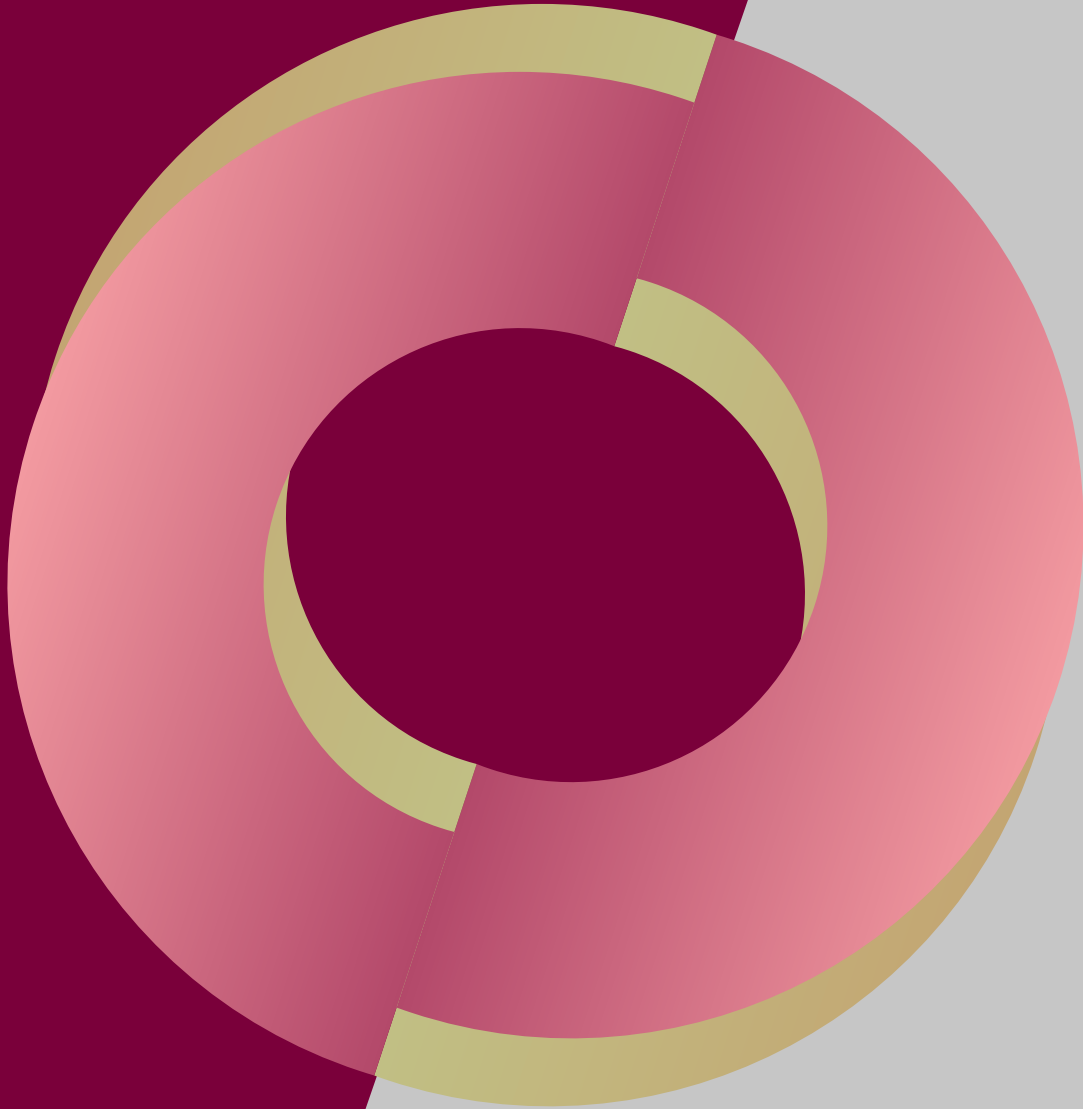


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# FOREIGN RESERVES MANAGEMENT

ISSN - 2145 - 6518



2019

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2019

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*Banco de la República*  
Bogotá, D. C., Colombia

ISSN - 2145 - 6518







# **FOREIGN RESERVES** MANAGEMENT

Prepared by:  
International Investments Department

  
**Office of the Deputy Technical Governor**

Hernando Vargas H.  
**Deputy Technical Governor**

**Office for Monetary Operations and International Investments**

Pamela Cardozo O.  
**Chief Officer for Monetary Operations and International Investments**

**International Investments Department**

Diego Felipe Cifuentes P.  
**Director**

**Sub-Directorate for Portfolio Management**

Andrés Cabrales U.  
**Deputy Director**

Jack Bohm S.  
Carlos Espinosa R.  
Santiago Guerrero V.  
Nicolás Rubio R.  
Adriana Sierra T.  
Philip Symington A.

**Sub-Directorate for Risk Management**

Gladys Andrea Galeano R.  
**Deputy Director**

Marisol Cárdenas G.  
Sara González R.  
Sergio Hernández D.  
Cristiam Rincón R.  
Orlando Rubio V.  
Christian Amaya C.

**Sovereign Funds and Technical Support Section**

Ingrid Marcela Sierra H.  
**Head**

Mónica Rodríguez A.  
Mariana Escobar V.  
Camilo Soto Z.

**Information Development and Management Section**

Pedro Sorza M.  
**Head**

Jaidar Garcés C.  
Camilo Restrepo V.  
Yesenia Silva D.

**Research and Analysis Group**

Miguel Gómez R.  
Daniel Díaz P.  
Cristian Camilo P.

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# Glossary

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**Back office:** the division of a portfolio management organization that is in charge of confirmation, reconciliation, clearance, settlement and keeping an accounting record of operations carried out during the investment process, including operational aspects of the relationship with counterparties.

**Balance of payments:** a record of all of a country's economic transactions with the rest of the world; includes information on the value of trade in goods and services, as well as transfer payments.

**Benchmark:** a basket of assets or a theoretical portfolio with predetermined weights according to certain rules that define the composition of the index. In general, a benchmark intends to replicate broadly the performance of a market for financial assets and serves as a performance indicator for other investment portfolios in that same market.

**Bond:** a financial debt contract in the form of a security that stipulates specific repayment of capital or principal to the holder, plus the respective interest.

**Conditional VaR (CVaR):** a market risk assessment measure that estimates the average loss on an investment portfolio in extreme scenarios. CVaR is calculated as the expected value of losses in the tail of the distribution of possible returns.

**Contractual interest rate (coupon rate):** interest rate associated with a debt instrument for which the issuer agrees to pay at agreed dates and predetermined intervals. It is measured as a percentage of the principal that is expected to be recovered when the debt security matures.

**Correspondent banks:** institutions that make or receive payments and provide other services on behalf of another bank outside the country. These include treasury correspondents.

**Counterparty risk:** a type of credit risk that occurs when one of those involved in a financial transaction might go bankrupt before it meets its contractual obligations.

**Credit event:** refers primarily to: 1) deterioration in the creditworthiness of bond issuers or bonds themselves, or 2) default or non-payment by an issuer.

**According to** the International Swaps and Derivatives Association (ISDA), a credit event can be any of the following: 1) the entity in question filing for bankruptcy; 2) accelerated settlement (a situation where an obligation may have to be settled prior to maturity due to a credit event experienced by the entity in question); 3) payment default; 4) debt restructuring (a change in the terms of the debt, which usually causes the debt to be less favorable for the debtholder); 5) repudiation or 6) moratorium.

**Credit risk:** the prospect of the occurrence of credit events such as: 1) deterioration in the creditworthiness of the issuer or the securities themselves, or 2) default or non-payment by the issuer.

**Credit risk rating (credit rating):** a rating issued by specialized international agencies

(Standard & Poor's, Moody's and Fitch) that reflects the payment capacity of an issuer of debt securities.

**Current account of the balance of payments:** the value of exports minus the value of imports, plus the net factor income from abroad, plus net transfers from abroad.

**Custodians: financial** institutions (often banks) in charge of holding customers' financial assets for safekeeping (in custody). Occasionally, custody includes the exercise of rights pertaining to the maturity of the securities.

**Effective duration:** a measure of risk that takes into account how changes in interest rates affect expected cash flows. It considers the effect of the discounted cash flows that occur at different interest rates, as well as the changes in cash flows. This is a more appropriate method for any bond with an embedded option (e.g., mortgage-backed securities have an embedded prepayment option that can be affected by the level of interest rates; in other words, a lower interest rate gives a mortgage holder a strong incentive to refinance his debt).

**Foreign Exchange risk:** the prospect of loss in a portfolio due to fluctuations in exchange rates.

**Floating exchange rate:** exchange rate regime that allows the market to determine the behavior of the ratio of one currency to another, based on supply and demand. The central bank does not intervene to control the price. Therefore, the amount of Colombian pesos required to purchase one unit of foreign currency (e.g., one U.S. dollar) may vary over time.

**Foreign exchange market:** where foreign currency is bought and sold. There are foreign exchange markets where pesos are bought and sold for dollars, or dollars for euros, among others.

**Front office:** the division of a portfolio management organization that is responsible for carrying out operations and transactions in capital markets.

**Gross return:** total income or returns received from an investment without excluding costs for fees, taxes or other expenses associated with the financial transaction.

**Issuer:** the entity that issues a security or bond.

**Legal risk:** the prospect of having contracts that cannot be performed legally or are not documented properly, or the risk of changes in legislation that affect the Bank's obligations.

**Liquidity risk:** the possibility that an asset might not be readily convertible to cash and at a minimum cost.

**M1:** a measure of the money supply regarding means of payment and includes cash in circulation, deposits in checking accounts or checks, and travelers checks.

**M2:** a measure of the money supply that includes M1, savings deposits and time certificates of deposits (CDs) with commercial banks, financial corporations, commercial finance companies and higher-order cooperatives.

**M3:** a measure of the money supply that includes M2, commercial bank fiduciary deposits and other sight deposits. It is also equivalent to cash in circulation, plus liabilities subject to reserve requirements.

**Mark to market:** a practice that involves daily valuation of an asset or portfolio at market prices to reflect its current market levels.

**Market risk (or interest rate risk):** exists when there are losses from the devaluation of a financial asset due to changes in interest rates in the economy.

**Middle office:** the division of a portfolio management organization that is responsible for monitoring all investments on a daily basis, in addition to measuring and controlling exposure to financial risks.

**Modified duration:** a measure of the market risk of an investment portfolio or security, defined as the percentage change in the value of the portfolio or security due to a 1% change in interest rates.

**Monetary aggregates:** a measure of the total amount of money in circulation in an economy. The main monetary aggregates are M1, M2 and M3.

**Mortgage-backed securities:** instruments with a value and flow of payments that is guaranteed by a basket or portfolio of assets or mortgages. Agencies' mortgages are also guaranteed by the leading government-sponsored mortgage entities in the United States (Fannie Mae and Freddie Mac) should the debtor default.

**Net return:** income or return received from an investment after deducting costs for fees, taxes and other expenses associated with the financial transaction.

**Operational risk:** the prospect of loss resulting from inadequate or failed internal processes, technology or infrastructure, errors committed by people, events originating with external sources or fraud.

**Primary market:** the market where newly issued securities are offered for sale.

**Rate of return:** the interest rate used to discount to present value all of the future cash flows from a security (interest and principal), so the sum of those discounted amounts is equivalent to the market price of the security. // The annualized rate of return on an investment in a debt security, calculated assuming the investment is held to maturity, all contractual payments are made, and interest payments (coupons) are reinvested at that same rate of return.

**Reputational risk:** risk that arises when harm to an organization occurs due to loss of its credibility or good name.

**Risk:** the prospect of loss by investing in any type of financial asset.

**Secondary market:** the market where financial instruments are bought and sold after first being placed on the primary market. The secondary market gives liquidity to bonds and securities that already exist.

**Special drawing rights (SDR):** artificial reserve asset created by the IMF and assigned to its member countries in proportion to their quotas. The value of special drawing rights is defined according to a basket of currencies, which currently includes the U.S. dollar, the euro, the pound and the yen. The benefit of SDR as a reserve asset is that countries can exchange it for the reserve currencies of other countries in an effort to deal with balance-of-payments financing needs or to modify the composition of their foreign reserves. In addition to their function as reserve asset, SDR serves as an accounting unit for the IMF and some international organizations.

**Sovereign entities:** generally refers to states (countries) that have sovereignty; in other words, those that exercise and have supreme and independent authority to act autonomously in the management of internal relations and in determining their conduct towards other states.

**Supranational entities:** organizations that are beyond the realm of governments or national institutions and act independently of them. Generally, this term refers to multilateral organizations such as the World Bank, the Inter-American Development Bank (IDB), the Latin American Reserve Fund (FLAR for the acronym in Spanish) or the Latin American Development Bank (CAF).

**Value at risk (VaR):** a methodology used to measure and control market risk by estimating the maximum loss an investment portfolio can incur, with a specific level of confidence (usually 95%), in different time horizons.

