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# FOREIGN RESERVES MANAGEMENT

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# FOREIGN RESERVES MANAGEMENT

*Banco de la República*  
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**FOREIGN  
RESERVES**  
MANAGEMENT



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# Glossary

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**Digital assets:** Representations of value that exclusively exist in digital form and that can be owned, transferred, or exchanged electronically. They include cryptocurrencies, tokens, digitized financial assets, and other instruments based on blockchain technology or distributed ledger systems.

**High Quality Liquid Assets (HQLA):** Classification established by the Basel Committee on Banking Supervision that refers to those assets that can be readily and immediately converted into cash without incurring losses in value.

**Monetary aggregates:** Measures of the total money supply in an economy. The key monetary aggregates are M1, M2, and M3.

**EM algorithm (Expectation – Maximization):** An iterative method used to estimate parameters in models with latent variables or incomplete data. It alternates between a stage that estimates hidden variables and another that updates the model parameters. This method is used in state-space models.

**Arbitrage:** A practice aimed at exploiting price differentials of the same asset across different financial markets to generate returns.

**Implied temperature rise:** A metric that indicates the increase in global temperature, measured in degrees Celsius (°C), that is likely to occur by the beginning of the next century if the entire economy follows the same emissions trajectory as the firm in terms of exceeding or failing to meet the carbon budget required to keep global temperature below 2°C.

**Back office:** The area of a portfolio management organization responsible for the confirmation, reconciliation, clearing, settlement, and keeping accounting record of operations carried out during the investment process, including the operational aspects of the relationship with counterparties.

**Balance of payments:** A record of all transactions between a country and the rest of the world. It includes information on the value of trade in goods and services, as well as transfer payments.

**Correspondent banks:** Institutions that make or receive payments and provide other services on behalf of another bank abroad. These include treasury correspondents.

**Bond:** A financial debt contract in the form of a security that stipulates, on a specified future date, the repayment of a specified amount of capital or principal, plus the corresponding interest, to the bondholder.

**Green bonds:** Debt instruments issued to finance projects with positive environmental impact, such as renewable energy, energy efficiency, clean transportation, or sustainable water management. These bonds must comply with specific transparency and reporting standards to be considered “green.”

**Brexit:** Refers to the withdrawal of the United Kingdom from the European Union.

**Credit risk rating (credit rating):** A rating issued by specialized international agencies (Standard & Poor’s, Moody’s, and Fitch) that reflects the creditworthiness of an issuer of debt securities.

**Working capital:** The most liquid segment of an investment portfolio intended to cover short-term liquidity needs.

**Net zero:** A state in which the amount of carbon dioxide released into the atmosphere because of human activities is equal to the amount of CO<sub>2</sub> removed from it.

**Basel Committee on Banking Supervision:** The international body responsible for developing global banking regulation standards and guidelines.

**Time convention:** A set of rules that define how the values of a variable are assigned to a specific period, e.g., whether a monthly data point represents the beginning, middle, or end of the month. This is essential to ensure the proper data alignment in models.

**Cryptocurrencies:** Digital assets that use cryptography to secure transactions, control the creation of new units, and verify the transfer of assets. They operate in a decentralized manner, generally on blockchain networks, and are not backed by central banks. Examples include Bitcoin and Ethereum.

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

**Yield curve:** A graphical representation that shows the relationship between the interest rates of a debt instrument and its respective time to maturity.

**Custodians:** Financial institutions, often banks, responsible for the safekeeping, administration, or oversight (custody) of financial assets belonging to their clients. In some cases, custody includes the exercise of rights pertaining to the maturity of the securities.

**Special Drawing Rights (SDRs):** An artificial reserve asset created by the International Monetary Fund (IMF) and allocated to The Fund's member countries in proportion to their quotas. Its value is defined based on a basket of currencies, currently composed of the U.S. dollar, the euro, the pound sterling, and the yen. The benefit of the SDR as a reserve asset derives from countries ability to exchange it for the reserve currencies of other countries in order to address balance-of-payments financing needs or to modify the composition of their foreign reserves. In addition to its function as a reserve asset, the SDR also serves as an accounting unit for the IMF and some international organizations.

**Bid-ask spread:** The difference between the ask price (the minimum price at which a seller is willing to sell an asset) and the bid price (the maximum price a buyer is willing to pay).

