

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

# Borradores de ECONOMÍA

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# The monetary and macroprudential policy framework in Colombia in the last 30 years: the lessons learnt and the challenges for the future<sup>1</sup>

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## Abstract

Over the past 30 years, monetary and macroprudential policy in Colombia evolved towards the pursuit of a low and credible inflation target and a stable financial system. The protracted inflation that began in the early seventies was defeated at the turn of the century with the help of the new framework for monetary policy formulation, inflation targeting. In the field of macroprudential policy, the financial crisis of the late nineties led to important institutional developments in the formulation and coordination of macroprudential policy, as well as in the assessment of systemic risk. Along with these developments, important lessons have been learnt. One is that, to preserve macroeconomic stability, the price stability objective must be complemented with the financial stability objective, as well as with macroprudential policy. Another lesson is that the new institutional framework for monetary policy formulation helped Banco de la República overcome 25 years of inflation, then called moderate inflation. The challenges for the future include to continue preserving price and financial stability, strengthening the role of the Banco de la República in macroprudential policy, and to continue strengthening the channels of international coordination and cooperation in macroprudential policy.

*Keywords:* Macroprudential policy; Monetary policy; Inflation targeting; Foreign exchange market intervention; Financial stability

*JEL codes:* E5; E52; E44; E58; E61; G01; G18; G21; G28

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# El marco institucional de la política monetaria y macroprudencial en Colombia en los últimos 30 años: las lecciones del pasado y los desafíos para el futuro<sup>8</sup>

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## Resumen

En los últimos 30 años la política monetaria y macroprudencial de Colombia transitó hacia la búsqueda de un objetivo de inflación bajo y creíble, así como de un sistema financiero estable. La prolongada inflación que comenzó a comienzo de los años setenta fue superada a comienzo del nuevo siglo con la ayuda del nuevo régimen para la formulación de la política monetaria, de meta de inflación. En el ámbito de la política macroprudencial, la crisis financiera de finales de los años noventa llevó a importantes avances institucionales para la coordinación de la política macroprudencial y para la evaluación del riesgo sistémico. A lo largo de estos desarrollos importantes lecciones han sido aprendidas. Una de ellas es que, para preservar la estabilidad macroeconómica, el objetivo de estabilidad de precios debe ser complementado con el de estabilidad financiera, así como con la política macroprudencial. Otra lección es que el nuevo marco institucional para la formulación de la política monetaria ayudó al Banco de la República a superar 25 años de inflación, entonces llamada inflación moderada. Entre los retos están continuar preservando la estabilidad de precios y la estabilidad financiera, reforzar el papel del Banco de la República en la política macroprudencial y continuar fortaleciendo los canales de coordinación y cooperación internacional en la política macroprudencial.

*Palabras clave:* Política macroprudencial; Política monetaria; Régimen de meta de inflación; Intervención en el mercado cambiario; Estabilidad financiera

*JEL codes:* E5; E52; E44; E58; E61; G01; G18; G21; G28

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Over the past 30 years, Colombia's monetary and macroprudential policy framework evolved in pursuit of a credible low inflation objective and a more stable financial system. To some extent the framework is the outcome of both the entrenched inflation that started in the early seventies and the financial vulnerability buildup of the nineties, which ended up in the financial crisis of the end of 20<sup>th</sup> century; a full-blown economic crisis that was part of the Emerging Market 1997-1999 crisis, involving external as well as internal, financial sector aspects, among other causes and dimensions.

The paper describes the evolution of the monetary and macroprudential policy framework in Colombia (Sections 1 and 2).<sup>10</sup> The paper also discusses some of the lessons learnt from the implementation of the monetary and macroprudential framework (Section 3). Finally, the paper concludes with some of the present and future challenges, namely, the need for inflation to return 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).

## 1. The evolution of the monetary policy framework

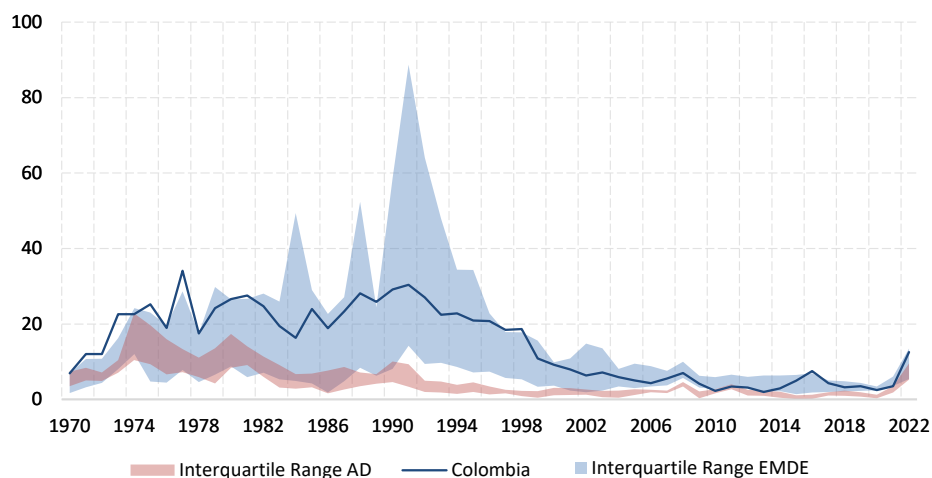
### Overview of inflation in the international context

In the early seventies, inflation in Colombia rose as much as it did in other advanced (AD) and emerging market (EM) economies (Figure 1). The upsurge in inflation in Colombia did not reach the hyperinflation levels of other Latin American countries, but became entrenched, not to be subdued until the dawn of the new century.

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<sup>10</sup> The term macroprudential policy was not widely used before the Global Financial Crisis (GFC). McCauley (2009) points out that EM economies early implemented policies with a macroprudential objective without calling them macroprudential.

Figure 1. The inflation of Colombia inflation in the international context



EMDE economies: AR, CB, CL, CN, HU, ID, IN, IQ, IR, KE, MX, MY, PE, PH, PL, RO, RU, SA, TH, TR, ZA, CO. AD economies: AU, CA, CH, CZ, DK, GB, HK, IL, IS, JP, KR, NO, NZ, SG, SE, US, EA.

Source: One-Stop Source: A Global Database of Inflation, Ha et al. (2021); FRED, Federal Reserve Bank of St. Louis; central bank websites and authors' calculations.

In 1991, after almost 20 years of moderate inflation, the new Political Constitution required that the Banco de la República, the central bank of Colombia (CB), be responsible for maintaining the purchasing power of money, and endowed the CB with the legal, technical, and operational independence necessary for the achievement of the inflation objective.<sup>11</sup>

To lead the CB, the Political Constitution created an independent Board of Directors consisting of 7 members,<sup>12</sup> including the Minister of Finance,<sup>13</sup> 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 4 years not to exceed three consecutive periods.<sup>14</sup> In addition, it 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 4 years, also not to exceed 3 consecutive periods each member.<sup>15 16</sup>

<sup>11</sup> Political Constitution, Article 371.

<sup>12</sup> *Idem.*, Article 372.

<sup>13</sup> *Ministro de Hacienda y Crédito Público.*

<sup>14</sup> Article 43, Decree 2520 of 1993.

<sup>15</sup> The President of the Republic appoints 2 members during the second half of its mandate. In case of resignation of one of the members, the President also appoints a replacement for the remaining of the 4-year term. Article 34 and 35, Law 31 of 1992.

<sup>16</sup> Hamann et al. (2014, p. 6) point out that the arrangement was established to preserve CB independence, as most of the Board members are appointed by the previous president.

Despite the earned central bank independence and the explicitly stated goal of inflation as the main objective of monetary policy, low single-digit inflation was not achieved during the nineties. The central bank struggled to maintain monetary targets as well as exchange rate bands, an endeavor that proved considerably difficult under increasing capital mobility.<sup>17</sup> A sudden stop in capital flows at the end of the nineties 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, as many others around the world, became unsustainable<sup>18</sup>.

In September 1999 the Colombian peso was allowed to float in the context of an agreement of Colombia with the IMF.<sup>19</sup> 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 EM economies with international capital mobility, capital inflows in Colombia have been a key driver of the exchange rate and a critical factor for financial stress. Figure 2 shows capital inflows and outflows. The figure shows the ebb and flow of foreign capital movements in Colombia, marking important events in the world economy and Colombia.<sup>20</sup>

As drivers of capital flows the literature emphasizes the role of external (“push”) factors, mainly the VIX (see e.g. the survey by Koepke 2019). A related literature, that of 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 Horeova and Lo Duca, 2013; Rey, 2015; and Bruno and Shin, 2015). Thus, the swings in capital inflows shown in Figure 2 are important factors

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<sup>17</sup> The argument of a transparent solution to the trilemma is put forth by Fischer (2001). A similar argument in the context of Colombia is underscored by Gómez-Pineda (2006).

