruments used from three to five between 2000 and 2013, Chile used six, including limits to the leverage ratio and interbank exposures.

It is important to note that the availability of macroprudential instruments does not necessarily mean that they are or have been used to manage the financial cycle. Moreover, although some of the instruments considered may not vary over time or over the business cycle, this does not make them any less (macro-) prudential. For example, the limit to the leverage ratio has existed in Chile's legislation since 1985. However, other countries have only recently adopted it, creating the impression that they have been more active in the adoption of (macro-) prudential policies.

### Number of macroprudential tools in different countries

Set of 12 prudential instruments used between 2000 and 2013

Graph 5



Source: Own calculation based on information from Cerutti et al (2017).

The approach to banking supervision in Chile has been to take into account macro developments in the assessment of credit risk and in the design of loan loss provisions. Supervisors – who are well aware that macroeconomic fluctuations are a

<sup>10</sup> The set of instruments included in Cerutti et al (2017) are: LTV, debt-service-to-income, dynamic loan loss provisions, countercyclical capital buffer, leverage ratio, capital surcharges on systemically important financial institutions, limits to interbank exposure, concentration limits, limits to foreign currency loans, reserve requirements, limits to domestic currency loans, and levy/tax on financial institutions.

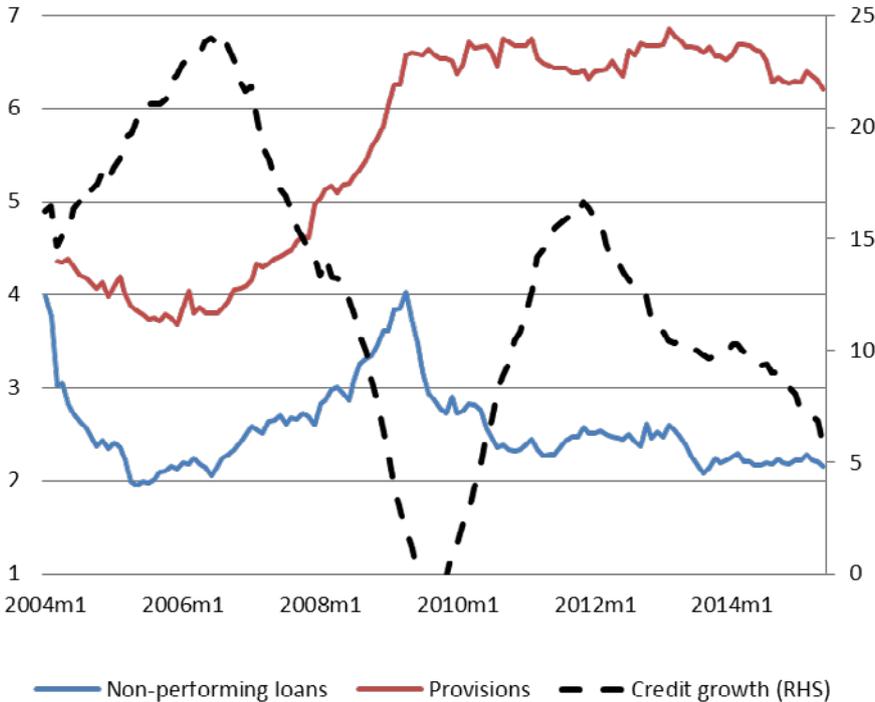
main source of shocks to the banking system – consistently take into consideration economic growth, employment fluctuations and exchange rates movements in assessing banks’ risk profiles. Thus, while there is no prescribed framework aimed at reigning in credit booms and busts in Chile, supervisors take into account macroeconomic developments that might impact banks’ risk profiles when determining loan loss provisions.

The period 2004–2006 offers a good example of such supervision. After a few years of very high real growth rates in consumer lending (which approached 25% annually), supervisors raised the requirements for loan loss provisions. This decision was based on the understanding that the pace of expansion was unsustainable and could lead to a deterioration of the quality of credit, and that it was therefore prudent to curb it. Importantly, this proactive decision occurred before loan portfolios showed signs of deterioration. Consequently, credit growth decreased while total provisions increased, making the banking system more resilient. Graph 6 shows the dynamic of loan growth, non-performing loans and the stock of total provisions for consumer loans. As can be seen, growth started to decelerate in conjunction with the accelerated accumulation of provisions, and that before the actual increase in non-performing loans. It must also be noted that the GFC resulted in further reductions in this type of lending.

Loan loss provisions, non-performing loans and the growth rate of consumer loans

As a percentage of total consumer loans

Graph 6



Source: Own calculations based on information from the SBIF.