**Effective duration:** A risk measure that considers how changes in interest rates affect expected cash flows. It considers both the effect of the discounted cash flows that occur at different interest rates and the changes in cash flows. This measure is particularly appropriate for any bond with an implied option (e.g., mortgage-backed securities have an implied prepayment option that may be affected by the level of interest rates; that is, at lower interest rates, a mortgage debtor has stronger incentives to refinance their debt).

**Modified duration:** A market risk measure of an investment portfolio or a security defined as the percentage change in the value of the portfolio or the security resulting from a 1.0% change in interest rates.

**Total carbon emissions:** Absolute greenhouse gas emissions, expressed in tons of CO<sub>2</sub> equivalent, financed by a portfolio.

**Issuer:** The entity that issues securities.

**Sovereign entities:** Generally refers to States (countries) that have sovereignty; that is, those who exercise and possess supreme and independent authority to act autonomously in the management of internal affairs and in determining their conduct with respect to other States.

**Supranational entities:** Organizations that operate beyond the scope of national governments and institutions and act independently of them. It generally refers to multilateral organizations such as the World Bank, the Inter-American Development Bank (IDB), the Latin American Reserve Fund (FLAR in Spanish), or the Development Bank of Latin America (CAF in Spanish).

**State-space model:** It is a mathematical representation of dynamic systems, that is, systems that change over time, using one equation that represents the evolution of the hidden variable (state) and another that relates this unobserved variable to measurable indicators. It allows the application of algorithms such as the Kalman filter.

**Credit event:** Refers mainly to 1) a deterioration in the credit quality of issuers of securities or of the securities themselves, or 2) default or non-payment by issuers. According to the definitions of the International Swaps and Derivatives Association (ISDA), a credit event may include any of the following: 1) bankruptcy of the reference entity; 2) accelerated settlement (i.e., a situation in which an obligation may have to be settled prior to its maturity date as a result of a credit event affecting the reference entity); 3) payment default; 4) debt restructuring (i.e., changes in the terms agreed between the issuer and security holders that are less favorable to the latter); 5) repudiation; or 6) moratorium.

**ESG (Environmental, Social, and Governance):** Refers to environmental, social, and governance criteria used to assess the sustainability and ethical impact of an investment.

**ESG factors:** Any qualitative or quantitative consideration or information (including, but not limited to, raw data, statistics, estimates, assessments, analyses, ratings, and scores) related to environmental, social, or corporate governance issues. ESG factors may be incorporated into the identification and assessment of risks and opportunities when making investment decisions.

**Kalman filter:** A tool used to estimate unobservable variables from observed data that contain noise or are incomplete.

**Exchange-Traded Funds (ETFs):** Investment fund that holds multiple underlying assets (such as stocks, bonds, or commodities) and are traded on stock exchanges, similar to individual shares. ETFs allow investors to access a diversified loan portfolio with relatively low costs and high liquidity.

**Front office:** The area of a portfolio management organization responsible for executing operations and transactions in the capital markets.

**Geopolitical:** Refers to factors related to international politics, relations between countries, conflicts, alliances, and power dynamics that may affect financial markets, global trade, and economic stability.

**Carbon footprint:** Total carbon emissions for a portfolio normalized by the portfolio's market value, expressed in tons of CO<sub>2</sub> equivalent per million dollars invested.

**Benchmark index:** A basket of assets or theoretical portfolio with predetermined weights according to certain rules that define the index's composition. In general,

an index aims to broadly replicate the performance of a financial asset market and serves as an indicator of the performance of other investment portfolios in that same market.

**Carbon intensity:** Volume of carbon emissions, expressed in tons of CO<sub>2</sub> equivalent, per million dollars of revenue.

**Weighted average carbon intensity:** The average volume of carbon emissions, expressed in tons of CO<sub>2</sub> equivalent, per million dollars of revenue, weighted according to the proportion of each investment in the portfolio.

**Foreign exchange intervention:** An instrument available to Banco de la República (the Central Bank of Colombia) as the exchange authority, with the primary objective of maintaining a low and stable inflation rate and preventing excessive fluctuations in the exchange rate.

**M1:** A monetary aggregate measure regarding means of payment, includes cash in circulation, deposits in checking or checks, and travelers' checks.

**M2:** A monetary aggregate measure that includes M1, savings deposits, and certificates of deposit (CDs) held at commercial banks, financial corporations, commercial financing companies, and higher-order cooperatives.