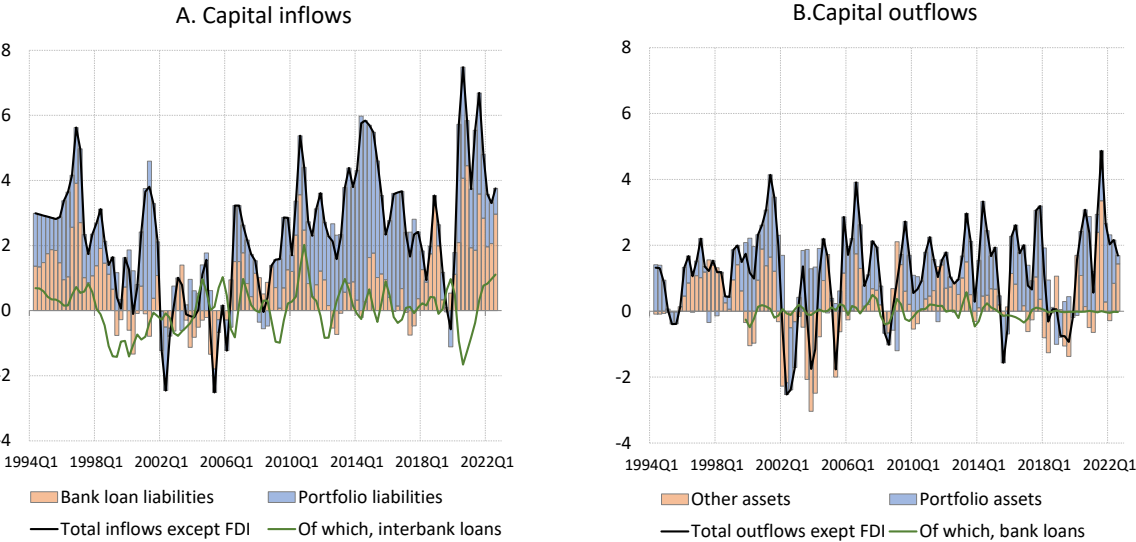
<sup>18</sup> See Fischer (2001) who notes that “soft exchange rate pegs are not sustainable” (p. 5).

<sup>19</sup> It was an Extended Fund Facility arrangement that would later become a Stand By-Agreement. Urrutia (2002, p. 15) points out that the arrangement helped avoid a possible exchange rate depreciation.

<sup>20</sup> The figure shows run-up to the financial crisis of the end of the nineties, 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.

for financial stress in Colombia; they are inversely related with the VIX and directly related with Rey’s (2015) common factor for the GFCy.<sup>21</sup>

Figure 2. Capital inflows and outflows



Bank loan liabilities were approximated from the balance of payments as “Other investment,” “Other liabilities incurred,” and excluding other liabilities incurred by Banco de la República. Portfolio inflows were taken from the balance of payments as “Portfolio investment liabilities,” “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:  $\frac{1}{4} x(t-1) + \frac{1}{2} x(t) + \frac{1}{4} x(t+1)$ .

Sources: from 1996-2002 Banco de la República, Balance of Payments Statistics in quarterly frequency. From 1994 to 1995 data are from Banco de la República, Balance of Payments Statistics in yearly frequency.

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 requirement of low inflation as the goal of monetary policy and the accountability of the CB were stated in the Political Constitution of 1991. In turn, the forward-looking operational procedure and the transparency characteristics, understood as an inflation projection and an Inflation Report (IR) that use a forward-looking inflation model, were fulfilled in March 2001<sup>22</sup>, even though some of its characteristics had already been introduced before. Indeed, since September 1999

<sup>21</sup> For a treatment of the effect of the GFCy in Colombia see Sarmiento et al. (2023).  
<sup>22</sup> Urrutia (2002, p. 20) points out that “the refinement of inflation forecasting models was a necessary condition for the formal adoption of inflation targeting.”

through end-2000 the decisions about the instrument of monetary policy in Colombia were set in the form of growth targets for the monetary base (Hernández y Tolosa, 2000).

In what follows, we use these characteristics of IT to organize the presentation of the evolution of IT in Colombia.<sup>23</sup> In addition, we discuss FX intervention because it has been a feature of the central bank policy framework in Colombia.

### The inflation target

As said above, inflation as the goal of monetary policy was established by the Political Constitution in 1991. In addition, the Political Constitution required the CB to carry out the central banking function with administrative autonomy.<sup>24</sup> This legal setup gave the CB the necessary independence to establish a specific numerical value for the inflation target.<sup>25</sup>

Inflation targets have taken the form of point and range targets. In most EM economies the point targets or the middle of the range target has been set at 3 percent.<sup>26</sup> That has also been the case of the long-term target in Colombia. In November 2002 the CB announced a long-term inflation target of 3 percent (Gómez-Pineda et al. 2002, p. 10) and followed a process of gradual disinflation. Although price stability literally means zero inflation, a small 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, a small but positive inflation rate can help avoid the major limitations and costs to monetary policy of the effective lower bound on the policy interest rate.<sup>27</sup> In other words, the effective lower bound has substantial costs in terms of the inability of conventional monetary policy to stimulate aggregate demand during recession.<sup>28</sup>

After the completion of the disinflation process, starting in 2010, the CB reiterated that the inflation target would permanently be 3 percent, within a 2-percentage point range.<sup>29</sup>

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<sup>23</sup> For a narrative account of IT under the different macroeconomic developments that took place during 1999-2015 see López et al. (2017), particularly sections 4 to 8 in pages 483 to 513.

<sup>24</sup> Articles 371 to 373 of the Political Constitution and Ruling C481-99 of the Constitutional Court.

<sup>25</sup> This is also underscored by González et al. (2019).

<sup>26</sup> In comparison, in most advanced economies the point target or the middle of the range is most commonly 2 percent.

<sup>27</sup> Other criteria are to enable changes in relative prices that otherwise would not take place under zero inflation.

<sup>28</sup> 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.

<sup>29</sup> For a list of the short-term inflation targets in Colombia see López et al. (2017, p. 522).



### The forward-looking operational 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 model of transmission mechanisms, MMT for its acronym in Spanish, see Gómez and Julio, 2001, and Banco de la República, IR, March 2001). The semi-structural MMT model included the monetary transmission channels now standard in inflation models. The emphasis of the model was on 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 for the country, namely, a disinflation shock, a risk premium shock and a food-inflation shock. The semi-structural MMT model was incorporated into the March 2001 monetary policy decision process and the Inflation Report.<sup>30</sup>

In October 2000, the Board the CB adopted a two-pillar strategy for the monetary policy framework (Editorial Notes of *Revista del Banco de la República*, October 2000). The strategy, akin to that implemented at the time by the ECB, included both IT as well as monetary base targets. The two-pillar strategy constituted a transitional phase towards IT, to allow the build-up of knowledge about the transmission mechanisms of monetary policy (Gómez-Pineda et al., 2002, p. 7-8). The monetary pillar was implemented on the assumption of a relatively stable demand for money (*Ibid.*, p. 6).

In 2002, with technical assistance from the IMF, a new version of the semi-structural MMT model was set up on an improved platform.<sup>31</sup> This version was used for the policy decisions and for the central projection of the IR until 2019. Shortly after the introduction of the forward-looking operational procedure and considering the evidence on the instability of money demand, the monetary targets of the transitional two-pillar strategy lost preeminence or were abandoned. Indeed, the 2002 IMF Consultations with Colombia, IMF (2003), state

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<sup>30</sup> Research on the transmission mechanisms of monetary policy and testing of the semi-structural MMT model was carried out in Banco de la República (2001a) and (2001b).

<sup>31</sup> The new platform run in Iris-Matlab, in contrast with the former platform that ran in Winsolve, a software developed at the Bank of England.

that the CB would “continue to cast monetary policy within and IT framework and a floating exchange rate regime” (p. 4).

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

As IT developed around the world, leading CBs introduced dynamic stochastic general equilibrium (DSGE) models into the forward-looking operational procedure. The CB first incorporated a DSGE inflation model in the June 2011 forecasting round. The DSGE inflation model, so-called Patacon (González, Mahadeva, Prada and Rodríguez, 2011),<sup>32</sup> 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 model morphed into a 4-Goods model (4GM, see González, Guarín, Rodríguez and Vargas, 2020).<sup>33</sup> The semi-structural 4GM model incorporated four Phillips curves, covering foods, regulated prices, goods, and services. In addition, it included trends for the real exchange rate and relative prices, as well as some features of the real economy that were considered relevant for a model tailored for Colombia, such as the price of oil and the terms of trade. The semi-structural 4GM model was incorporated into the policy discussions in December 2018 and into the Monetary Policy Report (MPR), formerly the IR, in September 2019.

### Transparency and communication strategy

Transparency stems from the communication of the rationale of the policy decisions to the public. Several communication instruments have served this purpose; namely, a press release after the policy meetings, including the distribution of the votes of the members of the Board; a press conference that explains the rationale of the decisions to the media; the minutes of the policy meeting explaining the policy decision, the criteria held in common by the

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<sup>32</sup> The calibration of the DSGE Patacon model as well as the main impulse responses are presented in Bonaldi, González, Rodríguez (2011). When they were launched, the DSGE Patacón and semi-structural 4GM models ran on a Dynare-Matlab platform.

<sup>33</sup> The semi-structural 4GM model is less backward looking than the semi-structural MMT model that used to emphasize inflation rigidities during disinflation. On the evolution of the transmission mechanisms of monetary policy, see for instance Mohanty and Turner (2008).

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 in the CB working paper series, *Borradores de Economía*,<sup>34</sup> as well as in Boxes in the MPR. Among these communication instruments, the MPR, formerly IR, 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.<sup>35</sup> Also in March 2001, the IR started using an inflation fan chart to evaluate the uncertainty and risks to the outlook, which are also inputs in the policy decision.<sup>36 37</sup>

Later, at 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. In the July 2021 MPR, uncertainty and risks to the outlook started to be built with the predictive densities method.<sup>38</sup> 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 monetary policy meetings where the Board makes monetary policy decisions was reduced from 12 to 8 per year (Banco de la República, 2019). The Board of the CB continues to meet monthly, giving a total of 12 meetings a year. Nonetheless, starting in October 2019, in February, May, August and November, the Board, in principle, does not make monetary policy decisions. In addition, also starting in October 2019 the IR was made more forward-looking and concise, and the name was changed to MPR.