## The role of the central bank in assessing financial risks

In fulfilling its financial stability mandate, the Central Bank of Chile continuously analyses risks that could affect the financial system. This analysis comprises an in-depth assessment of the banking system, including the conduct of stress tests aimed at uncovering potential systemic risks rather than a focus on the soundness of individual institutions. These risks are communicated by the Central Bank of Chile through its regular participation in the Financial Stability Council (FSC), as well as through its bi-annual publication, the *Financial Stability Report* (FSR). The communication of these risks acts, in some ways, as a distinct macroprudential instrument. On the one hand, it can trigger policy actions by the financial authorities that participate in the FSC. On the other, it may encourage financial decisions by the public in a stabilising direction.

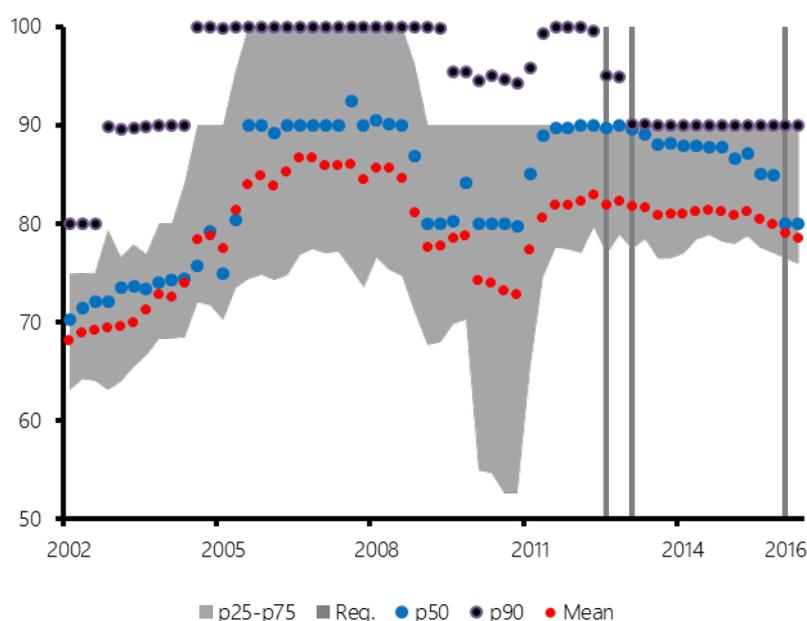
As an example of how the evaluation and communication of systemic risks act as a policy tool in Chile, the central bank assessed at the end of 2012 that the large number of mortgage loans being issued with a high LTV ratio could be undesirable at a time when real estate prices were rising at an unprecedented speed. The issue was discussed in the FSR and brought up at the FSC. As a result, the level of loan loss provisions that banks have to set aside for riskier mortgage loans was reformed by bank supervisors in January 2016. Moreover, the anticipation that provisions would rise reduced the issuance of high LTV mortgages even before the policy was put in place, as shown in Graph 7.

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### Effective LTV ratios

As percentage of individual mortgage loans

Graph 7



Note: Gray vertical lines represent the central bank discussion in two consecutive *Financial Stability Report* publications. The dotted vertical line indicates when the new regulation on provisions came into effect.

Source: Central Bank of Chile based on information from Asociación Chilena de Factoring (Achef), Superintendencia de Bancos e Instituciones Financieras (SBIF) and Superintendencia de Valores y Seguros (SVS).

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## Exchange rate flexibility and capital flows

As a small open economy, one of the major sources of financial vulnerability in Chile stems from the volatility of external financial conditions and capital flows. Sudden stops of capital flows to EMEs have been largely documented, and are typically associated with fall in output, stressful adjustment of the real exchange rate, and negative consequences for financial stability.

In the past, several policy instruments have been used to deal with this issue, including reserve requirements on short-term capital inflows, limits on capital outflows, reserve requirements on foreign currency demand deposits, limits on banks' currency mismatches, and loan loss provisions on bank borrowers with currency mismatches in their balance sheets. Some of these instruments may be considered macroprudential. The introduction of unremunerated reserve requirements on capital inflows implemented in the early 1990, which is of particular relevance, and has been studied extensively. While only one out of five studies found that controls reduced capital inflows,<sup>11</sup> three out of four found that controls had a significant impact in lengthening the average maturity of debt.<sup>12</sup>

In contrast, regulations aimed at reducing the exposure of banks and their borrowers to exchange rate fluctuations have been deemed successful and are an essential policy tool in the current regulatory framework. The regulations comprise both currency mismatch limits at the bank level as well as an assessment of a borrower's foreign currency risk when considering its credit risk and loan loss provisions. In addition to these policies, the central bank significantly changed its policy framework after the Asian crisis of the late 1990s, moving towards an inflation targeting regime and a fully flexible exchange rate regime.<sup>13</sup> In the remainder of this section, we argue that a credible flexible exchange rate framework may be considered itself a macroprudential policy.