**Volatility:** a measure of the variability of returns on a financial asset during a specific period.

# Introduction

The Colombian Constitution and Law 31/1992 (Article 14) assigned *Banco de la República* a mandate to manage Colombia's foreign reserves. Likewise, they also stipulate that the criteria to manage foreign reserves are safety, liquidity, and return. The purpose of this report is to explain how Colombia's foreign reserves are managed. At December 2018, they amounted to USD 48,392 million (m).

The report begins with a description of the main concepts associated with foreign reserves and outlines the framework on which its management by the Bank is based. It then describes, in detail, the policy for managing foreign reserves, as well as the fundamental aspects of its operation. The report ends with an account of the current state of the country's foreign reserves.



# 01

## Purpose of Foreign Reserves

### 1.1 Definition

Foreign Reserves are external assets controlled by the country's monetary authority. To be regarded as a reserve, an external asset must meet the following requirements: first, it must be under the direct and effective control of the country's monetary authority and, secondly, it must be readily available. Colombia's foreign reserves include: 1) the investment portfolio, which accounts for the majority of the reserves and is comprised of financial instruments on the international market and gold; 2) contributions to supranational entities, such as the International Monetary Fund (IMF) and the Latin American Reserve Fund (FLAR);<sup>1</sup> and 3) international agreements. One characteristic of the investment portfolio is that it is available for immediate use. Contributions to the IMF and FLAR allow Colombia to maintain access to their contingency credit lines. International agreements, such as the one signed with the Latin American Integration Association (ALADI), help to facilitate trade among the member countries.

### 1.2 General Objectives of Foreign Reserves Accumulation

Identifying the objectives of foreign reserves is essential to understanding *Banco de la República's* reserve management policy.

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<sup>1</sup> In keeping with the methodological criteria established in the *IMF Balance of Payments and International Investment Position Manual* for calculating reserve assets, contributions to FLAR are excluded from the balance of international reserves reported to the IMF for statistical purposes. However, on *Banco de la República's* balance sheet and in the information provided in this report, contributions to FLAR continue to be part of the country's reserve assets.

The Bank holds what it deems to be an adequate amount of foreign reserves to intervene in the foreign exchange market and to facilitate access by the government and the private sector to international capital markets.

### 1.2.1 Foreign-Exchange Intervention

Intervening in the foreign exchange market is one of *Banco de la República's* instruments to accomplish the fundamental objective of keeping the inflation rate low and stable, as well as reaching levels of output that are close to its potential. For example, when rapid depreciation of the peso threatens the goal of meeting the inflation target (3%), the Bank can mitigate exchange rate pressures by selling foreign currency on the market, thereby preventing the burden of the adjustment from falling solely on the interest rate. The Bank can also intervene in the foreign exchange market to control atypical or sudden movements in the exchange rate characterized by a great volatility of the exchange rate and a sizeable increase in the spread between the currency's purchase and sale prices (bid-offer spread). Such movements may influence the performance of other financial assets linked to the foreign exchange market and can jeopardize the objective of proper functioning of internal and external payments.

*Banco de la República* does not intervene the market with a specific target for the exchange rate. As stated earlier, the main objectives of its intervention concern inflation, economic activity and the proper functioning of the foreign exchange market. Moreover, the Bank recognizes that the foreign exchange intervention is not always convenient or effective, which is why it is neither constant nor indiscriminate.

### 1.2.2 Access to the International Capital Markets

Having a sufficient amount of foreign reserves facilitates access to international capital markets for both the government and the private sector. The level of foreign reserves is a determining factor in the perception of Colombian borrowers' payment capacity. Credit risk rating agencies and foreign lenders believe having an adequate level of reserves would allow Colombian residents to meet their obligations denominated in foreign currency, such as paying for imports and foreign-debt service, should the country find difficulties to access foreign funding. The fact that agents in the international capital markets use the payment capacity of the reserves as a measure of the country's liquidity, highlights the importance of holding an adequate amount of foreign reserves.

Accordingly, *Banco de la República* seeks to maintain enough assets denominated in foreign currency to comply effectively with the aforementioned objectives. The amounts of foreign currency purchased are determined in such a way that *Banco de la República's* external liquidity is sufficient to cover the external deficit, foreign debt payments and other potential capital movements. Additionally, Colombia has access to the IMF Flexible Credit Line (FCL),<sup>2</sup> which operates as insurance that enables countries to deal with deterioration in external conditions. Like other central banks, *Banco de la República* places special emphasis on ensuring the safety and liquidity of its reserve investments, without setting aside the importance of generating returns on those reserves.

### 1.3 Historical Developments in the Objectives of Foreign Reserves Accumulation at *Banco de la República*

Prior to the 1990s, the primary objective of reserves was to support foreign trade transactions. Therefore, the criterion for judging the sufficiency of foreign reserves was the number of months of imports they could pay for. At that time, the foreign exchange policy, known as “crawling peg” regime<sup>3</sup>, was applied in a market that had very little exposure to foreign capital, due to the restrictive regulation that was in effect.

Law 9/1991 liberalized the foreign exchange market in an effort to stimulate foreign investment and facilitate international trade. “Crawling peg” regime was replaced gradually for the exchange rate band regime, and free floating exchange rate was introduced in 1999. With this new regulatory framework, the private sector increased its foreign borrowing, and syndicated loans—the traditional source of public-sector financing in international markets at the time—were replaced by bond issuance. The rise in capital flows made it more necessary than ever to maintain enough foreign reserves to protect the economy from a sudden reversal of those flows.

On the other hand, the 1990s saw several emerging market economies with solid fundamentals forced to confront capital outflows, due to the contagion effect caused by the crisis in Mexico, the Southeastern

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2 The FCL is an instrument created by this multilateral organization to support member countries that have strong economic fundamentals, prudent policies and a sound institutional framework for economic policy. Colombia's application for FCL Access was approved for the first time in May 2009 and has been renewed on a number of occasions. The current FCL comes to 7,848 special drawing rights (approximately USD 11,400 m) and was approved on May 25, 2019 for two years.

3 As part of this policy, *Banco de la República* established the official exchange rate on a daily basis, making small daily devaluations.

Asian countries and Russia. This fact proved that countries with prudent fiscal and monetary policies can also face this type of circumstances, further reinforcing the need to hold an adequate amount of foreign reserves, particularly in light of empirical evidence that showed countries with sufficient reserves were less vulnerable to contagion.

As a result of those events, the credit rating agencies started to assign more importance to the level of foreign reserves when defining the ratings for emerging market economies, since reserves are a measure of the capacity of the government and the private sector to meet their obligations in foreign currency.

The global financial crisis in 2008-2009 and the drop in commodity prices during 2014 and 2015 confirmed the importance of having an adequate amount of foreign reserves. In this context, it again became evident that countries with high levels of reserves have been able to deal more adequately with the vulnerabilities to which they have been exposed due to global distortions associated with capital flight, increased uncertainty, declining exports, systemic risk and other situations arising from crisis environments.

#### **1.4 Implications of the Objectives of Foreign Reserves Accumulation on their Management**

In accordance with the objectives of foreign reserves accumulation, it is possible to identify four main characteristics of the policy *Banco de la República* uses to manage them:

- To ensure compliance with the country's foreign payment obligations, reserves are invested in extremely safe and liquid financial assets for which there is a broad secondary market.
- With a floating exchange rate regime, the likelihood and the amount of interventions in the foreign exchange market are lower. As a result, the percentage of reserves set aside to cover immediate liquidity needs, which is referred to as working capital (invested in the very short-term), is maintained at low levels and currently represents approximately 3.9%
- Since the need for liquidity is less under the current foreign exchange rate regime, the remainder of the investment portfolio has longer maturities and higher expected returns, although the level of risk is kept low. Reserve management policies are based on the modern portfolio theory, which recommends applying the principle of diversification: in other words, "don't put all your eggs in one basket", since it is impossible to predict with certainty how each investment in a portfolio will perform.



In this way, portfolio security, liquidity and profitability are assessed as a whole and not according to the performance of individual investments.

- *Banco de la República* has a highly specialized staff and technological equipment in managing the risks associated with foreign reserves investments. It also has the support of top-level foreign firms in this respect.

These investment policies are not exclusive to *Banco de la República*. In fact, they are consistent with the trend followed by most central banks throughout the world.

# 02

## Institutional Framework

### 2.1 Legal Framework

The Colombian Constitution,<sup>4</sup> Law 31/1992 and Decree 2520/1993 (the Statutes of *Banco de la República*) set forth the rules *Banco de la República* must follow when fulfilling its functions, one of which is to manage the country's foreign reserves.

Law 31/1992, Chapter IV, on the management of foreign reserves and authority over international matters, states in Article 14: "*Banco de la República* will administer the foreign reserves as provided to the public interest, to the benefit of the national economy and with the purpose of facilitating the payments that the country needs to do abroad. The administration comprises the management, investment, deposit in custody, and disposal of the reserved assets." Law 31 also determines "The investment of these assets will be made in accordance with the criteria of security, liquidity, and profitability in assets denominated in freely-convertible reserve currencies or in gold."

*Banco de la República's* Board of Directors (BDBR) is the body authorized to "order contributions to international financial organisms on the account of the foreign reserves, provided that such contributions also constitute reserve asset, [...] with the purpose of making direct payments for the acquisition of risk-coverage instruments in the market [and] enter into contracts of non-monetizable payment balance credits.". The Board

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<sup>4</sup> The Colombian Constitution adopted in 1991, Title XII (on the economic regime and public finance), Chapter 6 (on the central bank), Article 371.

of Directors is not authorized to make loans with foreign reserves, and the law states *Banco de la República's* foreign reserves shall be immune from seizure.

Finally, Article 68 of the Statutes indicates: “In the event that the Bank signs international commercial or financial contracts that cause it to be subject to foreign law or courts, it shall locate its foreign headquarters and agents for the purpose.” In accordance with this provision, Sub-paragraph d of Article 1 in Internal Resolution 2 (The General Contracting Regime of *Banco de la República*), issued by the Board of Directors in 2010 with respect to the scope of its application, establishes that agreements “related to the management, custody, administration, investment, disposition and other activities concerning foreign reserves are excluded from said regime.”<sup>5</sup>

## 2.2 Organizational Framework

### 2.2.1 Decision-Making Bodies

At *Banco de la República*, the main decision-making bodies for the management of reserves are the Foreign Reserves Committee and the Foreign Reserves Operating Committee.<sup>6</sup> The former is in charge of establishing the objectives, principles and general policies for the management of reserves. It meets at least once every two months, is chaired by the Governor of the Bank, and is attended by all full-time members of the Board of Directors and by the Minister of Finance and Public Credit (or his/her representative).

As part of its function of defining the reserve management policies, the Foreign Reserves Committee is in charge of establishing investment guidelines and setting the benchmark. These tools define the criteria for the composition of the investment portfolio, the types of assets that are eligible, the authorized operations and the tolerable exposure to different risks. The investment policies established by this committee are set in accordance with the portfolio principle. In other words, the idea is to ensure all investments in aggregate meet the criteria of security, liquidity and profitability. These policies do not consist of selecting individual investments; rather, they focus on defining criteria to ensure investments are made within a secure

<sup>5</sup> Internal Resolution 2/2010, Article 2, stipulates: “contracts entered into and carried out abroad may be subject to foreign regulations and courts.”

<sup>6</sup> In exercise of its legal and statutory powers, particularly those provided for in articles 14 and 15 and in Sub-paragraph ñ of Article 34 in the Statutes of *Banco de la República*, the BDBR issued Internal Resolution 6/2015 to replace Resolution 2/2001. It regulates the objectives, functions and responsibilities of the Foreign Reserves Committee and creates the Foreign Reserves Operating Committee.

framework. Apart from outlining the criterion calling for the reserve portfolio to be invested at low risk, the investment policy also seeks to encourage an adequate profitability, since this criterion is part of the mandate given to *Banco de la República* by law.

On the other hand, the Foreign Reserves Operating Committee is responsible for monitoring and promoting efficient management of the operational risk posed to foreign reserves. It usually meets at least once a month and its members include the Chief Officer for Payment Systems and Banking Operation, the Chief Officer for Monetary Operations and International Investments, and the Secretary to the Board of Directors.

The International Investments Department is part of the Office for Monetary Operations and International Investments and is in charge of implementing and monitoring the investment policies set by the Foreign Reserves Committee. The area within the International Investments Department that is responsible for the portfolio investments managed internally is the Sub-Directorate for Portfolio Management, while the Sub-Directorate for Risk Management is in charge of risk management, monitoring compliance with the investment guidelines, and the performance attribution of all investments. In addition, the department has three areas that provide support for reserve management. The Research and Analysis Group does economic and financial research and develops quantitative tools to support the process of investing foreign reserves and managing the risks this implies. The Information Development and Management Section helps to create and improve the technological tools used in the reserve investment process and is responsible for efficient portfolio data management. The Sovereign Funds and Technical Support Section of the International Investments Department works with the Bank's legal departments to ensure the terms and conditions agreed in the contracts reflect financial market practices and match the technical conditions of the transactions.