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<sup>34</sup> The CB working paper series can be found at <https://repositorio.banrep.gov.co/handle/20.500.12134/5018>.

<sup>35</sup> A monthly internal IR circulated within the CB since 1995. Later, a quarterly IR was first made public in January 1999.

<sup>36</sup> The fan chart was explained in the March 2001 IR; the technical details appear in Julio (2007).

<sup>37</sup> The level of uncertainty in the fan chart was constructed first with a notion of statistical uncertainty and later with the history of inflation forecast errors. The balance of risks was constructed with an evaluation of the different shocks that could materialize over the forecasting horizon. The fan chart was constructed by overlaying the level of uncertainty and the balance of risks to the central projection of the semi-structural MMT model.

<sup>38</sup> In contrast with the previous fan-chart method where uncertainty and risks were overlaid to 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. The method was explained in the Banco de la República (2021), Inflation Report, July.

## 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.<sup>39</sup>

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 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 to an audience of professional communicators and answer questions from them. In addition, 3 days after the press release and press conference, the Technical 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 EM economies. The regime has allowed the exchange rate to be the first line of defense 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 contain the incentives for exchange rate risk-taking (see e.g. Vargas, 2011).

As has been the case in CBs in other EM economies and even in some AD economies, the CB intervenes in the FX market. In Colombia this has been the case since the exchange rate was allowed to float (Figure 3). FX intervention in Colombia has had three explicit

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<sup>39</sup> In its capacity as a central bank with its own legal regime, the CB is supervised by the *Superintendencia Financiera de Colombia* and controlled by an auditor appointed by the President of the Republic. The supervision function is as stated in Article 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 it has a disciplinary regime surveilled by the Office of the Attorney General (*Procuraduría General de la Nación*).

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 (Banco de la República, 2023, *Informe de la Junta Directiva al Congreso de La República*, March, p. 80).

The literature on fear of floating (e.g., Calvo and Reinhart, 2002) has established that CBs in EM economies intervene to offset both the financial channel of the exchange rate and the pass-through of the exchange rate to inflation.<sup>40</sup> Still, as noted below, ever since the Colombian peso was allowed to float and several macroprudential policies were implemented, the strength of the financial channel of the exchange rate as well as that of the pass-through to inflation appear to have receded.

Figure 3 shows the amount of FX intervention implemented by the CB along with the direct, COP/USD, exchange rate. The figure suggests that FX purchases tend to take place at times of Colombian peso appreciation, and sales, during depreciation. Beyond these short-term interventions, over the long-term, FX intervention has helped 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<sup>41</sup>) 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.<sup>42</sup>

As mentioned above, the CB has also recently intervened to preserve the liquidity of the FX market. In particular, the intervention during the pandemic crisis aimed at providing market participants alternatives for their FX hedging needs and short-term liquidity in foreign currency. From March 2020 until March 2021, the CB sold dollars through non-deliverable

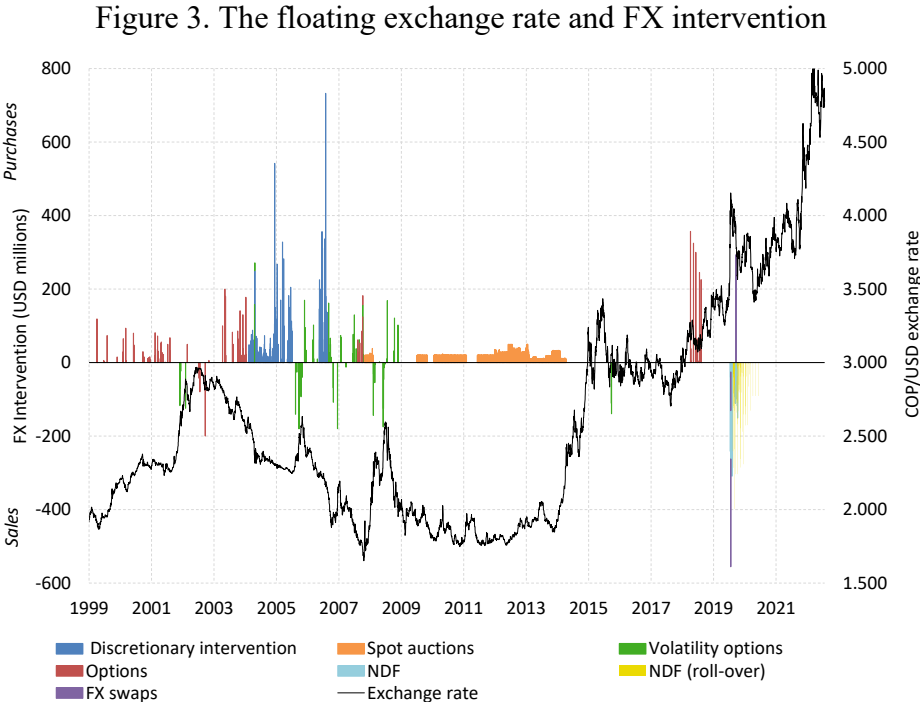
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<sup>40</sup> In addition, it has been recently pointed out that FX intervention can have a macroprudential role as it can offset the effect of capital movements on credit (see Hofmann et al., 2021).

<sup>41</sup> In a way, the access of Colombia to the IMF FCL in 2009 was an endorsement of the quality of the monetary, fiscal, and macroprudential policy framework.

<sup>42</sup> See Banco de la República, 2021, *Informe de Administración de las Reservas Internacionales*, Rincón et al., 2020, Banco de la República, 2023, *Informe al Congreso*, March, p. 79-83, and Vargas, 2011. These criteria follow the IMF (2016) Assessment of Reserve Adequacy (ARA) criteria; at the same time, these criteria resemble the Liquidity Coverage Ratio at a macroeconomic level.

forward (NDF) contracts to offset potential restrictions across hedging instruments.<sup>43</sup> In March and April 2020, the CB performed 60-day FX swaps to provide short term dollar funding.<sup>44</sup>



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

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).

<sup>43</sup> In the NDF forward the CB sells dollars forward and on the due date pays the difference between the spot rate and the forward rate.

<sup>44</sup> In the swap contract the CB sells dollars spot and buys the same amount at some point in the future. See Banco de la República, 2023, *Reporte al Congreso*, March, p. 81.

## 2. 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, 2012; IMF-FSB-BIS, 2016). In the pursuit of this objective, the authorities implement a range of macroprudential measures that seek to contain systemic risk.

In Colombia, macroprudential policy (as described in Vargas et al., 2017) is carried out by four institutions, the Ministry of Finance (MoF: *Ministerio de Hacienda y Crédito Público*), the Superintendency of the Financial Sector (SFC: *Superintendencia Financiera de Colombia*), the Deposit Guarantee Fund (DGF: *Fondo de Garantías de Instituciones Financieras, Fogafín*) and the CB. The MoF regulates the capital requirements for all financial institutions and the controls on portfolio 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 establishes limits to the LTV and DSTI ratios in the mortgage market.<sup>45</sup> The SFC is in charge of the supervision function, whereas the SFC and the DGF are in charge of the resolution function. The DGF is also in charge of the deposit insurance scheme. Finally, the CB performs the lender of last resort function with information support from the SFC.

Macroprudential policy is discussed and coordinated within a Financial System Coordination and Surveillance Committee (CCSSF: *Comité de Coordinación y Seguimiento del Sistema Financiero*). Colombia is an early adopter of an institution such as the CCSSF, 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, the CB, the 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, different macroprudential policies are 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 2006-2007 (see below).

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<sup>45</sup> 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.

In Colombia, the intricate financial system features financial conglomerates with systemic relevance. The Colombian financial conglomerates also have systemic relevance in several the Central American countries.<sup>46</sup> Currently, the assets of Colombian Banks are about a half of the assets of the financial system 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 in Central America took place when European banks retrenched, at the time of the financial crisis in Europe (Cardozo et al., 2020).

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

The IMF Integrated Macroprudential Policy (iMaPP) database (Alam et al., 2019) can help study the evolution of the macroprudential measures implemented in Colombia. The

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<sup>46</sup> Colombian conglomerates have a market share of 24% in Panama, 53% in El Salvador (53), 50% in Costa Rica, 16% in Guatemala, 16% in Honduras, and 22% in Nicaragua (Cardozo et al. (2022, p. 11).