There are different channels through which a flexible exchange rate regime can contribute to financial stability. One tries to discourage both speculative capital flows and leveraged positions built on the perception of misaligned asset prices. A credible policy of flexibility implies that the exchange rate can adjust quickly to what the market deems to be its fundamental value. Therefore, the room for speculation is limited. In addition, an important consequence of this is that it allows for an independent monetary policy.

A second channel is discussed in Cifuentes and Jara (2014). According to these authors, a flexible exchange rate, combined with the build-up of holdings of foreign assets by the private and public sector, may reduce the impact of sudden changes in gross inflows (ie stops and surges) by increasing the probability of offsetting changes in gross outflows (ie retrenchments and flights). This channel emphasises the role played by domestic agents, who may adjust their positions in foreign assets in response to observed exchange rate movements brought about by the changes in gross inflows. Flexibility of the exchange rate is key for this channel to operate.

<sup>11</sup> Only Gallego et al (2002) find a positive effect, while Valdés-Prieto and Soto (1996), Larraín et al (2000), De Gregorio et al (2000), Cowan and De Gregorio (2007) do not.

<sup>12</sup> Larraín et al (2000), De Gregorio et al (2000), Gallego et al (2002) find a positive effect, while Valdés-Prieto and Soto (1998) do not.

<sup>13</sup> See Claro and Soto (2013) for a description of the change in the FX framework in the early 2000s.

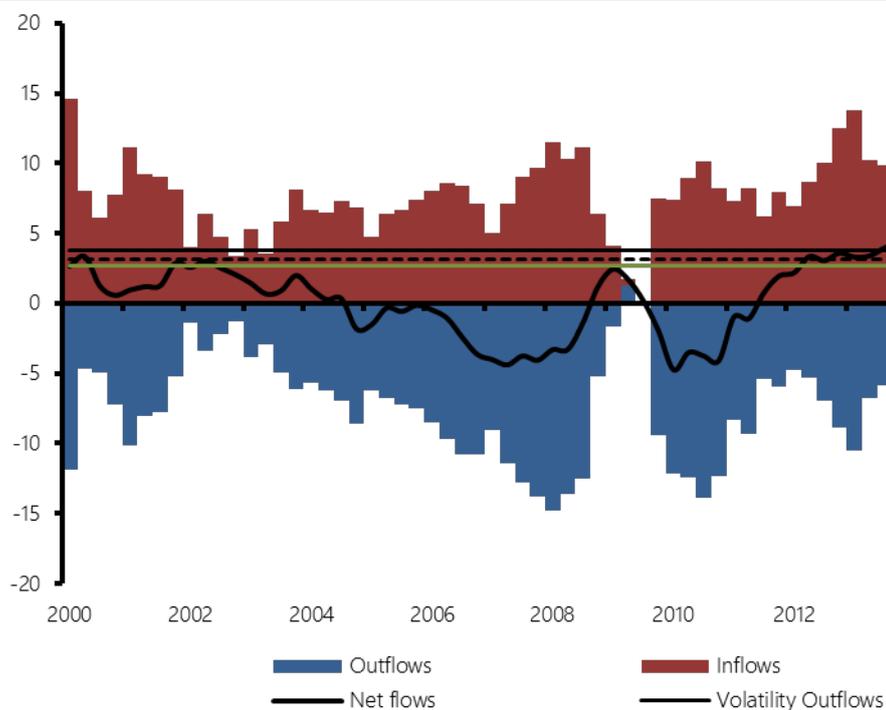
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## Capital inflows, outflows and net flows in Chile

Assets (gross outflows) and liabilities (gross inflows) measured as a percentage of GDP

Graph 8

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Note: Assets include international reserves. Volatilities represent the standard deviation from 1997–2015.

Source: Central Bank of Chile.

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Cifuentes and Jara (2014) find, in a panel of EMEs and AEs, that the flexibility of the exchange rate and the free movement of funds by residents are significant in producing countervailing movements in outflows when a shock to inflows occurs. They also find that these offsetting movements are more likely to happen when sudden changes in gross inflows are related to global rather than local factors. This seemed to be the case in Chile during the GFC when, despite the sudden decrease in gross inflows faced by the economy in 2008–2009, net capital inflows ended up being positive because residents repatriated part of their assets held abroad. A corollary of this, as shown in Graph 8, is that net inflows are less volatile than gross inflows.

## Summary

In this note, we outlined the presence of macroprudential elements in Chile's prudential and supervisory framework. In addition, we highlighted the macroprudential role of the flexible exchange rate policy, which has successfully insulated the financial sector from external macroeconomic shocks.

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