### 2.2.2 Supervisory Bodies

*Banco de la República* has a broad and robust infrastructure to control the investment portfolio management. It includes staff members from different areas within the Bank and from other institutions to ensure an impartial and independent process. According to the Colombian Constitution, control over *Banco de la República* is exercised by the President of Colombia, who is authorized in Law 31/1992 to delegate that function to the General Auditor's Office. As the President's representative, the General Auditor is responsible for certifying the Bank's financial statements; exercising control over its

management and results (including the management of foreign reserves); ensuring its operations and transactions are consistent with legal prescriptions, respective decisions taken by the Board of Directors and the Office of the Governor, and the Bank's rules and regulations; procure measures are taken in a timely manner to preserve and secure the Bank's assets and those it holds in custody or under any other title; and confirming the Bank's accounts are kept regularly and in accordance with the law and all applicable accounting standards.<sup>7</sup> The General Auditor also presents quarterly assessments to the President of Colombia, the Office of the Financial Superintendent of Colombia and the BDBR on various aspects of the Bank's operation and control, including the management of reserves.

On the other hand, "inspection and surveillance of *Banco de la República*, granted to the President by the Constitution, shall be exercised by the Banking Superintendent [now the Office of the Financial Superintendent of Colombia] [...] in accordance with Decree 239/1993".<sup>8</sup>

*Banco de la República* also hires an external auditing to issue an opinion on its financial statements, in accordance with international auditing standards. Deloitte has been entrusted with this task since 2014. The involvement of an outside firm is part of the agreements countries have with the IMF, besides acknowledging the importance international markets place on the verification of information related to foreign reserves (auditors' notes to the Bank's financial statements are available at <http://www.banrep.gov.co/es/estados-financieros-anales>).

The Internal Control Department at *Banco de la República* was created under Law 87/1993, which outlines the procedures governing internal control over public institutions. The department is responsible for independently verifying the procedures necessary for the central bank to do its job in investing foreign reserves are in place and are being observed fully.

In addition to the various control bodies mentioned earlier, the Bank submits two annual reports to the Colombian Congress that includes a chapter on foreign reserves management policies, composition and performance of foreign reserves. This is done in the interest of transparency and pursuant to the provisions in Law 31/1992 (Article 5 therein).

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<sup>7</sup> Law 31/ 1992, Title IV (Inspection, Surveillance and Control), Article 48.

<sup>8</sup> In this respect, see Article 70 in Decree 2520/1993 and Article 47 in Law 31/ 1992.

Information on foreign reserves is also available in the Bank's financial statements published monthly in *Revista del Banco de la República*, as well as in the reports submitted each month to the Office of the Financial Superintendent of Colombia, or in the quarterly information sent to the General Accounting Office. Moreover, at the beginning of each year, the Bank's financial statements at December 31 of the previous year are published in a daily economic newspaper with nationwide circulation. The notes to the financial statements contain detailed information on certain balance-sheet items, including those related to foreign reserves, with comments on directly and externally managed portfolios and risk-management policies. Finally, the amount of the country's foreign reserves is posted weekly on *Banco de la República's* website.

# 03

## Organizational Structure for Foreign Reserves Management

As mentioned already, there is an internal infrastructure to monitor the management of reserves, as well as an external one. Moreover, in the interest of maintaining strict practices for controlling risk at every stage of this management process, there is also a clear separation between the functional areas. This is done to minimize fraud, operational and legal risks, among others. A central aspect of the framework for risk management at *Banco de la República*, and in many other central banks, is the separation of functions assigned to the front, middle and back offices, and their separation from the areas responsible for internal control, auditing and accounting. This division of tasks ensures that exposure is within the limits established by the defined hierarchy. It also minimizes opportunities for fraud. The main elements of this entire scheme for risk management are the following:

- The Bank's front office is the Sub-Directorate for Portfolio Management of the International Investments Department, which is part of the Office for Monetary Operations and International Investments. It is responsible for planning and implementing the operations of the portfolios managed internally, pursuant to the policies and guidelines defined by the Foreign Reserves Committee. The front office has a team of eight staff members.

- The duties of the back office, in terms of reserve management, are performed by the Booking and Control of International Settlements Department (DRCPI for the Spanish acronym). It is part of the Office for Payment Systems and Banking Operation and is responsible for confirmation, settlement and reconciliation of the operations carried out during the investment process, including the operational aspects related to custodians<sup>9</sup>, counterparties, correspondent banks and external managers.<sup>10</sup> The DRCPI also assesses the value of the portfolios and registers all operations on the books. It has a staff of 22 employees.

Consequently, there is a complete separation between those who execute financial transactions and those who are responsible for their registration, confirmation and reconciliation. Furthermore, the International Investments Department, as part of the Office for Monetary Operations and International Investments, belongs to the Office of the Deputy Technical Governor, while the DRCPI, as part of the Office for Payment Systems and Banking Operation, belongs to the Office of the Deputy Executive Governor. All this helps to reduce the risk of fraud.

- The Sub-Directorate for Risk Management of the International Investments Department is part of the Office for Monetary Operations and International Investments and is in charge of monitoring all the portfolios on a daily basis to verify if managers are in compliance with the investment policies and guidelines established by the Foreign Reserves Committee. Based on this monitoring, the Sub-Directorate for Risk Management prepares financial and operational reports that are presented to the Foreign Reserves Committee and the Foreign Reserves Operating Committee respectively. The team also analyzes the investment strategies implemented in the different portfolios. The Sub-Directorate for Risk Management has organized working groups to control the risks to which the country's foreign reserves are exposed. These include market, credit, liquidity, counterparty and operational risks, among others. To monitor some of them, it teams up with other areas of the Bank, such as the Risk and Process Management Department. The Sub-Directorate for Risk Management is the middle office in the management of reserves and has a team of eight employees.

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9 The custodians are the financial institutions where the Bank's securities are deposited. The Federal Reserve Bank of New York, Euroclear Bank, JP Morgan Chase Bank and State Street Bank are the main custodians of the country's international reserves.

10 *Banco de la República* engages firms to manage a portion of the country's reserves. A detailed description of the external management program is provided in Chapter 6.



Thus, it is important to note the separation of functions is not restricted to the back and front offices. There also is a separation of functions between those who carry out transactions and manage financial exposure (front office) and those who measure it (middle office).

Other departments within the Bank also participate in the reserve management and, therefore, are part of the risk-management framework. The Accounting Department is responsible for keeping the books on foreign reserves, which it does independently. The Foreign Exchange and International Settlements Department manages the SWIFT system (Society for Worldwide Interbank Financial Telecommunication), which allows for a secure exchange of messages between financial institutions around the world. Access to this system is restricted. The International Investments Department and the DRCPI have access to SWIFT from different profiles; this allows different areas to capture, verify and release payment messages, which helps to mitigate the risk of fraud. The Internal Control Department, which reports directly to the Office of the Deputy Executive Governor, ensures procedures are documented properly and advises on how to execute them safely. The manuals on processes and procedures are published on the Bank's intranet and are updated frequently. They serve as tools for training new staff members and clearly define the authority assigned to each area and position. The General Directorate for Human Resource Management requires each position to have a manual of functions; it clearly outlines the responsibilities and faculties of every employee at the Bank.

The General Auditor attends the meetings of the Foreign Reserves Committee and is entitled to speak but not to vote. His office conducts frequent inspection visits to the International Investments Department and the DRCPI to analyze the control environment and do forth recommendations to improve the security of their processes and procedures. It also visits custodians and external managers to verify their control mechanisms.

# 04

## Management of the Investment Portfolio and Related Risks

All investments imply some risk, even those traditionally considered to be the safest. For example, sovereign bonds issued by developed countries, which are deemed the safest assets in the market, are exposed to the risk that their prices change or countries default on their debt. Money held in a safe deposit box is also exposed to risks; for example, there is the risk of it being stolen or deteriorating. Gold commonly is associated with secure conditions, but sometimes its price drops sharply. Moreover, any investment decision is made in an environment of uncertainty, since it is impossible to predict with certainty how investments will perform in the future. This means every investor always faces different types of risk.

The security criterion applied to managing foreign reserves in Colombia implies adequately controlling the risk to which investments are exposed. In order to manage risks within acceptable parameters and levels, the Foreign Reserves Committee defines strict limits for exposure to each of the different risks that foreign reserves face. Additionally, there is an internal structure to monitor and manage risk, since investments that are considered safe may become risky at any moment, due to changes in the economic environment or the financial situation of each issuer.

The main risks to which a central bank generally is exposed in managing its foreign reserves portfolios and the way *Banco de la República* deals with those risks are explained below.

#### 4.1 Liquidity Risk

Liquidity is one of the criteria defined by law for the investment of reserves. In the case of central banks, this is the risk of not being able to convert reserve assets into cash quickly and at low cost when needed. This risk is a constant challenge to managers, since liquidity conditions in the market can change at any moment.

Central banks minimize liquidity risk by investing in financial assets that can be easily liquidated on the secondary market, such as securities issued by the governments of industrialized countries (e.g., U.S. government bonds) or short-term assets. *Banco de la República* also has a number of policies designed to keep a low liquidity risk on its investments. To begin with, a high proportion of the investment portfolio must be in assets that fall within the category of high-quality liquid assets defined by the Basel Committee on Banking Supervision. Likewise, each security must have a minimum issue size, according to its currency of denomination (e.g., above USD 300 m in the case of issues in USD) and purchases of more than 10% of the outstanding amount are not permitted.<sup>11</sup>

In addition to investing in highly liquid assets, central banks usually define investment tranches according to the objectives of liquidity and profitability. Shorter-term, most liquid investments are used to intervene in the foreign exchange market. Normally, the portion of reserves that would be used only in exceptional cases is invested over a longer term in order to seek a higher rate of return. *Banco de la República* divides the reserve investment portfolio into three tranches: short-term, medium-term and the gold tranche.<sup>12</sup>

- The objective of the short-term tranche is to cover the potential liquidity needs of reserves in 12 months. This includes working capital, which is the portfolio into which funds from foreign exchange market intervention are placed, and its investments are concentrated in very short-term, dollar-denominated assets. Working capital is concentrated in deposits and

<sup>11</sup> These limits do not apply to money market assets.

<sup>12</sup> The names and composition of the tranches in the investment portfolio were changed during the first half of 2015 to improve the efficiency with which reserves are managed. The tranches previously labeled as “indexed” and “non-indexed” were replaced by the short and medium-term tranches to indicate there is a portion of the portfolio that is less likely to be used in the short term. Additionally, gold was included as a tranche of the investment portfolio.

investments that can be liquidated in one day at a very low cost. The level of working capital can be between USD 1,115 m and USD 2,000 m. The remainder of the short-term tranche is invested in a larger number of instruments and has a maturity and expected return profile greater than that of the working capital, maintaining a high level of liquidity. It is sought that the expected yield on this tranche in U.S. dollars to be positive, with a 95% level of confidence, in a twelve-month horizon. As of December 2018, the value of the short-term tranche was USD 29,566.19 m (63.5% of the investment portfolio), including USD 1,815.46 m in working capital.

- The medium-term tranche is invested with a maturity and return profile superior to that of the short-term tranche. In this case, the objective is to maximize the risk-adjusted return in US dollars -the currency in which the value of foreign reserves is reported- for the portion of the portfolio considered least likely to be used within twelve months. The purpose of having a tranche with these characteristics is to increase the expected return on foreign reserves in the long term, while maintaining a conservative portfolio. It is sought that the expected yield on this tranche in U.S. dollars to be positive, with a 95% level of confidence, in a three-year horizon. As of December 2018, the medium-term tranche was comprised of seven actively managed portfolios that were intended to generate a higher return than the benchmark. This tranche also includes funds managed by the Bank for International Settlements (BIS), to which only central banks and multilateral entities have access. The purpose of these funds is to make investments in assets that are suitable for the world's foreign reserves, as part of a cooperative effort between different countries. The medium-term tranche amounted USD 16,458.11 m as of December 2018, accounting for 35.4% of the investment portfolio.
- The last tranche is comprised of foreign reserves invested in certified physical gold, which can be traded readily on international markets. Gold makes it possible to diversify the investment portfolio, since its price behaves differently from the prices of the securities in which the short and medium-term tranches are invested.<sup>13</sup> The market value of the country's gold reserves as of December 2018 was USD 529.29 m, or 1.1% of the investment portfolio. The share of gold in the foreign reserves is low, since the price of this metal tends to be highly volatile.

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<sup>13</sup> The correlation between the price of gold and the price of securities issued by national governments is approximately 0.3, which indicates their variations tend to be different.

## 4.2. Market Risk (or Interest Rate Risk)

In the case of investments of foreign reserves, market risk materializes when the prices of investments drop. As for fixed-income instruments, which account for the majority of Colombia's reserve investments, their prices decline when interest rates on the world's major financial markets rise. This happens because these instruments pay a fixed rate of interest, which becomes less competitive when market rates increase. In contrast, when international interest rates fall, these reserves gain value.