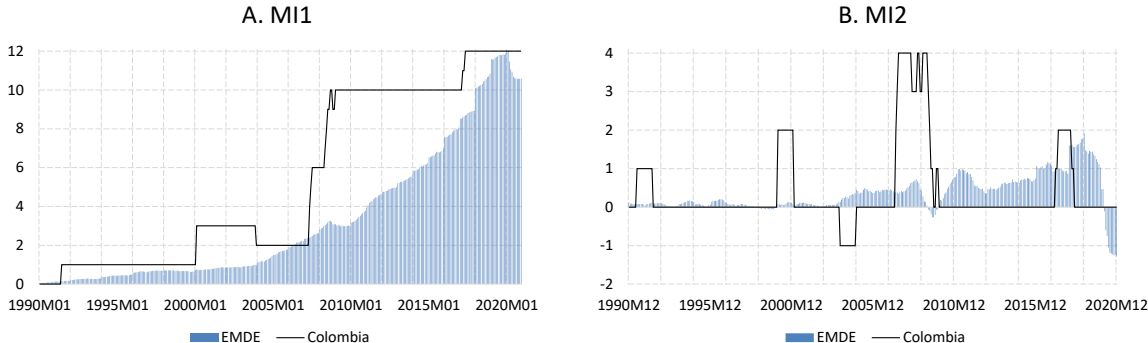


database provides a policy action indicator for each macroprudential instrument through a monthly dummy variable that indicates a policy action in a particular month as well as its direction, tightening if positive, loosening if negative.<sup>47</sup>

The results of the iMaPP database in Colombia (Echavarría, 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 for the 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), the cumulate sum of the number of tightening and loosening macroprudential policies; and on the other hand, a Macroprudential Indicator 2 (MI2), or the cumulate 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.

Figure 4. Macroprudential policy action indicators



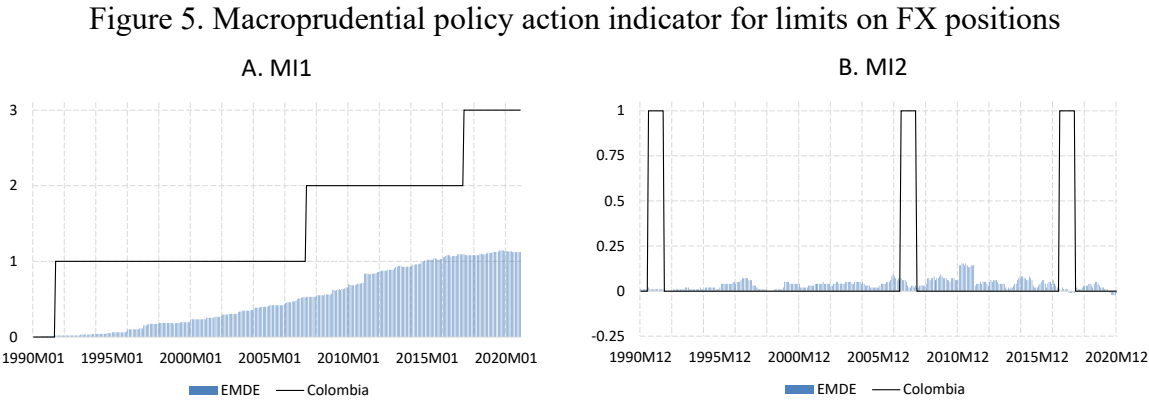
EMDE economies: AL, DZ, AO, AR, AM, AZ, BS, BH, BD, BY, BJ, BT, BA, BW, CB, BN, BG, BF, BI, KH, CV, CL, CN, CD, CR, CI, HR, DO, EC, SV, ET, FJ, GM, GE, GH, GW, HT, HN, HU, IN, ID, JM, JO, KZ, KE, XK, KW, KG, LA, LB, LS, MK, MY, ML, MR, MU, MX, MD, MN, ME, MA, MZ, NP, NE, NG, OM, PK, PY, PE, PH, PL, RO, RU, KN, SA, SN, RS, SB, ZA, LK, SD, TJ, TZ, TH, TL, TG, TO, TT, TN, TR, UG, UA, AE, UY, VN, YE, ZM, CO.

Source: the IMF’s iMaPP database, Alam et al. (2019), indicator SUM\_17; and authors’ calculations.

<sup>47</sup> 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 cumulate sum may indicate the existence of a measure, although its effect may have lapsed.

Figure 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 emerging and developing (EMDE) economies. As it is well known, the increase in the net number of tightening macroprudential policy actions in EMDE economies took place well before than in AD economies (e.g. Cerutti et al., 2017). In addition, Figure 4 shows that the number of net tightening macroprudential policy measures took place in Colombia ahead of the average for EMDE economies. The figure 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 contribute to managing capital flow swings. Figure 5 shows the MI1 and MI2 for this specific macroprudential policy. Compared to the average for EMDE economies, Colombia was an early adopter of this type of measures (Panel A). Limits on FX positions were further tightened during the capital inflow of 2006-2007, as well as in 2017 (Panel B).

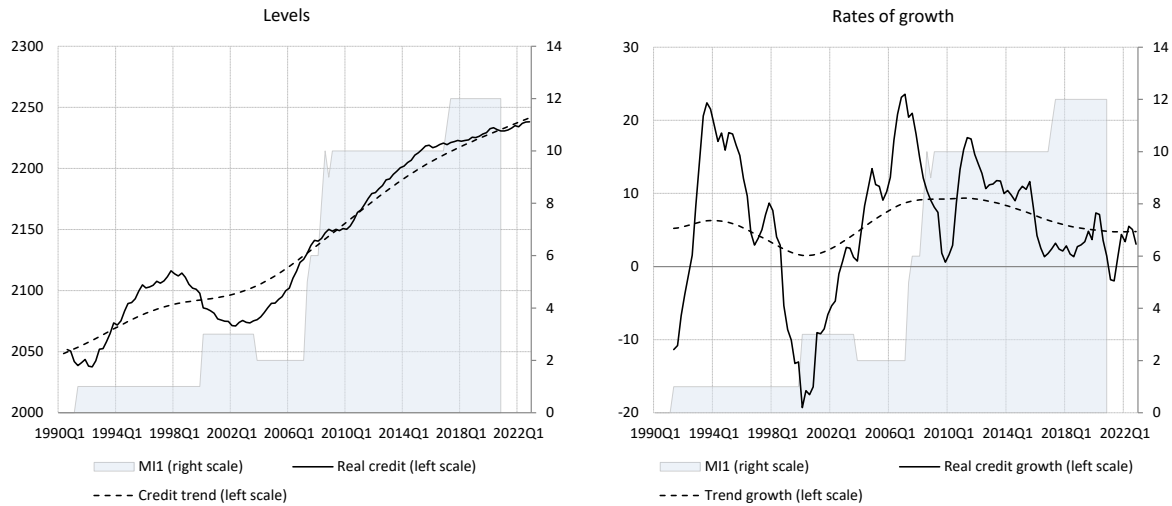


EMDE economies: as indicated in Figure 4.  
 Source: the IMF’s iMaPP database, Alam et al. (2019), indicator LFX; and authors’ calculations.

Regarding the effectiveness of these macroprudential policies, multicountry studies by Gambacorta and Murcia (2020) and Cerutti et al. (2017) have shown that they are effective. In studies for Colombia, the effectiveness has been shown by Gómez et al., 2020.<sup>48</sup> In addition, Figure 6 shows a drop in the amplitude of credit cycle in Colombia as the number of macroprudential measures increased overtime.

<sup>48</sup> In addition, Vargas et al., (2017) show that macroprudential measures improved the solvency and liquidity in the financial system.

Figure 6. The credit cycle



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 on data from the following sources: credit and housing prices from Banco de la República, consumption data from DANE, the MI1 index as in Figure 4.

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

### The run-up to the financial crisis of the end of the nineties

The reforms of 1991<sup>49</sup> transformed the decades-long restrictions to capital movements into a regime with international capital mobility.<sup>50</sup> The CB liberalized several interest rates while the MoF helped create a public debt market as well as a yield curve. As underscored by Perez-Reyna (2017), Urrutia et al. (2006) and Zarate et al., (2012), along with the surge in capital inflows climbed the price of real state, the number of financial intermediaries, the participation of foreign capital in the banking sector, bank privatizations, and the credit level and rate of growth.<sup>51</sup> As shown in Figure 6, the highest rates of credit growth that led to the financial crisis at the end of the nineties took place in 1993-1995. Positive rates of credit growth continued until 1998; thereafter, the credit level dropped amidst the financial crisis

<sup>49</sup> Law 45 of 1990 and Law 9 of 1991.

<sup>50</sup> In Colombia, the liberalization process was known as the “opening of the economy” (*apertura*). Sufi and Taylor (2021, p.24) point out that deregulation of the financial sector frequently led to credit growth.

<sup>51</sup> An account of the financial crisis of the end of the nineties can be found in Perez-Reyna (2017) and the references therein.

of the end of the nineties. The upsurge in credit took place under poor regulation and low capitalization.

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 with macroprudential limits,<sup>52</sup> which is perhaps the earliest measure taken in Colombia explicitly with a macroprudential objective.

Several factors set the stage for the financial crisis of the end of the nineties: the capital inflow during the decade; an insufficient macroprudential regulation; widespread risk-taking in the household and corporate sectors; a high rate of credit growth; a significant surge of real estate prices, and an increasingly fragile government financial position.<sup>53</sup> When the capital flows reversed, the substantial risks taken by the different sectors materialized. The crisis was amplified owing to the poor capital provisions in the banking sector (Zarate et al., 2012).

### The financial crisis of the end of the nineties

The EM crisis of 1997-1999 led to a drop in net capital inflows (Figure 2). The widespread latent risks materialized; a profound and prolonged financial crisis ensued. A brief account of the crisis follows.

By the end of the 1990's real estate prices stagnated while the nominal value of housing loans, that 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 was also hit by the materialization of interest rate risk.<sup>54</sup> Solvency indicators in this and other parts of the financial system sharply deteriorated. Several private and state-owned banks went insolvent, some were rescued, others were merged or liquidated (Zarate et al 2012). In the cooperative sector (credit unions) solvency

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<sup>52</sup> Resolución No. 57 of 1991 issued by Junta Monetaria.