**M3:** A monetary aggregate measure 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.

**Foreign exchange market:** The market where foreign currencies are bought and sold. Some foreign exchange markets include the following: the market for buying and selling pesos for U.S. dollars, or U.S. dollars for euros, among others.

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

**Secondary market:** The market where financial instruments are bought and sold after first being placed on the primary market. The secondary market provides liquidity to existing securities.

**Middle office:** The area of a portfolio management organization responsible for daily monitoring of all investments, as well as measuring and controlling exposure to financial risks.

**Nowcasting:** An economic forecasting technique that uses high-frequency data releases to estimate aggregate variables prior to their official publication.

**Troy ounce:** A unit of mass measurement primarily used to weigh precious metals such as gold, silver, platinum, and palladium.

**Parameter:** A numerical factor that is part of a set defining a system or establishing the conditions for its operation. It is estimated from data and can be constant or vary over time.

**Carbon budget:** A metric that represents the estimated amount of carbon dioxide and other greenhouse gases a company can emit while remaining within the limits required to comply with the 1.5°C or 2°C global warming targets by 2100.

**Natural Language Processing (NLP):** A branch of artificial intelligence focused on the interaction between computers and human language.

**Carbon transition score:** A metric that classifies companies as leaders or laggards with respect to the risks and opportunities arising from the transition to a low-carbon economy, through a categorical classification or a score (0-1).

**Information ratio:** A financial metric that measures the relationship between the excess return of an investment portfolio over its benchmark and the risk assumed by deviating, to a greater or lesser extent, from the it.

**Gross return:** The total income or return received from an investment before deducting fees, taxes, and other expenses associated with the financial transaction.

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

**Risk:** The prospect of incurring losses by investing in any type of financial asset.

**Exchange rate risk:** The prospect of losses in an investment portfolio due to fluctuations in foreign exchange rates.

**Credit risk:** The prospect of the occurrence of credit events such as 1) a deterioration in the credit quality of issuers of securities or of the securities themselves, or 2) defaults or non-payment by issuers.

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

**Geopolitical risk:** The risk associated with wars, terrorist attacks, and tensions between States that disrupt the normal and peaceful course of international relations.

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

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

**Legal risk:** Refers to the risk associated with contracts that are not legally enforceable, are not properly documented, or with changes in legislation that affect the Bank's obligations.

**Operational risk:** The prospect of incurring losses due to failures in internal processes, technology, infrastructure, personnel, events originating from external sources, or fraud.

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

**Transition risks:** Potential losses derived from the process of transformation toward a more sustainable and decarbonized economy, as a result of political, technological, and market changes.

**Physical risks:** Potential losses caused by direct physical damage from climate change.

**Overfitting (a model):** Occurs when a statistical model uses more parameters than necessary relative to a limited amount of data, causing it to capture noise rather than structural patterns and resulting in weak predictions.

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**Sustainability:** The ability to meet current needs without compromising the resources and well-being of future generations. It is based on three fundamental pillars: environmental, social, and economic.

**Stablecoins:** Cryptocurrencies designed to maintain a stable value, generally pegged to an underlying asset such as a fiat currency (e.g., the U.S. dollar), a basket of assets, or even commodities. Their objective is to reduce the volatility typically associated with other cryptocurrencies.

**Contractual interest rate (coupon rate):** The interest rate associated with a debt instrument, which the issuer agrees to pay at scheduled dates and predetermined frequency. This rate is measured as a percentage of the principal expected to be repaid at the maturity of the debt instrument.

**Rate of return:** The interest rate used to discount to present value all future cash flows of a security (interest and principal), so that the sum of those discounted values is equivalent to the security's market price. || 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 as scheduled, and that interest payments (coupons) are reinvested at the same rate of return.

**Mortgage-backed securities:** Instruments whose value and payment flows are backed by a basket or portfolio of assets or mortgages. Agency mortgages are instruments that are also guaranteed by the leading government-sponsored mortgage companies in the United States (Fannie Mae and Freddie Mac) should the debtor default.

**Climate value at risk:** A metric that measures the percentage change in the market value of a company as a result of the potential effects of climate change.

**Value at Risk (VaR):** A methodology used to measure and control market risk, which consists of estimating the maximum loss a portfolio can incur, at a given confidence level (typically 95%), over different time horizons.