To limit market risk on the investment tranche, *Banco de la República* invests in instruments that are not especially sensitive to interest rate hikes, on average. It also monitors market risk through methods that are recognized in finance theory, such as duration, value at risk (VaR), conditional value at risk (CVaR) and stress tests, all of which help to measure the volatility of the prices of financial assets and the volatility of the portfolio as a whole. Duration is defined as the percentage change in the value of the portfolio due to a 1% variation in interest rates. For example, if interest rates increase 1%, a portfolio with a duration of 2 will lose 2% of its value. A portfolio with a higher modified duration has a higher expected return in the long term, since the rate of return on long-term bonds is normally higher than the rate on short-term bonds. Nevertheless, market risk of the portfolio also increases as the modified duration is greater. On the other hand, VaR is a measure that is widely used internationally to estimate, with a given level of confidence, the maximum loss the portfolio could incur in different time horizons. The CVaR is a measure that complements the VaR, because it provides the expected value of losses when these exceed the VaR. Finally, stress tests are estimates of portfolio return in extreme scenarios that were observed in the past or could occur in the future. All of these measures are reviewed in order to detect changes in the level of risk under different market conditions.

## 4.3 Credit Risk

The portfolio is exposed to credit risk because of credit events such as: 1) deterioration in the creditworthiness or credit quality of issuers/issues of investment assets, or 2) defaults (non-payment) by issuers.

To limit credit risk, the Bank has determined that losses caused by credit risk must be very low, even in extreme scenarios. Specifically,

default situations in 1% of the worst scenarios must not exceed 1% of the value of the portfolio.<sup>14</sup>

The measures applied by the Bank to comply with this policy and, therefore, to control credit risk include defining a minimum permissible credit rating, as well as setting limits per issuer. As a reference, *Banco de la República* uses the ratings assigned by Standard & Poor's, Fitch Ratings and Moody's Investors Service. In the scale used by these international agencies, the highest long-term rating is AAA (extremely strong capacity to comply), followed by AA (very strong capacity to pay) and A (strong capacity to pay). The lowest rating is D and pertains to issuers who have defaulted on their payments. It is considered the average investor can invest safely, in the long term, in debt securities with ratings above BBB-. These are called investment-grade securities. Currently, it is established in the Bank's guidelines that the minimum long-term credit rating for debt securities that are eligible for the reserve portfolio is A-<sup>15</sup>, i.e., three levels above what most investors consider as safe. The guidelines state an eligible issue must have at least two ratings, and the lower of these ratings is to be used.

In addition, the Bank has defined maximum limits on concentration per issuer to ensure diversification and lessen the impact of a credit event. Table 4.1 shows the aggregate limit per issuer in the investment portfolio according to its rating.

The limits indicated in Table 4.1 imply that investments are concentrated in bonds issued by the governments of developed countries with high credit ratings. Investment in debt of other high-quality issuers, such as quasi-governments and corporates, is permitted within strict limits. Investments in mortgage-backed securities of U.S. agencies are also allowed.<sup>16</sup>

The Bank also sets restrictions on the type of assets allowed and their characteristics. For example, it does not permit investments in jurisdictions with a weak regulatory framework or where money laundering

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14 Statistically, this implies taking the average value of credit risk losses in 1% of the distribution. The expected value of that distribution is 0% of losses due to credit events.

15 The investment guidelines for active portfolio management allow investing in exchange traded funds (ETFs) of investment-grade corporate bonds. Therefore, the investments that make up these funds may have credit ratings within a range of AAA to BBB-.

16 In the United States, these are referred to as government sponsored enterprises. They are private entities created for public purposes to reduce borrowing costs in certain sectors of the economy. The best known are Fannie Mae and Freddie Mac. They finance mortgage debt and were taken over and capitalized by the U.S. government in 2008.

Table 4.1  
Limits per Issuer

Issuer	Rating	Investment-portfolio limits
Sovereign Debt in Local Currency	AAA	No limit
	AA+, AA, AA-	No limit
	A+,A,A-	0.7%
Quasi-Governments and Sovereign in Non-Local Currency <sup>a/</sup>	AAA	No limit
	AA+, AA, AA-	6.3%
	A+,A,A-	0.3%
Local Authorities	AAA	4.6%
	AA+, AA, AA-	1.3%
	A+	0.3%
Corporate Issuers	AAA	3.3%
	AA+, AA, AA-	1.0%
	A+	0.3%

a/ Quasi-governments are government-related issuers (e.g., supranationals and agencies). Local authorities (e.g., states and provinces) are also included in this group, but have stricter limits.

Source: Banco de la República.

and terrorist financing are not combatted adequately. Only issues with senior (non-subordinated) payment priority in the event of liquidation are acceptable, and the maximum aggregate exposure to issuers other than the governments in the benchmark is 50% of the portfolio.

In addition to permanently monitoring the evolution of credit ratings and compliance with the limits for all issuers, the Bank keeps an eye on the maximum loss from events of default the portfolio can incur in a one-year horizon, with a certain level of confidence.<sup>17</sup> The purpose of this is to ensure the total risk of the portfolio is within the stipulated limits.

Besides the credit risk incurred with issuers, there is also a risk with custodians, current account correspondents abroad and futures agents. It concerns to the cash balance deposited with these entities. To reduce credit risk, there are limits on the balances in these accounts, and a minimum rating of A- is required.

17 This variable is quite similar to what is known in the literature as credit value at risk (or credit VaR). The main difference is that credit VaR calculates all possible returns related to increases or declines in credit ratings, while the measure calculated in this case concentrates only on the subset of events of default.

#### 4.4 Foreign Exchange Rate Risk

The level of foreign reserves is reported in U.S. dollars. Therefore, investments in euros, yen and other currencies are converted to U.S. dollars at the market exchange rates in effect at the time. This means the portfolio value expressed in dollars may decline if the currencies in which the investments are denominated depreciate against the U.S. dollar. This exposure to fluctuations in exchange rates is known as foreign exchange-rate risk.

Currency prices are highly volatile and often exhibit no defined long-term trend. It is, therefore, very difficult to forecast their behavior reliably. *Banco de la República* and most of the world's central banks have currencies other than the U.S. dollar in their exchange composition. Besides diversifying the portfolio, this also serves to cover the country's payments abroad. The impact of foreign exchange risk is alleviated with the equity account "exchange adjustment" referred to in Decree 2520/1993, Article 62, Paragraph 4 (Statutes of *Banco de la República*), which increases in years when reserve currencies strengthen against the Colombian peso, and decreases in years when they weaken against the peso. Accordingly, currency variations have no impact on the comprehensive income statement.

To invest reserves with a high degree of security and liquidity, investments are allowed in a number of currencies; namely, U.S. dollars, Canadian dollars, Australian dollars, New Zealand dollars, Hong Kong dollars, Singapore dollars, Swedish and Norwegian kronor, pound sterling, Swiss francs, euros, yen, renminbi and the Korean won. All these currencies have large public debt markets, are highly traded internationally, and are currencies of countries with credit ratings that meet *Banco de la República's* investment guidelines.

The foreign exchange composition of Colombia's foreign reserves is established primarily by defining the benchmark. The Foreign Reserves Committee determines the weight of each currency within the benchmark and the maximum permitted deviations from that index. Chapter V explains the concept of the benchmark and the determinants of the currency composition of the different tranches in the portfolio.

As of December 31, 2018, 87.35% of the investment portfolio was in U.S. dollars, 6.22% in Australian dollars, 3.06% in Canadian dollars, 1.1% in New Zealand dollars, 1.42% in Norwegian kroner and 0.85% in other currencies.

#### 4.5 Counterparty Risk

Counterparty risk is the possibility of incurring in losses related to a counterparty's default on a previously agreed purchase or sale



transaction. This may occur for different reasons, such as operating errors or counterparty credit events. Accordingly, “payment-on-delivery” mechanisms are used to reduce counterparty exposure in fixed income transactions, the idea being to exchange paper for cash simultaneously in order to mitigate the impact of a default. When trading fixed income instruments, counterparties are also required to be market makers in one of the countries whose currency is eligible for foreign reserves portfolios.

In the case of foreign exchange trading, *Banco de la República* relies on continuous linked settlement (CLS), which is internationally the most widely used payment-on-delivery mechanism for foreign exchange settlement. In addition, counterparties must have a minimum credit rating of A- if they have an ISDA framework agreement.<sup>18</sup> If they do not, the minimum rating is A+. In addition, foreign exchange transactions are performed in the short term, and limits on maximum exposure are set for each counterparty.

#### 4.6 Operational Risk

Operational risk is the prospect of loss due to a failure involving internal processes, technology, infrastructure, people or events originating from external sources or fraud.

In order to manage operational risk in a consistent manner with the policies defined for the Bank as a whole, the International Investments Department works jointly with the Office for Risk Management, which is part of the Office of the Deputy Executive Governor. The International Investments Department and the Booking and Control of International Settlements Department have documented critical operational processes and published them internally. They also have a database on past events and the follow-up done in each case, and there are contingency plans to deal with the possible effects of earthquakes or system failures. These plans are reviewed frequently. The Integral System for Operational Risk Management (SIARO for the Spanish acronym) is applied to estimate the probability and impact of operational risk of the main processes involved in reserves investment. The purpose of this is to identify if controls, tools or processes need to be improved.

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18 The framework agreement established by the International Swaps and Derivatives Association (ISDA) is designed to establish the terms and conditions governing over-the-counter derivatives traded between entities, including the procedures to be followed in the event of default.

#### **4.7 Legal Risk**

Exposure to contracts that are not legally enforceable or not documented properly, or to changes in legislation that affect the Bank's obligations is defined as legal risk. It is the responsibility of the Legal Foreign Affairs Unit, which is part of the Legal Department at *Banco de la República*, to review all contracts related to the management of foreign reserves. In doing so, it receives advice from specialized law firms in international financial legislation. The Sovereign Wealth Funds and Technical Support Section of the International Investments Department is responsible for supporting the Legal Foreign Affairs Unit by ensuring that contract terms and conditions reflect financial market practices and are compatible with the technical conditions of the transactions.

#### **4.8 Reputational Risk**

There is the possibility that reputation and credibility in the management of reserves might be questioned due to perceived mismanagement. To deal with this risk, the Bank has a solid infrastructure for the investment of reserves and is transparent with respect to its management policies. The two annual reports to the Congress, plus this report, which is published once every two years, also explain reserve management and its results.

# 05

## Benchmark and Portfolio Management

### 5.1 Definition

Most central banks manage their foreign reserves guided by a theoretical portfolio or benchmark. In capital markets, this concept refers to a basket of assets with predetermined weights, based on a number of rules defining their composition. Generally speaking, a benchmark tries to replicate broadly the behavior of a market of financial assets and serves as an indicator of the performance of other investment portfolios in that same market.<sup>19</sup> Most studies conclude the benchmark chosen for a portfolio explains at least 90% of the return on that portfolio, making it the most important decision any investor can make.

Since this is the main investment decision with respect to reserves, the process to choose the benchmark is founded on the best international practices. The International Monetary Fund, in its document entitled *Revised Guidelines for Foreign Exchange Reserve Management*, recommends “Sound investment decisions should be consistent with the chosen strategy and not be dictated by the reporting

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<sup>19</sup> For example, some of the best-known benchmarks in the market are the Colcap in Colombia, or the S&P500 and the Dow Jones in the United States.

and accounting framework.” This means the reserves investment strategy must have an adequate investment horizon, based on an assessment of the adequate level of reserves, the objectives for holding them and the risks to which they are exposed. Likewise, when indicating that reserve management should focus on portfolio performance as a whole, the International Monetary Fund states: “ investment decisions regarding specific assets should not be dictated by accounting issues regarding that specific asset (e.g., not having to sell a given asset because it would result in a book loss)”.<sup>20</sup>

These general principles are mirrored in the process *Banco de la República* uses to define theoretical portfolios or benchmarks to manage the reserves investment portfolio. Different benchmarks are constructed for the short and medium-term tranches to reflect different investment horizons. These benchmarks serve as a reference framework to measure the management of each portfolio.

The concept of a benchmark does not apply to the working capital of the reserves, since their objective is to meet immediate liquidity needs. For this reason, they are denominated in US dollars.

## 5.2 Composition

Having decided to use benchmarks for the investment tranche, the Bank needs to define its composition in terms of the currencies and the types of instruments.

### 5.2.1 Currency Composition

Several considerations should be considered when choosing the currency composition of reserves. To begin with, if one of the main objectives of accumulating reserves is to be able to intervene in the exchange market, the currency or currencies in the reserve portfolio should be of considerable importance to that intervention.

In light of this objective, working capital is invested entirely in U.S. dollars, which is the currency that it is used to intervene the exchange market.