<sup>53</sup> For an account of the views of the role of government expenditure and debt in the crises see Perez-Reyna (2017, p.445) and Lopez et al. (2017, p. 472 y 476).

<sup>54</sup> The materialization was due to the rise in interest rates to defend the exchange rate band and to a change in the inflation adjustment of the mortgage banks' deposit rates, now calculated as a percent of the system wide average deposit interest rate.

problems and liquidations also derived from the deterioration in household balance sheets (see Zarate et al., 2012).

Amidst the profound financial crisis and recession, monetary policy turned procyclical, as a result of the defense of an exchange rate band. Consequently, by end-1998 the real interest rate rose above and beyond 15 percent.<sup>55</sup> Despite the strong defense of the exchange rate, the net capital outflows forced several realignments of the exchange rate band. The Colombian peso depreciated within the successive realignments of the band, adding to the recession via the financial channel of the exchange rate.<sup>56</sup> Unemployment soared to more than 1 out of 5 people in the work force.

### The aftermath of the financial crisis of the end of the nineties

The unprecedented economic crisis led to a profound reassessment in the perception of risk as well as in the risk-taking by households, firms, banks, and the government. The financial crisis of the end of the nineties 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 discussion and coordination of macroprudential policies. Another important institutional development was the creation, in 2002, of the Financial Stability Department (FSD) within the CB. Twice a year, the FSD prepares and publishes a Financial Stability Report (FSR: *Reporte de Estabilidad Financiera*).<sup>57</sup> Since its creation, the FSR has had relevant enhancements, including in 2017 the incorporation of the systemic stress model SYSMO (Gamba et al., 2017), which is the analytical framework used by the FSD to construct the stress testing exercises<sup>58</sup>. The continuous financial stability

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<sup>55</sup> This is the real interest rate on 90-day deposits deflated by 12-month CPI inflation.

<sup>56</sup> For an approach that emphasizes 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 Lopez et al., (2017).

<sup>57</sup> The first report was published in July 2002.

<sup>58</sup> 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 the response of banks. In addition to the FSR, further detailed analysis of some risks that are relevant for financial stability in Colombia are provided by the Special FSRs (*Reportes Especiales de Estabilidad Financiera*).

assessments of the FSD serve also as input into the CB participation in the CCSSF.<sup>59</sup> These institutional developments have strengthened the CB capacity to influence macroprudential policy, through the macroprudential instruments directly under its control, and also indirectly as a member of the CCSSF.

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

Aside from these institutional developments, important macroprudential policy measures were also the result of the financial crisis of the end of the nineties. That is the case of the above-mentioned limits to loan to value (LTV) and the debt service to income (DSTI) ratios.

In hindsight, another important decision that has served as an important macroprudential policy is the flotation of the Colombian peso, as it is an important deterrent to open unhedged FX positions.

#### The capital inflow and credit growth of 2006-2007

In 2006-2007, 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 EM economies, 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.<sup>60</sup> All this took place in an economy that had, not long ago, experienced the financial crisis of the end of the nineties. Thus, all the regulatory agencies were ready to take measures. The CB established a marginal reserve requirement on domestic deposits<sup>61</sup> and an unremunerated reserve requirement (URR) on debt inflows. The MoF intervened with an URR on portfolio inflows. The SFC participated in the package with a provisioning method based on expected credit losses.<sup>62</sup>

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<sup>59</sup> 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 of the works of the CGDFS research group on stress testing is Cardozo et al. (2020).

<sup>60</sup> For a discussion with this approach see Vargas et al. (2017).

<sup>61</sup> The rationale of the marginal reserve requirement as well as its effectiveness are presented in Vargas et al., (2011) and Vargas and Cardozo (2012).

<sup>62</sup> For detail about the package of measures see Vargas et al. (2017).

The marginal reserve requirement, implemented by the CB in May 2007, had a deliberate macroprudential purpose. The decision was motivated by the growth in real credit that was above and beyond 30 percent.<sup>63</sup> One year after the implementation of the measures, credit growth dropped sharply (Figure 6).<sup>64</sup> In June 2008, the marginal reserve requirement was reverted, and the ordinary reserve requirement was increased (Mora-Arbeláez et al., 2015).<sup>65</sup>

In parallel to the marginal reserve requirement, to deter regulatory arbitrage, the CB reactivated a URR on foreign indebtedness equivalent to 40 percent of foreign indebtedness (see Vargas et al., 2017).<sup>66</sup> Likewise, the MoF established a URR on portfolio inflows.<sup>67</sup> One year later, both the URR on foreign indebtedness and that on portfolio inflows were reverted to zero.<sup>68</sup>

In 2007 and 2008 the SFC enhanced the provisioning scheme with the method of expected credit losses (ECL).<sup>69</sup> The ECL method helps cushion the effect of bank provisions on credit supply, banks' profits and economic activity.<sup>70</sup> In addition, the SFC implemented a dynamic ECL method that relates provisions with a handful of bank indicators.<sup>71 72</sup>

### The GFC and the 2008 capital outflow

The macroprudential framework was put to the test again during the GFC. In contrast with the previous period of crawling exchange rate and crawling bands, both the floating exchange rate regime and the limits on FX positions had now helped contain FX risk. Therefore, the

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<sup>63</sup> In an authoritative comment, Hamman et al. (2014), p. 35, point out that real credit growth reached rates beyond 30 percent. Indeed, that was the case for some credit aggregates. This number may not show in Figure 6 because of the quarterly frequency of the data and because the figure refers to total credit.

<sup>64</sup> As Gómez et al. (2020) point out (p. 2), part of the collapse in credit was due to the GFC. The marginal reserve requirement also increased the monetary policy transmission from the policy interest rate to other interest rates (Vargas et al. 2017).

<sup>65</sup> Resolución Externa No. 5 of 2008 issued by the Board of Directors of Banco de la República.

<sup>66</sup> The URR had been first established in the nineties, Resolución 21 of 1993.

<sup>67</sup> Decree 1801 de 2007.

<sup>68</sup> Decree 3264 de 2008..

<sup>69</sup> The previous method was based on incurred credit losses (ICL); that is, the 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 (SARC), see Circular externa 011 of 2002 and Morais et al. (2021).

<sup>70</sup> For commercial credit, the regulation was implemented on July 1, 2007, and for consumption credit on July 11, 2008. The measures hold for banks.

<sup>71</sup> As the indicators are in the bank level, the SFC does not have to take a stance on the financial cycle. See Circular Básica Contable y Financiera, Chapter II.

<sup>72</sup> For a study of loan provisions in Colombia see Cabrera et al. (2022).

capital outflow that took place during the GFC could easily be met with currency depreciation and 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 generalized policy across EM economies was a countercyclical reduction in interest rates. In Colombia, the policy was feasible due to the low open FX positions and the low exchange rate passthrough to inflation (e.g. Zarate et al., 2012, and Vargas, 2011). This contrasts with the experience during the financial crisis of the end of the nineties, when a drop in the policy interest rate during crisis would have been considered as a luxury accessible only to AD economies.

On its part, in 2009 the SFC implemented an instrument similar to Basell III liquidity coverage ratio (LCR, *Indicador de Riesgo de Liquidez*, IRL).<sup>73</sup>

It bears emphasis 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 spur, the taper tantrum and the fall in oil prices

As was the case in other EM economies, Colombia rapidly recovered from the GFC. Given the health of 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 nineties when the lengthened balance sheet repair prevented a quick recovery.

This time, AD economies were launching unconventional monetary policies (UMP). The bout of global liquidity that started in 2010 led to a surge in capital flows to EM economies (Sahay et al., 2014, and Borrillo et al., 2016). In addition, in 2014 JP Morgan increased the weight of Colombia in their EM bond indexes,<sup>74</sup> which led to an increase in the participation of foreign investors in the public debt market and, thus, to an increased exposure of Colombia to foreign liquidity (see Romero et al., 2021, and García-Andrade, 2019).

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<sup>73</sup> The instrument limits short term liquidity risk by requiring banks to maintain enough liquid assets to meet their liquidity requirements for the next 7 and 30 days. See Banco de la República (2008), FSR, September, p. 108; Banco de la República (2009), FSR, September, p. 99; and Chapter VI of Circular Básica Contable y Financiera, issued by the Superintendencia Financiera de Colombia (SFC).

<sup>74</sup> Importantly, in 2012 the withholding tax on foreign portfolio investment earnings was reduced and simplified in Colombia.



In 2013, the mere talk about the possibility of unwinding UMP led to an increase in financial market volatility (Sahay et al., 2014, and Borrillo et al., 2016). The beginning of the program of actual taper of bond-buying purchases by the Federal Reserve at end-2014 took place along with 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 EM economies receded. EM currencies depreciated, including the Colombian peso, which was highly related to the collapsing oil price.

This episode highlights one of the advantages of the IT regime with floating exchange rate. The sharp depreciation of the Colombian peso of more than 60 percent 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 percent 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 increased central bank credibility. In addition, the sharp depreciation did not affect financial stability, as both the macroprudential framework put in place and the floating exchange rate regime had helped limit the effect of the exchange rate financial channel.

The capital inflow during the 2010 global liquidity glut affected credit to a smaller extent, compared to the effect during the previous 1990-1998 credit build-up.<sup>75</sup> As illustrated in Figure 6, the macroprudential measures in place helped tame the amplitude of the credit growth cycle.