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

**Vector Autoregression (VAR):** A multivariate econometric model that captures the interdependencies among time series. Each variable is explained by its own lagged values and the lagged values of other variables in the system.

**Volatility:** A measure of the variability of returns on a financial asset over a given period of time.

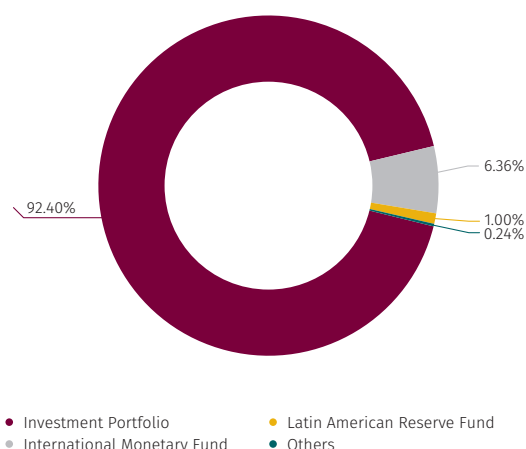
## Introduction

The Political Constitution of Colombia and Article 14 of Law 31 of 1992 assign Banco de la República (*Banrep*) the responsibility for managing foreign reserves. Likewise, they establish that such reserves must be managed in accordance with the principles of safety, liquidity, and return. The purpose of this document is to explain the management of Colombia's foreign reserves, which amounted to USD 62,481 million (m) as of December 2024.

First, the main concepts related to foreign reserves and the framework underlying *Banrep's* management are introduced. Subsequently, an overview of the current status of the reserves and the main changes that occurred during the reporting period is provided. Finally, the main risk management policies applied to the reserves are described, and the evolution of various indicators is presented.

# 1. General Overview of Foreign Reserves

Graph 1.1  
Composition of Gross Foreign Reserves



Source: Banco de la República.

## 1.1 Definition

Foreign reserves are external assets managed by the monetary authority. For an external asset to be considered as foreign reserve, it must be under the direct and effective control of the monetary authority and must be readily available for use.

The main component of foreign reserves is the investment portfolio, which is composed of financial instruments in international markets (Graph 1.1). In addition, reserves include contributions to multilateral institutions such as the International Monetary Fund (IMF) and the Latin American Reserve Fund (FLAR)<sup>1</sup>. These contributions allow Colombia to maintain access to contingent credit lines. Other facilities, such as access to the U.S. Federal Reserve's repo facility for foreign and international monetary authorities (FIMA) and access to contingent external liquidity lines at the Bank for International Settlements (BIS), serve as a complement in situations of liquidity needs.

## 1.2 General Objectives of Holding Foreign Reserves and Implications for Their Management

The level of foreign reserves is a determining factor in the perception of domestic borrowers' creditworthiness in foreign currency obligations. Credit rating agencies, lenders, and foreign investors consider that an adequate level of foreign reserves would allow residents to meet foreign currency obligations, such as the payment of imports and external debt service, at times when the country faces difficulties in accessing external financing.

In this context, *Banrep* aims to maintain an adequate level of foreign currency-denominated assets. Accordingly, the level of external liquidity is intended to cover the external deficit, external debt payments, and other potential capital flows.

*Banrep* places particular emphasis on ensuring the safety and liquidity of its reserve investments, without diminishing the importance of generating returns. In accordance with this, the main characteristics of *Banrep's* reserve management policy are as follows:

- Reserves are invested in financial assets with high levels of safety and liquidity.

<sup>1</sup> Following the methodological criteria established in the IMF's *Balance of Payments and International Investment Position Manual*, contributions to FLAR are excluded from the balance of foreign reserves reported to the IMF for statistical purposes when calculating reserve assets. However, in *Banrep's* balance sheet and in the information provided in this report, contributions to FLAR continue to be included as part of reserve assets.

- Reserve management policies are based on modern portfolio theory, which suggests applying the principle of diversification, since it is impossible to predict with certainty the performance of each of the investments that make up a portfolio. In this regard, the safety, liquidity, and return of the portfolio are assessed as a whole, rather than based on the performance of individual investments.
- *Banrep* has a highly specialized staff and technological equipment, as well as the support of top-level foreign firms, to manage the risks associated with reserve investments.

These investment policies are not exclusive to *Banrep* and are consistent with those of other central banks worldwide.