Secondly, if reserves are to be used at a particular time to fulfill obligations in foreign currency with respect to trade in goods and services, as well as capital flows, the manner of balance-of-payments outflows will have to be considered. Accordingly, *Banco de la República* looks at aspects such as the prices of imported goods and the currency composition of the external debt, both public and

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<sup>20</sup> IMF Reserve Management Guidelines, <https://www.imf.org/external/np/pp/eng/2013/020113.pdf>, p. 18.

private. Because the short-term tranche is the first to be used to meet liquidity requirements in foreign currency, its currency composition seeks to replicate the behavior of balance-of-payments outflows, thereby providing coverage for Colombia's external payments. This allows the value of the short-term tranche to increase in periods when other currencies strengthen against the U.S. dollar, compensating for the fact that both the value of imports and the value of the country's external debt in those currencies grow when measured in U.S. dollars. Although transactions are conducted with many countries, only currencies with a high daily volume of trading, large public debt markets and high credit ratings are chosen.

The currency composition of the benchmark approved for the short-term tranche was as follows as of December 31, 2018: 82% U.S. dollars, 9% Australian dollars, 5% Canadian dollars, 2% New Zealand dollars and 2% Norwegian kroner.<sup>21</sup> This methodology has been used successfully to cover balance-of-payments outflows, since the value of the currencies that are part of the exchange composition frequently behaves much like the country's payments in foreign currency, both in periods of increase and decline.

With respect to the medium-term tranche, there is no restriction on currency composition because the objective is to maximize the risk-adjusted return in U.S. dollars, since this tranche is less likely to be used in the short term and U.S. dollars are the currency in which the level of reserves is reported. In the benchmark for this tranche, currencies other than the dollar are allowed as long as they help to fulfill the objective of the tranche. Currently, the benchmark for the medium-term tranche is 93% dollars, 3% pounds and 4% Australian dollars.

### 5.2.2 Eligible Instruments

The type and maturity of the instruments that are part of the benchmark portfolio will have to be defined once its currency composition has been decided. As part of this process, instruments that meet the conditions for reserves in terms of security and liquidity are selected. The only instruments currently eligible for the benchmark are the market's safest and most liquid assets: securities of the governments of developed countries with high credit ratings and issuers that have the support of those governments. Gold is also included in this process as an eligible asset, in order to find its optimal share of the investment portfolio.

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<sup>21</sup> Approved in November 2018. By the end of December 2018, it was still in the process of being implemented.

### 5.3 Construction

To construct a benchmark, the constraints on risk tolerance will have to be defined beforehand. Since there are many asset combinations with different levels of risk, the constraints allow the selected benchmark to have a tolerable level of risk for the institution (details on these restrictions are provided in Box 1 of this report). In the case of *Banco de la República*, any admissible solution must be 95% or more likely to yield positive returns and have an expected loss in value of under 1%. These constraints are quite conservative, as they imply the expected return is positive most of the time and, in extreme cases, when the return is negative, the loss is contained. The following is an explanation of how the constraint for each tranche is constructed.

- In the case of the benchmark for the short-term tranche, a 12-month horizon is defined to comply with the constraints that call for positive returns with a 95% level of confidence and the expected value of a possible loss not exceeding 1%, since this tranche is the one most likely to be used in the short term. The foreign exchange effect of the constraint on this tranche is excluded, since the decision on the foreign exchange composition aims for a similar volatility to that of the balance-of-payments outlays and not for a higher return.
- For the medium-term tranche, the constraints with respect to having positive returns with a 95% level of confidence and the expected value of a possible loss not exceeding 1%, are defined over a longer horizon (three years) to reflect the reduced probability of using the resources in this tranche and the quest for a higher return. Since the base currency of the medium-term tranche is the U.S. dollar, the constraint takes into account the foreign exchange risk generated by currencies other than the dollar.

The portfolio construction methodologies employed to estimate the benchmarks are commonly used worldwide.<sup>22</sup> The following optimization process is used, based on the foreign-exchange composition constraint for the short-term tranche, the set of eligible instruments and the constraints on risk tolerance:

- A set of portfolios or asset baskets that minimizes the risk posed to each expected level of return is constructed for each tranche.<sup>23</sup>

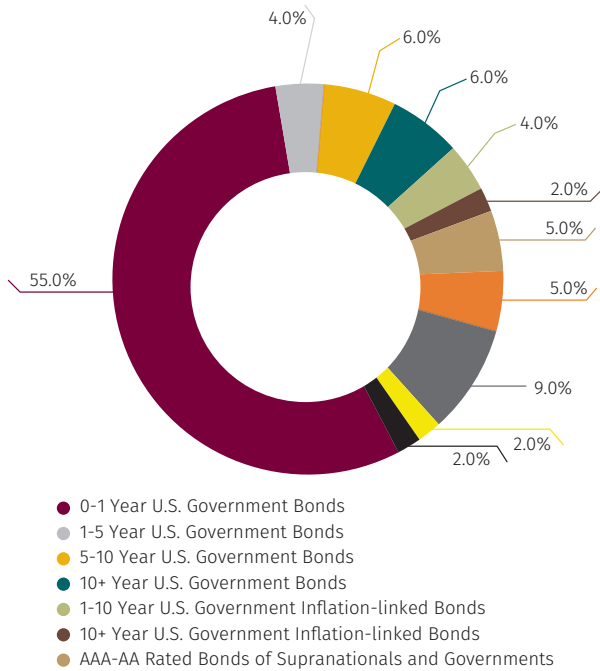
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22 The main methodology being used currently is known as Black-Litterman.

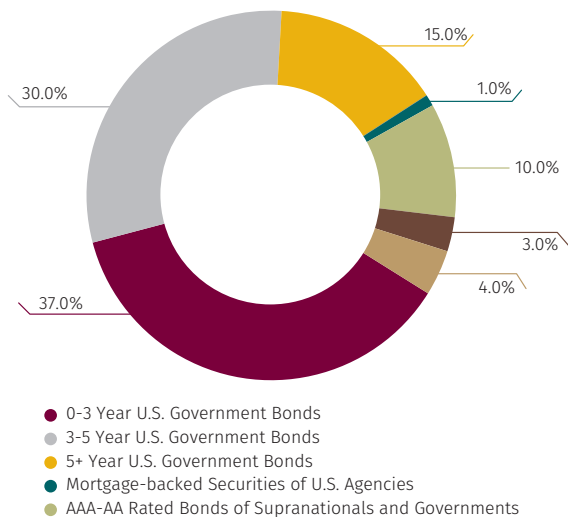
23 Known as the *efficient frontier*.

Graph 5.1  
Benchmark Composition

A. Benchmark Composition for the Short-Term Tranche



B. Benchmark Composition for the Medium-Term Tranche



Source: Banco de la República.

- The portfolio that maximizes the expected return for *Banco de la República* and complies with the risk-tolerance constraints is selected for each tranche.<sup>24</sup>

The results of this process are two theoretical portfolios that are used as benchmarks. The eligible assets used in their construction include asset baskets that have been prepared by specialized entities. Used widely and recognized internationally, these indexes have the advantage of being transparent, computable, replicable and up to date. The desired share of gold in the investment portfolio is also obtained with this exercise.

The current benchmarks and their components are shown in Graph 5.1. A large portion of both benchmarks is in short-term U.S. bonds, which have a low price volatility and are highly liquid. As of December 31, 2018, the modified duration of the two indexes was 2.21 for the short-term tranche and 2.60 for the medium-term tranche. This duration allows the portfolio to remain moderately sensitive to a hike in interest rates in the developed countries.<sup>25</sup>

24 The utility function takes into account the return on the portfolio, its risk or volatility, and a parameter that measures *Banco de la República's* risk aversion.

25 In November 2018, the Foreign Reserves Committee approved a new benchmark for the short and medium-term tranches. It had been implemented entirely by January 31, 2019. On that date, the modified duration of the two indexes was 2.7 for the short-term tranche and 4.14 for the medium-term tranche.

## 5.4 Passive and Active Management Mandates

The benchmark is a theoretical construction rather than a real portfolio. Consequently, policies for managing the portfolio based on that index will have to be defined. As mentioned earlier, considering the various reasons for holding foreign reserves, the most important components of the investment portfolio are the short and medium-term tranches, which have different benchmarks. There are two alternatives for managing the tranches against their benchmark: passive management and active management. These have different investment guidelines that set limits on the differences allowed with respect to the benchmark.

- Passive management seeks to replicate the composition of the benchmark. The investments in this tranche are mainly securities issued by the entities that make up the benchmark. As of December 31, 2018, the passive portfolio was valued at USD 27,750.86 m (59.80% of the investment portfolio). The working capital and the passive portfolio make up the short-term tranche. There is also a medium-term passive portfolio valued at USD 1,515.46 m (3.27% of the investment portfolio).
- Active management looks for a higher return than the benchmark. To achieve this objective, the composition of the active portfolios may be different from that of the index. Within a controlled-risk framework, the managers of these portfolios apply their expertise and resources to determine strategies to increase the long-term return on reserves. By the end of 2018, there were seven actively managed portfolios, totaling USD 12,319.57 m in value (30.55% of the investment portfolio). All actively managed portfolios are part of the medium-term tranche.

The Foreign Reserves Committee has determined that 28% to 38% of the portfolio is to be managed actively. This range allows for an adequate balance between the advantages of passive management (lower management costs and less risk in contrast to the benchmark) and the benefits of active management (higher expected returns and better portfolio diversification).

The actual returns on the reserve's investment portfolios are compared against the performance of the benchmark to determine if the portfolio managers have done their job successfully. In the case of passive management, the aim is for the portfolio to perform similarly to the benchmark. In contrast, the challenge for active management is to obtain a higher return than the index, in keeping with the investment guidelines defined by the Foreign Reserves Committee and a controlled risk budget.



## 5.5 Performance Measurement and Attribution

Reserves investment portfolio performance is measured through daily valuation at market prices (mark to market). A time-weighted daily rate of return is used to calculate the monthly returns.<sup>26</sup>

Performance is measured daily and reported to the Foreign Reserves Committee for horizons that range from monthly to year-to-date, full year and three years, using U.S. dollars as the base currency and without taking into account movements against the U.S. dollar of the currencies in which the reserves are invested.<sup>27</sup> This calculation is done for both the benchmark and the portfolios; therefore, absolute and relative returns can be measured against their respective index. The net returns are calculated from the gross returns by deducting the fees charged by the external managers.

Performance attribution is used to determine the most important factors that explain the absolute and relative returns on portfolios. This is done with a multifactorial risk model, which allows the return on individual securities, portfolios, mandates and programs to be allocated by factors such as the movement in interest rates, in types of assets other than government bonds, and in currencies. It also permits an integrated analysis of returns and risk factors to determine the efficiency of investment strategies.

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26 The time-weighted daily rate of return calculates the daily change in the value of the portfolio, excluding portfolio withdrawals or additions. The return for any period is calculated by geometric compounding of the daily returns. This is the methodology recommended by the CFA Institute, which is among the world's leading associations of investment professionals. One of its objectives is to publicize common standards used to measure portfolio performance.

27 The majority of private portfolio managers report their profits in the clients' local currency. Central banks, however, use a foreign currency (the US dollar or the euro): in most cases, it is the one used for the intervention.

# Box 1 Constraints on Market Risk in the Optimization Process

Market risk in a portfolio materializes when the prices of its component assets decline. In the case of a fixed income portfolio, such as the one for foreign reserves, this occurs when interest rates increase in the markets where those assets are traded. To control market risk in the foreign reserves portfolio, constraints are established as part of the process to optimize and construct benchmarks for several market-risk measures.

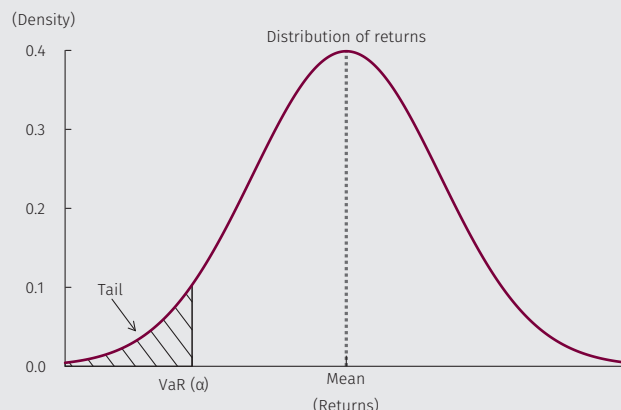
## 1. Measures of Market Risk in Portfolios: VaR and CVaR

One of the most widely used market risk measures in finance is value at risk (VaR). It quantifies, with a given confidence level and time horizon, the maximum loss a portfolio could incur. Graph B1.1 is a representation of how VaR would look in a generic distribution of returns: the solid vertical line represents the point from which, to the left, the confidence level ( $\alpha$ )<sup>1</sup> of the distribution of accumulated returns is established, while the value on the horizontal axis where this cut is located is the VaR.

VaR is a measure that identifies where the tail of the distribution of returns is located. However, it does not provide information on the losses the portfolio would incur when extreme situations arise; that is, when the threshold of the value at risk is exceeded. So, for a better idea of the behavior of the distribution of returns in extreme scenarios, the conditional value at risk (CVaR) is calculated to quantify the expected loss in the distribution tail. Graph B1.2 is a representation of the VaR and the CVaR of a generic parametric distribution.