In 2012, the IMF (2012) Financial Sector Stability assessment (FSSA) had underscored the complexity of the Colombian financial system and had recommended that the SFC should be given greater powers to regulate financial conglomerates. In this vein, the Conglomerates Law of 2017<sup>76</sup> stated that the SFC should supervise financial conglomerates as well as their holding companies and regulate their capital adequacy ratios, if necessary.

The rising 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 to net FX positions in different currencies.<sup>77</sup> In addition, to limit liquidity risk in

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<sup>75</sup> For an analysis of the effect of capital-flow swings on credit, see Sarmiento (2022).

<sup>76</sup> Law 1870, 2017.

<sup>77</sup> 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 percent of top-tier capital (*patrimonio*

different currencies, in 2017 the CB established limits on an individual position indicator (IEI).<sup>78</sup> 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<sup>79</sup> (Banco de la República, 2016, FSR, first semester).

### 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.<sup>80</sup> In 2018, a solvency requirement was established for systemically important institutions. The requirement was to be increased gradually to 1 percent of risk weighted assets in 2024, starting from 0.25 percent in 2021.<sup>81</sup> In addition, also in 2018, a capital conservation buffer was set to 1.5 percent in 2024, starting at 0.375 of risk weighted assets in 2021.<sup>82</sup> <sup>83</sup> Furthermore, in 2019 a lower limit of 3 percent was introduced for the leverage ratio, the ratio of bank capital to assets, effective in 2021.<sup>84</sup>

In addition, in 2020 an instrument similar to the Basel III Net Stable Funding Ratio regulation was implemented.<sup>85</sup> Among the sources of stable funding are long-term loans, bank deposits and equity. To ensure that financial institutions do not undertake excessive maturity transformation, for large banks the ratio was to be gradually built up to 100 percent in 2022 and for medium-sized banks to 80 percent. Smaller banks only inform the SFC and are not subject to a minimum NSFR (see Banco de la República 2020, FSR, March 2020).

The pandemic was yet another test for the macroprudential framework, now equipped with increased capital buffers. As in the GFC, the new test was weathered without any

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*técnico*), respectively. Resolución Externa No. 3 of 2016 and Circular Reglamentaria Externa DODM-361 issued by the Board of Directors of Banco de la República. See also Banco de la República, FSR, 2019, first semester.

<sup>78</sup> Resolución Externa No. 1 of 2018 issued by the Board of Directors of Banco de la República. See also Banco de la República, FSR, 2019, first semester.

<sup>79</sup> *Ibid.*

<sup>80</sup> For an evaluation of the convergence of Colombia to Basel III regulations see IMF (2022, p. 22).

<sup>81</sup> The solvency requirement was set as follows: 0.25 percent in 2021; 0.5 percent in 2022; 0.75 percent in 2023; and 1 percent in 2024. See Decree 1477 of 2018.

<sup>82</sup> 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.

<sup>83</sup> This 1.5 percent requirement differs from the 2.5 percent requirement of the Basel III regulations because the total solvency limit in Colombia is 9 percent and not 8 percent as in other countries.

<sup>84</sup> The Circular No. 020 of 2019 of the SFC set the limit in 3 percent. See also Decree 1477 of 2018.

<sup>85</sup> Circular Básica Contable y Financiera of 2020 issued by SFC.

bankruptcy<sup>86</sup>. There was a drop in capital inflows during the pandemic (Figure 2), external demand fell sharply, and the terms of trade collapsed driven by the oil price. The exchange rate absorbed a substantial part of the shock, the CB provided 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 counter cyclical provisions while the CB provided support with short term liquidity.

### 3. The lessons learnt

After the foregoing account of the development of the monetary and macroprudential framework in Colombia, it seems natural to draw some lessons. Some of the lessons have already been pointed out by Zarate et al. (2012). A first old lesson is that macroeconomic stability is not guaranteed by the price stability objective alone. Instead, the financial stability objective requires it to 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 has 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.<sup>87</sup>

An additional lesson is that, in contrast with the monetary policy framework that prevailed before the financial crisis of the end of the nineties, a transparent monetary policy framework with a floating exchange rate helped the CB focus on the inflation objective and so the CB could overcome 25 years of so-called moderate inflation<sup>88</sup>.

Still another lesson is that financial stability risks change over time and 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 where information is not currently available, such as

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<sup>86</sup> Still, five institutions were required to increase their capital, see IMF (2022), p. 12.

<sup>87</sup> Some of the lessons pointed out by Zarate et al. (2012) were not developed in detail in this Chapter.

<sup>88</sup> Dornbush and Fisher (1993) introduced the term “moderate inflation” to refer to inflation rates that persist in the range of 15 to 30 percent.

non-bank financial institutions, fintech, crypto-assets and even possibly central bank digital currencies, among others.

A final lesson is about the interaction between monetary and macroprudential policies.<sup>89</sup> 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 larger when both policies are used simultaneously. Both policies work through the financial system and so the development of the financial system as well as 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 is a matter that poses plenty of research questions, particularly considering the trade-offs that capital-flow swings impose on monetary policy in EM economies.

#### 4. The 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 endeavor.

As for financial stability, a key issue is to strengthen the role of the CB in macroprudential policy (see the IMF FSSA, 2022, p. 7). In principle, as pointed out by Martin et al. (2021), if macroprudential policy is effective, it can be directed towards the achievement of the financial stability objective while monetary policy is directed to 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 aspects in a 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, 2022) has recommended

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<sup>89</sup> On the topic, see Martin et al. (2021).

strengthening the monitoring of household indebtedness and cross border links of financial institutions, as well as enhancing the role of the Central Bank in the evaluation of systemic risk within the CCSSF, among others.<sup>90</sup>

In addition, Colombia is host as well as home of international banks. In this international environment, the control, supervision, and particularly the resolution of financial institutions in times of crisis is subject to the challenges exposed by Shoenmaker (2013) in the financial trilemma;<sup>91</sup> namely, 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.<sup>92</sup>

Finally, adaptation of the 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.

#### References

- Alam, Zohair, Adrian Alter, Jesse Eiseman, Gaston Gelos, Heedon Kang, Machiko Narita, Erlend Nier, and Naixi Wang. 2019. “Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database” *IMF Working Papers* 19 (66).  
<https://doi.org/10.5089/9781498302708.001>
- Arango, Miguel. 2006. “Evolución y Crisis del Sistema Financiero Colombiano.” *Serie Estudios y Perspectivas* (11), CEPAL.
- Ball, Laurence. 2014. “The Case for a Long-Run Inflation Target of Four Percent.” *IMF Working Papers* 14 (92). <https://doi.org/10.5089/9781498395601.001>
- Banco de la República. 2000. “La Estrategia de Política Monetaria.” *Revista Del Banco De La República* 78 (876), Nota Editorial.
- \_\_\_\_\_. 2001a, “Transmission mechanisms and inflation targeting: the March 2001 inflation forecast,” Mimeo Banco de la República.
- \_\_\_\_\_. 2001b, “Transmission mechanisms and inflation targeting: the July 2001 inflation forecast.” Mimeo Banco de la República.
- \_\_\_\_\_. 2006. “Financial Stability Report” (September).
- \_\_\_\_\_. 2008. “Financial Stability Report” (September).
- \_\_\_\_\_. 2009. “Financial Stability Report” (September).
- \_\_\_\_\_. 2016. “Financial Stability Report” (I Semester).
- \_\_\_\_\_. 2019. “Financial Stability Report” (I Semester).
- \_\_\_\_\_. 2020. “Financial Stability Report” (I Semester).

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<sup>90</sup> See also Banco de la República, FSR, September 2022

<sup>91</sup> See also IMF-FSB-BIS (2016), p. 8.

<sup>92</sup> For a list of the bilateral and multilateral instances of coordination of Colombia with the Central American countries, see CCSBSO (2016).