## 2. Institutional Framework

### 2.1 Legal Framework

The Political Constitution of Colombia<sup>2</sup>, Law 31 of 1992, and Decree 2520 of 1993 (the Statutes of *Banco de la República*) establish the rules to which Banco de la República (the Central Bank of Colombia) must adhere in order to fulfill its central banking functions, which include the management of foreign reserves. The law further establishes that: “the investment of these reserves shall be carried out in accordance with the principles of safety, liquidity, and return, in assets denominated in freely convertible reserve currency or in gold.”

### 2.2 Organizational Framework

#### 2.2.1 Decision-Making Bodies

At *Banrep*, the main decision-making bodies for the management of reserves are the Foreign Reserves Committee and the Foreign Reserves Operational Committee<sup>3</sup>. The former is responsible for setting the objectives, principles, and general policies for reserve management. As part of its role in establishing reserve management policies, the Foreign Reserves Committee sets the investment guidelines and the benchmark index, which are the tools that define the criteria for the composition of the investment portfolio, the types of eligible assets, authorized operations, and the tolerable exposure to different risks.

#### 2.2.2 Supervisory Bodies

The Bank has a broad and robust infrastructure to oversee the management of investment portfolios, ensuring that this activity is carried out in an impartial and independent manner. *Banrep's* Auditor General certifies the financial statements and oversees management and compliance with regulations in the Bank's processes, including the management of foreign reserves. In addition, *Banrep* hires an external auditing firm, which independently verifies the information on its financial statements, including the one related to foreign reserves<sup>4</sup>. Finally, *Banrep* has an Internal Control Department that ensures the necessary procedures are in place to comply, in the case of the central bank, with the tasks related to reserve investment and that those procedures are followed.

The Bank submits two annual reports to the Congress of Colombia, including a chapter on management policies, composition, and performance of the foreign reserves.

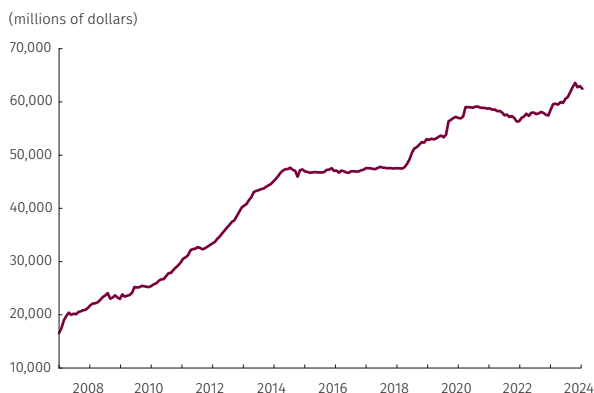
2 Political Constitution of Colombia of 1991, Title XII (on the Economic Regime and Public Finance), Chapter 6 (on the Central Bank), Article 371.

3 In the exercise of its legal and statutory powers, particularly those provided for in Articles 14 and 15 and in letter ñ of Article 34 of the Statutes of *Banco de la República*, the Board of Directors of *Banco de la República* (BDBR) issued Internal Resolution 6 of 2015, which replaced Resolution 2 of 2001, which regulates the objectives, functions, and responsibilities of the Foreign Reserves Committee and establishes the Foreign Reserves Operational Committee.

4 Comments on *Banrep's* financial statements made by the auditors can be found at: <http://www.banrep.gov.co/es/estados-financieros-anauales>

## 3. Current Situation of Colombia's Foreign Reserves

Graph 3.1  
Colombia's Net Foreign Reserves



Source: Banco de la República.

### 3.1 Level and Return of Foreign Reserves

Net foreign reserves<sup>5</sup> totaled USD 62,481 m on 31 December 2024, increasing by USD 5,212 m over the past two years. This increase was driven by the positive performance of foreign reserves and the reserve accumulation program approved by the Board of Directors of *Banco de la República* (BDBR). Graph 3.1 shows the evolution of Colombia's foreign reserves.

The level of foreign reserves in U.S. dollars changes mainly due to three factors: foreign exchange market intervention, exchange rate fluctuations, and returns. The performance of each of these factors over the past two years is described below.

#### 3.1.1 Return on Reserves

The return obtained by *Banrep* from managing foreign reserves takes place within a framework in which security prevails. The decision to hold a portfolio with a conservative risk profile implies lower long-term returns compared with portfolios that assume higher risk levels. Financial portfolio management theory indicates that, when an investor seeks lower risk, the expected return will be lower. The return on foreign reserves depends mainly on two factors: the accrual of interest and the valuation of securities.