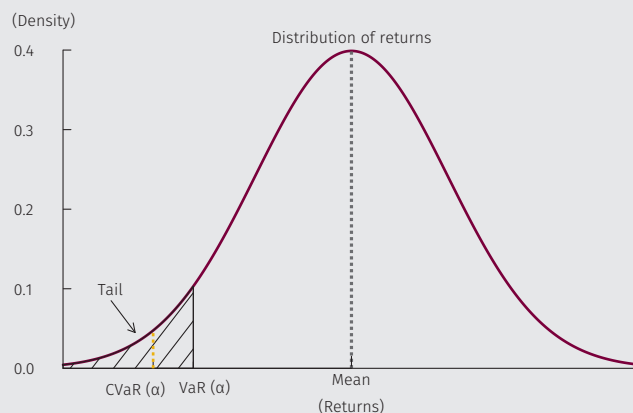
Graph B1.3 shows two parametric distributions with risk and return characteristics that lead to the same VaR. However, the distribution with the highest standard deviation (burgundy line) has a more negative CVaR than the distribution

Graph B1.1  
Representation of the VaR



Source: Banco de la República.

Graph B1.2  
Representation of the CVaR



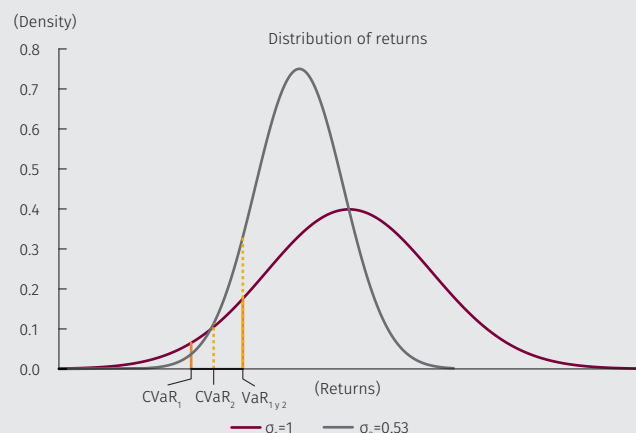
Source: Banco de la República.

with the lowest standard deviation (grey line), which means larger losses could materialize there. Controlling only the VaR of the distribution of returns can result in the model being indifferent between distributions with risk and return profiles that, under certain market conditions, may have exposure to possible losses beyond the desired level for the type of managed portfolio.

There are different methods for calculating VaR and CVaR. These include, among others, using the empirical distribution of returns, approximating the empirical distribution to a theoretical distribution (parametric approximation) and deducing the future distribution of returns, based on theoretical arguments. A popular one, because it is easy to implement, is the normal or Gaussian distribution. There are analytical formulas to calculate VaR and CVaR by approximating the distribution of returns and, therefore, losses, to a normal distribution. If the mean (annualized) of the distribution of returns is  $\mu$  and the standard deviation (annualized) is  $\sigma$ , we can define the value at risk and the conditional value at risk as:

<sup>1</sup> The typical percentages are 1.5 and 10; in other words,  $\alpha$  is 1%, 5% or 10%.

Graph B1.3  
Two distributions with the same VaR and a different CVaR



Source: Banco de la República.

$$VaR_{\alpha}(X, T) = \mu * T + \sigma * \sqrt{T} * z_{\alpha}$$

$$CVaR_{\alpha}(X, T) = \mu * T - \sigma * \sqrt{T} * \phi(z_{\alpha}) / \alpha$$

Where  $z_{\alpha}$  is the quantile with level of confidence  $\alpha$  and  $\phi(z)$  is the density function of a standard normal variable.

A parametric approximation of the distribution of returns to a multivariate normal distribution is used in the exercise to determine the strategic asset allocation of the foreign reserves portfolio. This requires estimating the mean vector of the expected returns on the assets and the covariance matrix of those returns.

## 2. Constraints on VaR and CVaR in Constructing Foreign Reserve Indexes

The following are the constraints established for VaR and CVaR in the exercise to optimize and construct benchmarks for each tranche in the investment portfolio:

1. *VaR constraint*: limits portfolio risk to prevent losses in 95% of the cases within the investment horizon. This is equivalent to constraining VaR to zero in the distribution of returns, with a 5% level of confidence.
2. *CVaR constraint*: this second constraint is intended to limit possible losses in extreme portfolio scenarios to 1% within the investment horizon. This is equivalent to constraining CVaR to -1%, with a 5% level of confidence.

Both constraints are applied in the optimization process. However, depending on market conditions (expected returns, volatility and correlations between assets), one of these two will be the one that actually limits the result. Having both constraints on portfolios ensures the market-risk profile remains low in different scenarios. The results of the 2018 strategic asset allocation exercise for foreign reserves are presented in Table B1.1. One can observe the active constraint for the short-term tranche is VaR/loss probability, while the active constraint for the medium-term tranche is the CVaR.

Table B1.1  
Risk Measures for each tranche in the period 2018

	Modified Duration	Return Deviation (annualized)	Horizon (years)	$VaR_{5\%}$	$p(r < 0)$	$CVaR_{5\%}$
Short-term Tranche	2.55	1.64	1	0.00	5.00	-0.60
Medium-term Tranche	4.13	3.02	3	1.35	2.83	-1.00

Source: Banco de la República.

# 06

## External Management Program

The Sub-Directorate for Portfolio Management of the International Investments Department manages the working capital, the passive portfolio of the short-term tranche, the gold tranche and a portion of the medium-term tranche, which accounts for USD 33,327.09 m.<sup>28</sup> The external management program was adopted by the Foreign Reserves Committee in 1994 to manage all other resources.

The external managers are firms specialized in the management of investment portfolios, and many central banks use them to manage their foreign reserves. In part, they do so to improve the professionalism with which their portfolios are managed, but also because of the access to international market analysis the professionals of these entities can provide, as well as the training given to central bank staff members who are involved in reserve management.

Because the external managers actively manage portfolios, they are authorized to invest in different assets and in proportions different from the benchmark, according to the investment policies and limits established by the Foreign Reserves Committee, which are known as *investment guidelines*. Contractually speaking, the external managers are responsible for any costs occasioned by deviations from the investment guidelines.

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<sup>28</sup> The internally managed medium-term tranche portfolio is managed in the same way as the portfolios in the external management program, but with stricter limits.

The Foreign Reserves Committee defines the parameters for assessing the external managers and monitors these indicators regularly.

External managers are hired to add value to the reserve investment portfolio via more diversified investment. The selected firms are experienced and well versed in the world's financial markets, and have sophisticated infrastructure, all of which can be useful to define investment strategies for foreign reserves. The assets managed by external firms are located in custody accounts managed by *Banco de la República*, and the contracts with these managers may be terminated at any time if decided by the Foreign Reserves Committee.

The external management program has generated the following benefits for *Banco de la República*:

- In the last ten years, the net return (after fees) on the external management program has exceeded its benchmark by 22 basis points (bps) per year, on average. In other words, the objective of adding value to reserve management has been achieved with this strategy.
- Portfolio risk is managed more efficiently by having diversified investment strategies with the different managers.
- The external managers have analytical capacity that has enabled them to select investments with a good risk/return profile, consistent with what is permitted by the investment guidelines.
- The external managers have trained officers of the Bank, thereby contributing to the development of qualified staff. This assistance also has improved the investment processes used by the International Investments Department and furthered its capacity for risk analysis.
- The International Investments Department receives information and analysis from professionals who are experts in the financial markets where the country's reserves are invested. Moreover, the firms participating in the program have a sound group of credit analysts, which makes it possible to complement and expand the information on issuers provided by the credit rating agencies.

The external managers are allowed to deviate from the benchmark through interest-rate and foreign exchange-rate strategies. Interest-rate strategies consist of buying or selling bonds according to how interest rates are expected to behave, while foreign exchange-rate strategies call for the foreign exchange composition of the portfolio to be modified, depending on how currencies are expected to behave. The Bank monitors the externally managed portfolios on a

daily basis to make sure the managers comply with the established limits.

The firms participating in the external management program with dedicated portfolios as of December 31, 2018 were JPMorgan Asset Management (UK) Limited, DWS International GmbH, Goldman Sachs Asset Management L.P., BNP Paribas Asset Management USA Inc., UBS Asset Management (Americas) Inc. and Pacific Investment Management Company LLC (Table 6.1). The objective of having several external managers is that the program, as a whole, outperforms the benchmark with a low level of risk. This is possible through diversification.

The external managers with dedicated portfolios are assessed at the following stages:

- *Selection process:* External managers are chosen from among the top international firms specializing in fixed income portfolio management. The candidates must respond to a request for proposal (RFP) that is intended to evaluate aspects such as the company's structure, organization, investment process, risk management, reporting, technology transfer and training services, and historical returns. The last stage of the selection process consists of a visit to the finalists. The ultimate decision is based on the fees quoted and the scores derived from the entire selection process. The Foreign Reserves Committee decided the process for selecting external managers should be done at least every three years.
- *Regular assessment:* Once the management agreement takes effect, the Bank begins to monitor the manager closely, and reports on its performance are submitted to the Foreign Reserves Committee on a bimonthly basis, at the very least. Additionally, the Foreign Reserves Committee requires a thorough evaluation of the first three years' performance for each manager. This period was selected in order to have enough information for an appropriate evaluation. After the first three years, each manager is assessed, in detail, on a yearly basis. The criteria for this monitoring include returns, a review of the investment and risk-management process, and aspects concerning the firm's operation and service. Depending on the results of each manager's assessment, the Bank may decide to modify the delegated amount or cancel the agreement. Firms with the best annual assessments manage the largest portfolios, depending on the amount of time they have worked with the Bank.

The Foreign Reserves Committee has decided to have eight actively managed portfolios. One of them is managed by the Bank's Sub-Directorate for Portfolio Management and the other seven by external

managers.<sup>29</sup> Both the number of managers and the share of the portfolio being managed actively are the result of consideration given to the following factors:

- Having only a few managers is not efficient. There is an important diversification benefit of having several active management portfolios, since the unfavorable results of one manager can be offset by the favorable results of others. To the extent that there are more managers, diversification allows for less risk overall.
- Having numerous managers is not efficient either. Working with many firms decreases the value of the assets managed by each of them, incurring in higher costs for management fees.

Table 6.1  
External Managers of the Foreign Reserves

Firm	Amount Managed (Millions of U.S. Dollars)
DWS International GmbH	1,870.46
BNP Paribas Asset Management USA Inc.	1,855.62
Goldman Sachs Asset Management L.P.	2,614.78
JPMorgan Asset Management (UK) Limited	2,236.28
Pacific Investment Management Company LLC	1,507.72
UBS Asset Management (Americas) Inc.	2,234.72
Total	12,319.57

Source: Banco de la República, December 2018

In addition to the firms listed in Table 6.1, a small share of the country's reserves is invested in funds managed by the Bank for International Settlements (BIS), to which only central banks and multilateral agencies have access. Its purpose is to diversify foreign reserves through a cooperative effort among various countries. As of December 31, 2018, these investments included the inflation-indexed securities fund (BIS investment pool series ILF1: BISIP ILF1), which amounted to USD 108.74 m; the fund invested in securities issued by the government and the Central Bank of the People's Republic of China (BIS investment pool: BISIP CNY), which amounted to USD 256.08 m; USD 107.08 m in the Korea Sovereign Debt Securities Fund (BIS investment pool: BISIP W), and the global corporate debt

investment fund denominated in US dollars (BIS investment pool: BISIP Y), which amounted to USD 250.87 m. Banco de la República has been a member of the BIS since December 2011, and one of the objectives of this multilateral entity is to help charts develop their capability to manage foreign reserves.

<sup>29</sup> At the end of December 2018, the external management program had six managers and one in the process of being hired.

# 07

## Current Situation of Colombia's Foreign Reserves

The country's net foreign reserves <sup>30</sup> totaled USD 48,392.92 m as of December 31, 2018. Graph 7.1 shows how the Colombia's foreign reserves have evolved over the last 12 years.

### 7.1 Payment-capacity Indicators

In view of the fact that foreign reserves help to protect the country from external shocks, which can come from the current account or the capital account, reserves indicators should focus on the variables that measure shocks of this type. Current-account shocks can originate with a drastic reduction in exports that makes it more difficult to pay for imports. Capital-account shocks are caused by difficulties in obtaining foreign financing, such as reduced access to international credit, or higher capital outflows from both foreigners and residents.

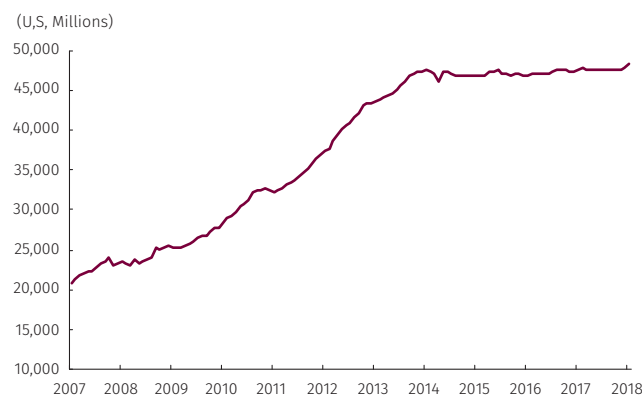
The Bank's strategy for accumulating foreign reserves recognizes the importance of having enough international liquidity to deal with outflows of capital from the country, which could be provoked by factors such as deterioration in

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<sup>30</sup> The net reserves are equal to the total amount of foreign reserves (or gross reserves), less the Bank's short-term external liabilities. These are sight obligations in foreign currency with non-resident agents.