- \_\_\_\_\_. 2001. “Inflation Report” (March).
- \_\_\_\_\_. 2021. “Inflation Report” (July).
- \_\_\_\_\_. 2023. “Informe de la Junta Directiva al Congreso de La República” (March).
- \_\_\_\_\_. 2019. “Proceso de Toma de Decisiones de Política Monetaria del Banco de la República y Comunicación sobre Política Monetaria.” *Recuadro 1. Informe de Política Monetaria* (October).
- \_\_\_\_\_. 2021. “Administración de las Reservas Internacionales.” (March), Banco de la República.
- \_\_\_\_\_. 2022. “Financial Stability Report” (I Semester).
- \_\_\_\_\_. 2023. “Informe de la Junta Directiva al Congreso de La República” (March).
- Bank for International Settlements. 2019. “Monetary Policy Frameworks in EMEs: Inflation Targeting, the Exchange Rate and Financial Stability.” *BIS Annual Economic Report*.
- Bekaert, Geert, Marie Hoerova and Marco Lo Duca. 2013. “Risk, Uncertainty and Monetary Policy.” *Journal of Monetary Economics* 60 (2013):771–788.  
<https://doi.org/10.1016/j.jmoneco.2013.06.003>
- Bergant, Katharina, Francesco Grigoli, Niels-Jakob Hansen, and Damiano Sandri. 2020. “Dampening Global Financial Shocks: Can Macroprudential Regulation Help (More Than Capital Controls)?” *IMF Working Papers* 20 (106), International Monetary Fund.  
<https://doi.org/10.5089/9781513547763.001>
- Blanchard, Olivier, Giovanni Dell’Ariccia, and Paolo Mauro. 2010. “Rethinking Macroeconomic Policy.” *IMF Staff Position Note* 10 (3). <https://doi.org/10.5089/9781455224982.004>
- Bonaldi-Varón, Jean Pietro, Andrés González-Gómez, and Diego Arturo Rodríguez-Guzmán. 2011. “Importancia de las Rigideces Nominales y Reales en Colombia: Un Enfoque de Equilibrio General Dinámico y Estocástico.” *Ensayos Sobre Política Económica* 29 (66): 48–78, Banco de la República. <https://doi.org/10.32468/Espe.6602>
- Borio, Claudio, Craig Furfine and, Philip Lowe. 2001. “Procyclicality of the Financial System and financial stability issues and policy options.” *BIS Papers* (1): 1–57. Available at:  
<https://www.bis.org/publ/bppdf/bispap01a.pdf>
- Borrallo, Fructuoso, Ignacio Hernando and Javier Vallés. 2016. “The Effects of US Unconventional Monetary Policies in Latin America.” *Working Papers* (1606), Banco de España.  
<https://dx.doi.org/10.2139/ssrn.2752888>
- Bruno, Valentina, and Hyun Song Shin. 2015. “Capital Flows and the Risk-Taking Channel of Monetary Policy.” *Journal of Monetary Economics* 71: 119–32.  
<https://doi.org/10.1016/j.jmoneco.2014.11.011>
- Cabrera, Wilmar, Santiago Gamba, Camilo Gómez, and Mauricio Villamizar-Villegas. 2022. “Examining Macroprudential Policy Through a Macroprudential Lens.” *Borradores de Economía* (1212), Banco de la República. <https://doi.org/10.32468/be.1212>
- Calvo, Guillermo A., and Carmen M. Reinhart. 2002. “Fear of Floating.” *The Quarterly Journal of Economics* 117 (2): 379–408. <https://doi.org/10.1162/003355302753650274>
- Cardozo, Pamela. 2020. “Stress Testing in Latin America: A Comparison of Approaches and Methodologies” *BIS Papers* (108), Bank for International Settlements. Available at: <https://ssrn.com/abstract=3535923>
- \_\_\_\_\_, Paola Morales-Acevedo, Andrés Murcia and Alejandra Rosado. 2022. “Does Geographical Complexity of Colombian Financial Conglomerates Increase Banks’ Risk? the Role of Diversification, Regulatory Arbitrage and Funding Costs.” *Journal of Banking and Finance*. Vol 134. 106076. <https://doi.org/10.1016/j.jbankfin.2021.106076>.
- CCSBSO. 2016. “Memorando multilateral de Intercambio de Información y Cooperación Mutua para la Supervisión Consolidada y Transfronteriza entre los miembros del CCSBSO.” (November), Consejo Centroamericano de Superintendentes de Bancos de Seguros y de Otras Instituciones Financieras.

- Cerutti, Eugenio, Stijn Claessens, and Luc Laeven. 2017. "The Use and Effectiveness of Macroprudential Policies: New Evidence." *Journal of Financial Stability* (28): 203–24. <https://doi.org/10.1016/j.jfs.2015.10.004>
- Cetorelli, Nicola, and Linda Goldberg. 2011. "Global Banks and International Shock Transmission: Evidence from the Crisis." *IMF Economic Review* 59 (1): 41–76. <https://doi.org/10.3386/w15974>
- Crockett, Andrew. 2000. "Marrying the Micro- and Macro-prudential Dimensions of Financial Stability." Transcript of speech delivered at the Eleventh International Conference of Banking Supervisors, held in Basel, Switzerland, September 20-21.
- Currie, Lauchlin. 1981. The Role of Economic Advisers in Developing Countries. Greenwood Press.
- Das, Mitali, Gita Gopinath, and Şebnem Kalemli-Özcan. 2022. "Preemptive Policies and Risk-off Shocks in Emerging Markets." *IMF Working Papers* 22 (003). <https://doi.org/10.5089/9781616358341.001>
- Dornbusch, Rudiger and Stanley Fischer. 1993. "Moderate Inflation." *The World Bank Economic Review*. Vol. 7, No. 1 (Jan., 1993), pp 1-44.
- Echavarría, Juan José 2020. "Instrumentos de Política Macroprudencial en Colombia." *Revista Del Banco De La República* 93 (1097), Nota Editorial. Available at: <https://publicaciones.banrepcultural.org/index.php/banrep/article/view/21559/21725>.
- Fischer, Stanley. 2001. "Exchange Rate Regimes: Is the Bipolar View Correct?" *Journal of Economic Perspectives* 15 (2): 3-24. <https://doi.org/10.1257/jep.15.2.3>
- Frost, Jon, Hiro Ito, and René van Stralen. 2020. "The Effectiveness of Macroprudential Policies and Capital Controls Against Volatile Capital Inflows." *BIS Working Papers* (867), Bank for International Settlements. Available at: <https://www.bis.org/publ/work867.pdf>
- Galati, Gabriele, and Richhild Moessner. 2013. "Macroprudential Policy – A Literature Review." *Journal of Economic Surveys* 27 (5): 846-878. <https://doi.org/10.1111/j.1467-6419.2012.00729.x>
- Gamba-Santamaría, Santiago, Oscar Fernando Jaulín-Méndez, Angélica María Lizarazo-Cuellar, Juan Carlos Mendoza-Gutiérrez, Paola Morales-Acevedo, Daniel Esteban Osorio-Rodríguez, and Eduardo Yanquen-Briñez. 2017. "SYSMO I: A Systemic Stress Model for the Colombian Financial System." *Borradores de Economía* (1028), Banco de la República. <https://doi.org/10.32468/be.1028>
- Gambacorta, Leonardo, and Andrés Murcia. 2020. "The impact of Macroprudential Policies and their Interaction with Monetary Policy: An Empirical Analysis Using Credit Registry Data." *Journal of Financial Intermediation*. Volumen 42, abril 2020, 100828.. Available at: <https://doi.org/10.1016/j.jfi.2019.04.004>
- García-Andrade, Sebastián. 2019. "Efectos Del Rebalanceo De Los Índices De J.P. Morgan En 2014 Sobre Los Rendimientos De Los Tes En Moneda Local." *Borradores de Economía* (1094). <https://doi.org/10.32468/be.1094>
- Gómez, Esteban, Andrés Murcia, Angélica Lizarazo, and Juan Carlos Mendoza. 2017. "Evaluating the Impact of Macroprudential Policies on Credit Growth in Colombia." *Journal of Financial Intermediation*. Volume 42, April 2020, Available at: <https://doi.org/10.1016/j.jfi.2019.100843>Gómez-Pineda,
- Gómez-Pineda, Javier Guillermo, and Juan Manuel Julio-Román. 2001. "Transmission Mechanisms and Inflation Targeting: The Case of Colombia's Disinflation." *Borradores de Economía* (168), Banco de la República. <https://doi.org/10.32468/be.168>. Also in: *Revista de Análisis Económico*, ILADES / Georgetown University, Vol 18, No. 2 (December), 2003. <https://ssrn.com/abstract=1244682>. Also in: *How Monetary Policy Works: Comparing Estimates of the Transmission Mechanism Between Developing, Transitional and Industrialized*

- Countries, ed. by Lavan Mahadeva and Peter Sinclair, pp. 139–168 (London and New York: Routledge), 2012.
- \_\_\_\_\_, José Darío Uribe, and Hernando Vargas-Herrera. 2002. “The Implementation of Inflation Targeting in Colombia.” *Borradores de Economía* (202), Banco de la República. <https://doi.org/10.32468/be.202>
- \_\_\_\_\_, 2006. “La Política Monetaria en Colombia.” *Revista Del Banco De La República* 79 (940):23-53, Banco de la República. Available at : <https://publicaciones.banrepcultural.org/index.php/banrep/article/view/9718/10110>. Also in *Borradores de Economía* no. 394, 2006.
- González, Andrés, Lavan Mahadeva, Juan D Prada, and Diego Rodríguez. 2011. “Policy Analysis Tool Applied to Colombian Needs: PATACON Model Description.” *Borradores de Economía* (656), Banco de la República. <https://doi.org/10.32468/be.656>
- \_\_\_\_\_, Carlos Huertas, Julián Parra, and Hernando Vargas. 2019. “Proceso de Toma de Decisiones de Política Monetaria del Banco de la República y Comunicación Sobre la Política Monetaria.” *Documentos técnicos o de trabajo - Subgerencia de Política Monetaria e Información Económica*, Banco de la República. Available at: <https://www.banrep.gov.co/sites/default/files/paginas/proceso-de-toma-decisiones-de-politica-monetaria.pdf>
- \_\_\_\_\_, Alexander Guarín-López, Diego A. Rodríguez, and Hernando Vargas-Herrera. 2020. “4GM: A New Model for the Monetary Policy Analysis in Colombia.” *Borradores de Economía* (1106), Banco de la República. <https://doi.org/10.32468/be.1106>
- Ha, Jongrim, M. Ayhan Kose, and Franziska Ohnsorge. 2021. “One-Stop Source: A Global Database of Inflation.” Policy Research Working Papers (9737). Available at: <https://doi.org/10.1596/1813-9450-9737>
- Hamann, Franz, Marc Hofstetter, and Miguel Urrutia. 2014. “Inflation Targeting in Colombia, 2002–12.” *Economía* 15 (1). <https://doi.org/10.31389/eco.83>
- Hernández-Gamarra, Antonio, and José Tolosa-Buitrago. 2001. “La Política Monetaria en Colombia en la Segunda Mitad de los Años Noventa.” *Borradores de Economía* (172), Banco de la República. <https://doi.org/10.32468/be.172>
- Hofmann, Boris, Hyun Song Shin, and Mauricio Villamizar-Villegas. 2021. “FX Intervention and Domestic Credit: Evidence from High-frequency Micro Data.” *BIS Working Papers* (774), Bank for International Settlements. Available at: <https://www.bis.org/publ/work774.pdf>
- IMF-FSB-BIS. 2016. “Elements of Effective Macroprudential Policies. Lessons from International Experience.” Available at: <https://www.bis.org/publ/othp26.pdf>
- International Monetary Fund. 2003. “Staff Report for the 2002 Article IV Consultation and Request for Stand-by Arrangement” *Policy Papers* 03 (19). <https://doi.org/10.5089/9781451808773.002>
- \_\_\_\_\_. 2012. “Financial System Stability Assessment” *Policy Papers* 13 (50).
- \_\_\_\_\_. 2016. “Guidance Note on the Assessment of Reserve Adequacy and Related Considerations” *Policy Papers* 16 (18). <https://doi.org/10.5089/9781498345644.007>
- \_\_\_\_\_. 2022. “Colombia: Financial System Stability Assessment.” *IMF Staff Country Reports* 22 (98). <https://doi.org/10.5089/9798400206634.002>
- \_\_\_\_\_. 2022. “Financial Sector Assessment Program Detailed Assessment of Observance—Basel Core Principles for Effective Banking Supervision” *IMF Country Reports* 22 (135). <https://doi.org/10.5089/9798400207372.002>
- Julio-Román, Juan Manuel. 2007. “The Fan Chart: The Technical Details of the New Implementation.” *Borradores de Economía* (468). <https://doi.org/10.32468/be.468>
- Kalemli-Özcan, Şebnem. 2019. “U.S. Monetary Policy and International Risk Spillovers.” *NBER Working Paper Series* (26297). <https://doi.org/10.3386/w26297>