Graph 7.1  
Net Foreign Reserves



Source: Banco de la República.

terms of trade, financial panic or financial crisis in neighboring countries. This being the case, having an adequate level of foreign reserves also helps to improve confidence in the country and, thus, to cope more successfully with a crisis in foreign markets. The current methodology used to determine the adequate level of external liquidity is described in the March 2019 edition of the *Report to Congress* (pg. 78).

A variety of external-vulnerability indicators are used to determine if a country's foreign reserves are sufficient to prevent and combat external shocks. The main ones are the ratio of foreign reserves to monetary aggregates and the ratio of reserves to foreign-debt payments in the following 12 months, plus the current-account deficit. The objective in weighing reserves against monetary aggregates, such as M2 or M3, is to determine the economy's capacity to respond to capital outflows provoked by a speculative attack. For its part, the ratio of reserves to short-term external debt, plus the current account deficit, indicates the country's capacity to respond to its credit obligations with the rest of the world in an extreme scenario where access to international financing is closed off entirely. Although the reserves-to-GDP indicator is used as a benchmark in some cases, it is less relevant because vulnerability to external shocks depends not so much on the size of the economy as on the country's trade and financial integration with the rest of the world. Generally speaking, international markets regard low values for these indicators as possible warning signs of the external vulnerability of the economies being analyzed.

Table 7.1 shows several indicators of foreign reserves for the Colombian case. Also included is the reserve adequacy indicator calculated by the International Monetary Fund (IMF) for a number of countries, aggregating different sources of balance-of-payments risk into a single indicator.<sup>31</sup> The literature warns the likelihood of crisis is greater if the indicators of reserves to short-term debt are below one. In the

31 The IMF's adequate level-of-reserve indicator includes the following variables as sources of balance-of-payments vulnerability: exports, short-term debt, monetary aggregates and other portfolio liabilities. The IMF establishes standard weights for each of these variables, according to what is observed in different countries during periods of pressure on the exchange rate. The suggested weights for countries with fixed exchange rates are 30% of short-term debt, 20% of other portfolio obligations, 10% of M2 and 10% of exports. For countries with floating exchange rates, they are 30%, 15%, 5% and 5%, respectively. The IMF considers a country's level of reserves to be adequate if it is between 1.0 and 1.5 of the estimated metric. The IMF document explaining this indicator can be found at: <http://www.imf.org/external/np/pp/eng/2011/021411b.pdf>

**Table 7.1**  
Payment-Capacity Indicators of the Foreign Reserves (FR)

	2014	2015	2016	2017	2018
FR/M3 (percentage)	30.4	35.4	31.5	29.8	31.1
FR/GDP (percentage)	12.4	15.9	16.5	15.3	14.7
FR in months of imports	7.5	8.7	10.3	10.1	9.2
FR/foreign debt service	1.84	1.61	1.64	1.34	1.27
FR/foreign debt amortization	2.18	1.90	1.96	1.58	1.52
FR/(foreign debt amortization + current account deficit)	1.14	1.08	1.30	1.18	1.09
FR/adequate level measure (IMF)	1.49	1.56	1.37	1.35	1.30

Sources: Banco de la República and the International Monetary Fund

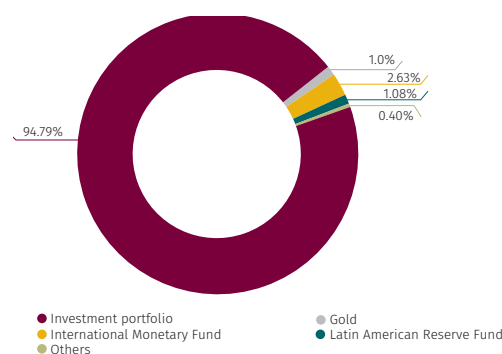
case of the IMF indicator, the recommendation is that it lies between 1 and 1.5.

According to these indicators, Colombia has an adequate level of reserves, as illustrated in the last rows in Table 7.1. Specifically, it shows the country currently has enough foreign reserves to cover short-term external debt payments and the country's current account deficit for more than one year.

## 7.2 Composition of the Foreign Reserves

Gross foreign reserves amounted to USD 48,401.50 m and short-term external liabilities, to USD 8.58 m. Net foreign reserves<sup>32</sup> amounted to USD 48,392.92 m at December 31, 2018. The main component of the country's gross foreign reserves is the investment portfolio without gold, which accounts for 94.78% of the total (USD 45,878.83 m). The remaining balance is distributed as follows: 1) the IMF quota and special drawing rights (SDRs) (USD 1,273.62 m); 2) contributions to FLAR (USD 524.68 m); 3) gold investments (USD 529.29 m); 4) contributions to the international agreement with Aladi (USD 62), and 5) others (USD 195.08 m).<sup>33</sup> Chart 7.2 shows the composition of foreign reserves.

**Graph 7.2**  
Composition of Gross Foreign Reserves



Source: Banco de la República.

32 Net reserves are equal to total international reserves (gross reserves), less the Bank's short-term external liabilities. These liabilities include sight obligations in foreign currency to non-resident agents.

33 "Others" include cash on hand and demand deposits.

### 7.3 Composition of the Foreign Reserves Investment Portfolio

Graph 7.3 shows the composition of the investment portfolio, detailing the portfolios managed internally and externally. The passive portfolio of the short-term tranche represents the largest share, while each of the medium-term tranche portfolios occupies a relatively small share.

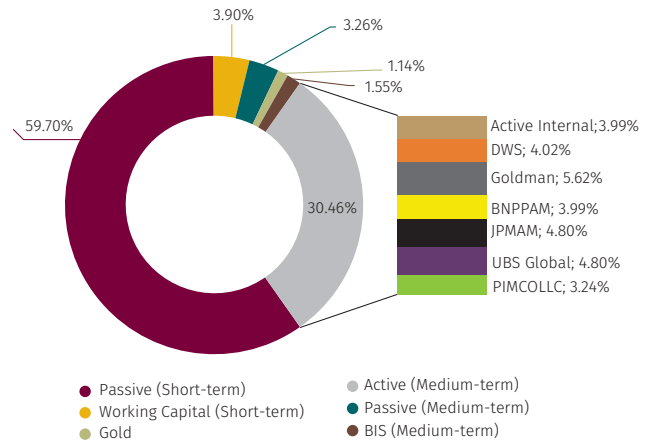
Graph 7.4 shows the composition of the investment portfolio by sector. The 97.8% of this portfolio is invested in securities issued by governments or government-related entities (quasi-government and mortgage agencies).<sup>34</sup>

Graph 7.5 shows the foreign-exchange composition of the investment portfolio. U.S. dollars account for 87.36% of the portfolio, while the remainder is invested in heavily traded currencies<sup>35</sup> backed by governments with high credit ratings.

### 7.4 Main Financial Risk Indicators of Foreign Reserves

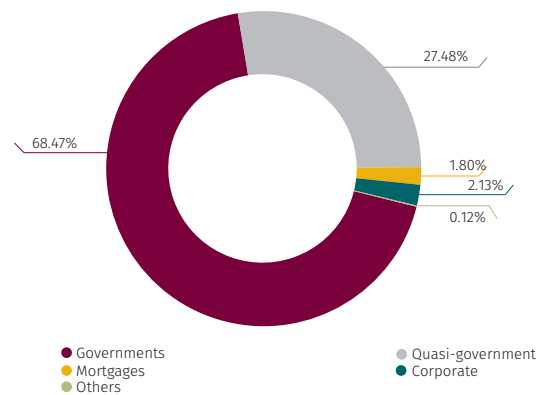
The duration of the investment portfolio was 2.31<sup>36</sup> by the end of 2018, which means the value of the reserves could lose 2.31% in response to an increase of 1% in the rates of all the bonds in the portfolio. Moreover, the value of the reserves is unlikely to lose more than 0.11% in one day (this measure is known in the financial

Graph 7.3  
Composition of the Investment Portfolio



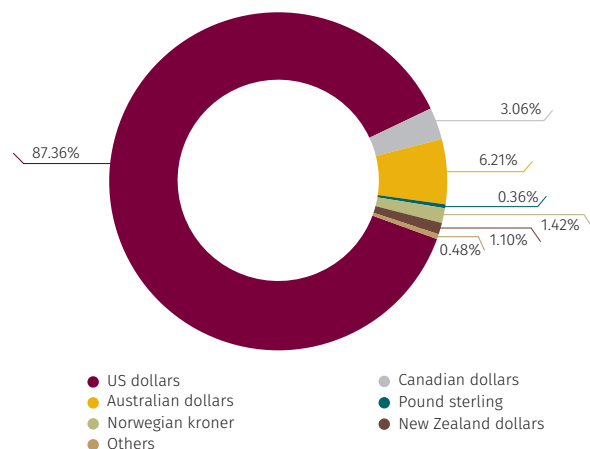
Source: Banco de la República.

Graph 7.4  
Composition of the Investment Portfolio by Sectors



Source: Banco de la República.

Graph 7.5  
Foreign exchange Composition of the Investment Portfolio



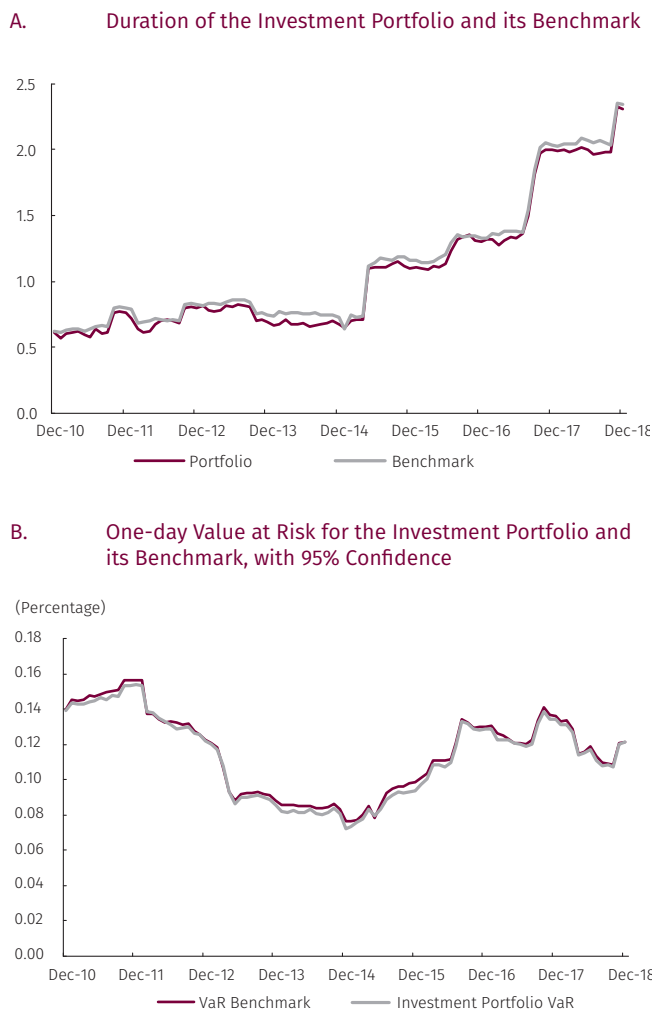
Source: Banco de la República.

34 The securities in question are issued by government-backed or government-sponsored entities (e.g., Fannie Mae and Freddie Mac), supranational organizations (e.g., the World Bank and the Inter-American Development Bank) and local governments (v.g., cities and states), among others.

35 Canadian, Australian, New Zealand, Hong Kong and Singapore dollars, Swedish kroner, pounds, Swiss francs, euros, yen, Norwegian kroner, Chinese renminbi and South Korean won.

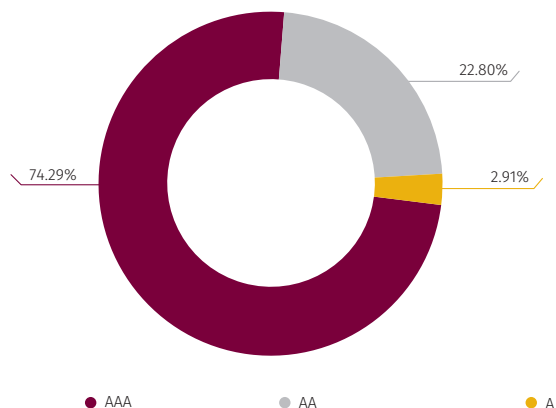
36 The measure reported is the effective duration. It is calculated by finding the prices of all securities in the portfolio in response to a uniform change in interest rates. This is a more robust measure than the modified duration, because it allows for considering the behavior of securities with embedded options.