- Koepke, Robin. 2019. "What Drives Capital Flows to Emerging Markets? A Survey of the Literature." *Journal of Economic Surveys* 33 (2):516-540. <https://doi.org/10.1111/joes.12273>
- López, Enrique, Hernando Vargas, and Norberto Rodríguez. 2017. "La Estrategia de Inflación Objetivo en Colombia." Chapter. In *Historia Del Banco De La República, 1923-2015*, 465–539. Banco de la República.
- McCauley, Robert. 2009. "Macroprudential Policy in Emerging Markets." Paper presented at the Central Bank of Nigeria 50<sup>th</sup> Anniversary International Conference on "Central banking, financial system stability and growth" held in Abuja, May 4-9.
- Martin, Alberto, Caterina Mendicino, and Alejandro Van der Ghote. 2021. "On the Interaction Between Monetary and Macroprudential Policies." *ECB Working Paper Series* (2527). <https://dx.doi.org/10.2139/ssrn.3797147>
- Mohanty, Madhusudan and Philip Turner. 2008. "Monetary policy transmission in emerging market economies: what is new?" *BIS Papers* (35):1-59, Bank for International Settlements.
- Mora-Arbeláez, Tatiana Andrea, Andrés J. García-Bernal, José Eduardo Gómez-González, and Mauricio Villamizar-Villegas. 2015. "Una Historia Exhaustiva de la Regulación Financiera en Colombia." *Borradores de Economía* (887), Banco de la República. <https://doi.org/10.32468/be.887>
- Morais, Bernardo, Gaizka Ormazabal, José-Luis Peydró, Mónica Roa, and Miguel Sarmiento. 2021. "Forward-looking Loan Provisions: Credit Supply and Risk-taking." *Borradores de Economía* (1159), Banco de la República. <https://doi.org/10.32468/be.1159>
- Morales, Paola, Daniel Osorio, Juan S. Lemus, and Miguel Sarmiento. 2022. "The Internationalization of Domestic Banks and the Credit Channel of Monetary Policy." *Journal of Banking & Finance* 135. <https://doi.org/10.1016/j.jbankfin.2021.106317>
- Perez-Reyna, David. "Historia del Bando de la República. Crisis de 1999" Chapter. In *Historia Del Banco De La República, 1923-2015*, 437–464. Banco de la República.
- Rey, Hélène. 2015. "Dilemma Not Trilemma: The Global Financial Cycle and Monetary Policy Independence." *NBER Working Paper Series* (21162). <https://doi.org/10.3386/w21162>
- Rincón-Castro, Hernán, Lucía Arango-Lozano, Sara Ariza-Murillo, Valeria Bejarano-Salcedo, Pamela Cardozo-Ortiz, Fredy Gamboa-Estrada, Juan Manuel Julio-Román et al. 2020. "Impacto de la Intervención Cambiaria y su Duración." *Ensayos Sobre Política Económica* (98): 1–123, Banco de la República.
- Romero, José Vicente, Hernando Vargas, Pamela Cardozo, and Andrés Murcia. 2021. "How Foreign Participation in the Colombian Local Public Debt Market Has Influenced Domestic Financial Conditions." *Latin American Journal of Central Banking* 2 (4). <https://doi.org/10.1016/j.latecb.2021.100043>
- Sahay, Ratna, Vivek Arora, Athanasios Arvanitis, Hamid Faruquee, Papa N'Diaye, and Tommaso Mancini Griffoli. 2014. "Emerging Market Volatility: Lessons From the Taper Tantrum." *IMF Staff Discussion Notes* (9), International Monetary Fund. <https://doi.org/10.5089/9781498318204.006>
- Sarmiento, Miguel. 2022. "Sudden Yield Reversals and Financial Intermediation in Emerging Markets." *Journal of Financial Stability* (August). <https://doi.org/10.1016/j.jfs.2022.101050>
- Sarmiento, Miguel, Nathali Cardozo-Alvarado, Fredy Gamboa-Estrada, Javier Gómez-Pineda, Carlos León-Rincón, Javier Miguélez-Márquez, and Jair Ojeda-Joya. 2023. "Ciclo Financiero Global, Flujos de Capital y Respuestas de Política." *Ensayos Sobre Política Económica* (104):1-55, Banco de la República. <https://doi.org/10.32468/espe104>
- Shoenmaker, Dirk. 2013. "Governance Challenges for Global Finance." Chapter. In *Governance of International Banking: The Financial Trilemma*, 1-17. New York: Oxford University Press.
- Sufi, Amir, and Alan Taylor. 2021. "Financial Crises: A Survey." *NBER Working Paper Series* (29155). <https://doi.org/10.3386/w29155>

- Superintendencia Financiera de Colombia. 2002. “Circular Externa 011.”
- Urrutia Montoya, Miguel. 2002. “Una Visión Alternativa: La Política Monetaria y Cambiaria en la Última Década” *Borradores de Economía* (207), Banco de la República.  
<https://doi.org/10.32468/be.207>
- \_\_\_\_\_, Carlos Caballero-Argáez, and Diana Lizarazo. 2006. “Desarrollo Financiero y Desarrollo Económico En Colombia.” Chapter. In *Historia Del Sector Financiero Colombiano En El Siglo XX: Ensayo Sobre Su Desarrollo y Sus Crisis*, 19–60. Bogotá D.C.: Asobancaria.
- Vargas, Hernando. 2011. “Monetary Policy and the Exchange Rate in Colombia.” *BIS Papers* (57).  
<https://doi.org/10.32468/be.655>
- \_\_\_\_\_, Yanneth R. Betancourt, Carlos Varela and Norberto Rodríguez. 2011. “Effects of Reserve Requirements in an Inflation Targeting Regime: The Case of Colombia.” *BIS Papers* (54):133-169, Bank for International Settlements. Available at:  
<http://www.bis.org/publ/bppdf/bispap54i.pdf>
- \_\_\_\_\_, Pamela Cardozo. 2012. “El Uso de Encajes en un Marco de Política Monetaria Óptima.” *Borradores de Economía* (716), Banco de la República.  
<https://doi.org/10.32468/be.1086>
- \_\_\_\_\_, Pamela Cardozo, and Andrés Murcia. 2017. “The Macroprudential Policy Framework in Colombia.” *BIS Papers* (94):103-128, Bank for International Settlements. Available at: <http://www.bis.org/publ/bppdf/bispap94i.pdf>
- \_\_\_\_\_, Juan J. Ospina and José V. Romero 2022. “The Covid-19 shock and the monetary policy response in Colombia” in *The monetary-fiscal nexus in the wake of the pandemic*. BIS Papers No. 122. March 2022 [https://www.bis.org/publ/bppdf/bispap122\\_f.pdf](https://www.bis.org/publ/bppdf/bispap122_f.pdf)
- Vegh, Carlos, and Guillermo Vuletin. 2012. “Overcoming the Fear of Free Falling: Monetary Policy Graduation in Emerging Markets.” *NBER Working Paper Series* (18175).  
<https://doi.org/10.3386/w18175>
- Zárate, Juan Pablo, Adolfo León Cobo, and José Eduardo Gómez. 2012. “Lecciones de las Crisis Financieras Recientes Para el Diseño e Implementación de las Políticas Monetaria y Financiera en Colombia.” *Ensayos Sobre Política Económica* 30 (69): 257–93, Banco de la República. <https://doi.org/10.32468/Espe.6906>