**Graph 7.6**  
Market-risk Indicators for Reserves



Source: Banco de la República.

**Graph 7.7**  
Distribution by Credit Ratings of the Investment Portfolio



Source: Banco de la República.

literature as value at risk or one-day VaR, with a 95% level of confidence).<sup>37</sup> Both measurements are low, which implies the foreign reserves portfolio has a moderate market risk or sensitivity to a change in prices. Graph 7.6 shows how both these measures have evolved historically in terms of the benchmark, as well as the portfolio. The increase in the duration of the investment portfolio at the end of 2017 and 2018 was due to an increase in the duration of the benchmark for the short and medium-term tranches. The rise in short-term interest rates in the United States, which implies more accrued interest and more capacity to assume market risk and invest in assets with more volatility, is the main factor behind these changes.

The high credit quality of the investment portfolio is illustrated in Graph 7.7. Most of the investments are AAA rated, since this is the rating on U.S. government issues. There is little risk of credit events occurring with these issuers, inasmuch as the historical figures show 0% probability of default in one year for sovereign issuers and regional-local authorities rated A- or above, while the probability is 0.09% for corporate issuers rated AA (including AA-), and 0.11% for those rated A.

## 7.5 Historical Returns of Foreign Reserves

The level of foreign reserves in dollars fluctuates mainly because of three factors: intervention in the foreign exchange market, fluctuations in exchange rates, and profitability. The behavior of each of these factors in the last ten years is described below.

<sup>37</sup> Value-at-risk (or VaR) is calculated by assuming that market prices behave in keeping with their historical trend (statistically, returns on assets are presumed to follow a normal distribution). In extreme cases; namely, in instances not observed historically up to that point (e.g., the financial crisis in 2008), the percentage decrease could be higher.

### 7.5.1 Foreign Exchange-Market Intervention

Chart 7.8 shows the Bank's intervention in the foreign exchange market. The positive values represent net purchases of reserves during the year, while the negative values represent net sales. Intervention has been the main factor behind the increase in reserves during the last ten years.

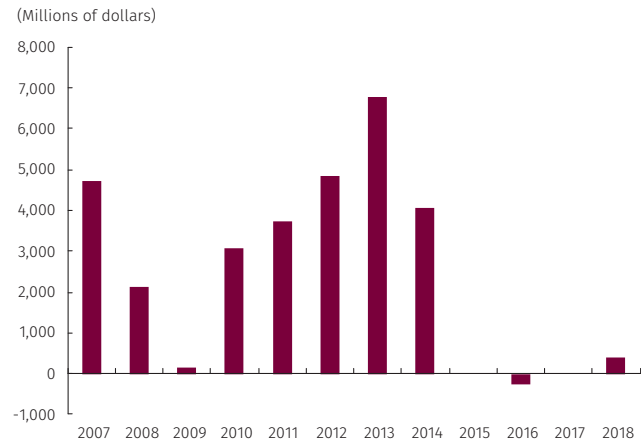
### 7.5.2 Foreign Reserves' Variation Due to the Foreign Exchange Differential

The country's foreign reserves are measured in U.S. dollars. Therefore, the value of reserve investments in other currencies is modified by changes in exchange rates. *Banco de la República* has set up an equity account for currencies fluctuation; it increases in years when other currencies strengthen against the dollar and decreases when they weaken. This means the comprehensive income statement is not affected by fluctuations in exchange rates. As explained earlier, the decision on foreign exchange composition focuses primarily on hedging the foreign exchange risk of the balance of payments, rather than on obtaining positive returns. Graph 7.9 shows the variations in foreign reserves according to the foreign exchange differential and the US dollar index (DXY), which measures the behavior of the dollar against the main currencies of developed countries. One sees the US dollar has appreciated in the last ten years, thereby reducing the U.S dollar value of investments of reserves in other currencies.

### 7.5.3 Return on Reserves

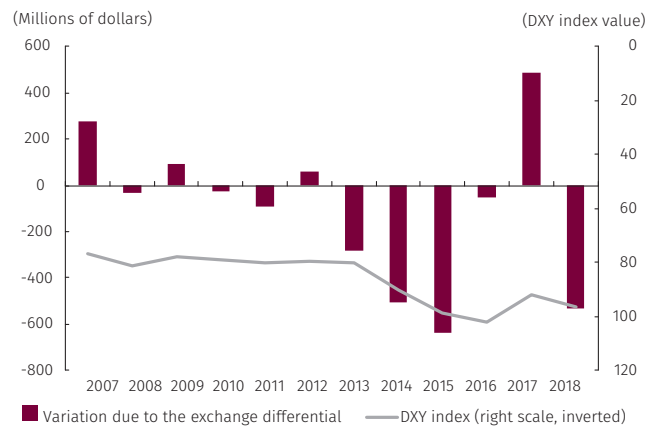
The profit the Bank obtains by managing foreign reserves is generated within a framework where security is paramount. The decision to have a portfolio with a conservative risk profile implies receiving less return in the long term, as opposed to portfolios that have a higher level of risk. According to the basic financial theory of portfolio management, investors who want less risk must expect fewer returns. The return on foreign reserves depends largely on two factors: interest rates and how the price of gold behaves.

Graph 7.8  
Banco de la República's Intervention in the Foreign Exchange Market



Source: Banco de la República.

Graph 7.9  
Foreign Reserves' variation due to the Foreign Exchange Differential



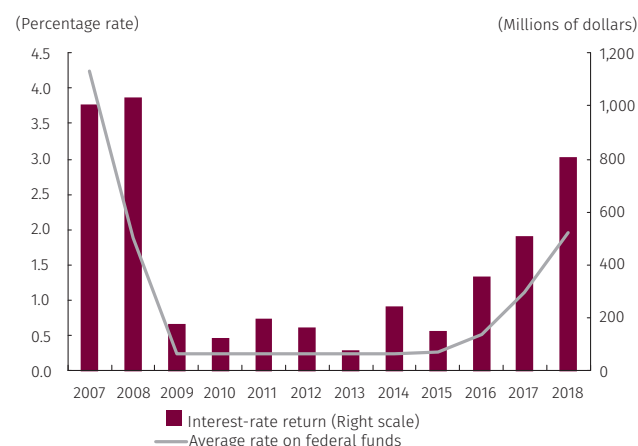
Source: Banco de la República.

The interest-rate yield comes primarily from returns on the debt securities in which the reserves are invested. These securities pay interest to investors and their market price varies. Debt securities can be sold prior to maturity, which is an important feature; however, interest rates are constantly changing in the market, while most securities pay a fixed interest rate. Thus, a decline in market interest rates raises the price of debt securities, as they become relatively more attractive with a higher fixed interest rate. The opposite occurs when market interest rates rise; in this case, the price of debt securities declines, since they become relatively less attractive due to their lower fixed interest rate. In the end, there is an inverse relationship between the price of a bond and the interest rate.<sup>38</sup>

The primary factor that determines the yield on debt securities, due to interest as well as price changes, is the central bank's monetary policy. This is because it tends to move all interest rates on instruments issued in a particular currency in the same direction. In terms of the interest received for holding a debt security, income is higher when interest rates are high and lower when they are low. With respect to the prices of debt securities, these rise when facing a decline in interest rates and fall when interest rates increase.

Graph 7.10 shows the profitability of foreign reserves due to the interest rate component and the U.S. benchmark interest rate (on federal funds) during the last ten years. As illustrated, the interest-rate yield during the last decade was positive but influenced by monetary policy in the United States. Relatively high profitability was observed between 2007 and 2008, due to the cuts in the benchmark interest rate ruled by the Federal Reserve (the central bank in the United States) in response to the global financial crisis, which caused bond prices to rise. Between 2009 and 2014, profitability due to interest rates was low because the Federal Reserve decided to keep the benchmark rate between 0% and 0.25% to stimulate the economy, which provoked low coupon payments without significant variations in prices. Since 2015, the reference interest rate of monetary policy has increased gradually, reaching a range of 2.25%

Graph 7.10  
Interest Rate Returns on Foreign Reserves



Source: Banco de la República.

38 The inverse relationship between the price of a bond and the interest rate can be also explained mathematically. The price of a fixed income instrument is defined as the present value of cash flows, discounted at a specific interest rate or rate of return, as shown in the following formula:  $P = \sum_{t=1}^n \frac{FC_t}{(1+i)^t}$ , where  $P$  = price of the instrument;  $FC$  = cash flow (coupons and principal);  $i$  = rate of return on the instrument; and  $n$  = number of periods.

to 2.50% in 2018. The gradual hike in the interest rate meant a decline in investment prices, which was offset by higher coupon payments. This allowed for a consistent increase in the profitability of foreign reserves between 2015 and 2018.

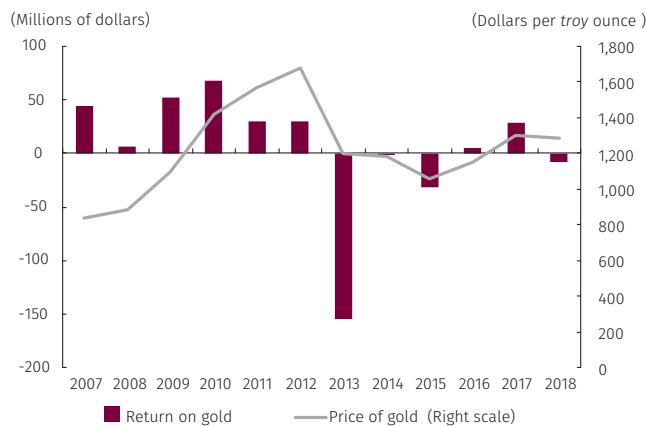
The second factor affecting the return on reserves is the change in the price of gold, since all foreign reserves assets are valued at market prices. Like most central banks, *Banco de la República* has a portion of its reserves in gold. However, it is a small share (1.09%). Accordingly, gold contributes much less to the return on the portfolio than fixed income instruments. Graph 7.11 shows the return on gold and the behavior of gold prices.

Between 2007 and 2012, the price of this metal increased every year, translating into positive returns on foreign reserves due to this concept. In 2013, the international price of gold dropped sharply, negatively affecting returns. Since 2014, the price of gold has been less volatile, contributing to more moderate returns on foreign reserves.

Graph 7.12 shows historical returns on foreign reserves,<sup>39</sup> which combines the two components discussed above: interest rates and the price of gold. A downward trend in returns was observed between 2007 and 2013; however, these have recovered since 2014, both in dollars and in the yield rate.

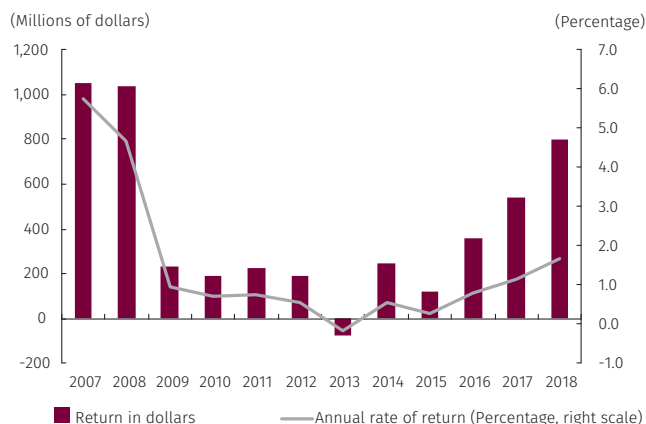
Finally, Table 7.2 shows the return on the portfolio tranches and the benchmark, including the effect of changes in the exchange rates against the U.S. dollar. This information illustrates how the tranches performed in light of their respective benchmarks. One sees passive management has generated returns similar to those of the benchmark in three and ten years, while active management has surpassed it.

**Graph 7.11**  
Returns Due to Changes in the Gold Price



Source: Banco de la República.

**Graph 7.12**  
Historical Return on Foreign Reserves



Source: Banco de la República.

39 The annual rate of return is calculated by using the total return for each year in dollars, as reported by the Accounting Department, and finding the average between the value of net reserves as of December 31 of the year in question and their value on the same date the year before.



Table 7.2  
Rates of Return on the Investment Portfolio Tranches, including the Foreign Exchange Rate Effect  
(Percentage)

	Annualized Portfolio Returns in the Last Three Years (2016-2018)			Annualized Portfolio Returns in the Last Ten Years (2009-2018)		
	Portfolio	Bench-mark	Difference	Portfolio	Bench-mark	Difference
Aggregate Portfolio, without gold	1.11	1.05	0.07	0.37	0.26	0.11
Passive Portfolio	1.07	1.03	0.04	0.23	0.23	0.00
Active Portfolio <sup>a/</sup>	1.09	0.95	0.14	0.53	0.31	0.22

<sup>a/</sup> Return, less management fees.  
Source: Banco de la República.



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This Report was coordinated, edited,  
and designed by the Publications  
Management Section of the  
Administrative Services Department, with  
font Fira Sans 10.5.

Printed by Nomos

November 2018