Interest-rate-related returns arise mainly from the returns on the debt securities in which the reserves are invested. In turn, valuation-related returns arise from changes in the prices of securities due to movements in interest rates. An important characteristic of debt securities is that they can be sold prior to maturity. However, interest rates fluctuate continuously in the market, while most securities pay a fixed interest rate. As a result, a decline in market interest rates leads to an increase in the price of debt securities, as they become relatively more attractive due to their higher fixed interest rate. Conversely, an increase in market interest rates reduces the prices of debt securities, as they become relatively less competitive due to their lower fixed interest rate. In

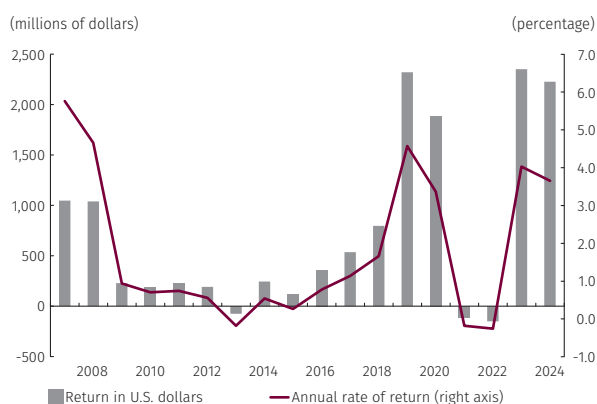
5 Net reserves are equal to total foreign reserves, or gross reserves, minus *Banrep's* short-term external liabilities. The latter consist of demand obligations in foreign currency with non-resident agents.

conclusion, there is an inverse relationship between a bond's price and the interest rate<sup>6</sup>.

One of the main factors determining the returns on debt security (both from interest and price changes) in the short end and the belly of the curve, where reserve investments are concentrated, is central bank monetary policy, as it tends to drive the movement of interest rates on all the instruments denominated in a given currency in the same direction. With respect to the interest rate of a debt security, earnings are higher when interest rates are high and lower when they are low. Regarding debt security valuations, these increase when interest rates decline and decrease when interest rates rise.

Graph 3.2 shows the historical returns on foreign reserves<sup>7</sup> over the past ten years, which comprise the two components explained: interest and valuation.

**Graph 3.2**  
Historic Return on Foreign Reserves



Source: Banco de la República.

The return on foreign reserves during 2023, excluding the exchange rate component, was 4.03%<sup>8</sup> (USD 2,355 m). This performance is primarily explained by higher interest rate levels, which had a positive impact on foreign reserve returns due to higher values earned from investments. The increases in central bank's policy rates, in response to inflation rising above target levels in several countries, resulted in interest rates in markets relevant to foreign reserves remaining at high levels in 2023 compared with those observed in previous years. Additionally, in the final months of the year, as global inflation levels began to ease, interest rates on sovereign debt securities declined, generating positive investment returns (valuation factor).

Finally, in 2024, foreign reserves once again recorded a positive return (3.65%)<sup>9</sup>, driven mainly by the interest received from investments in the investment portfolio (interest factor) and, to a lesser extent, to the valuation of the portfolio resulting

6 The inverse relationship between a bond's price and the interest rate can also be explained mathematically. The price of a fixed-income instrument is defined as the current value of its cash flows, discounted at a specific interest rate, as shown in the following formula, where  $P$  = price of the instrument;  $FC$  = cash flows (coupon rates and principal);  $i$  = the instrument's rate of return; and  $n$  = number of periods, as follows:

$$P = \frac{FC_1}{(1+i)} + \frac{FC_2}{(1+i)^2} + \dots + \frac{FC_n}{(1+i)^n}$$

7 The annual rate of return is calculated using the total annual return in U.S. dollars reported by the Accounting Department and by averaging the value of net reserves as of 31 December of the reporting year and the same date of the immediately preceding year.

8 This return is obtained by dividing the observed return by the average value of net reserves as of 31 December 2022 and 31 December 2023. Since 2015, the impact of the exchange rate effect has been excluded from the returns on reserves.

9 This rate of return is calculated by dividing the observed return in U.S. dollars by the average value of net reserves as of 31 December 2023 and 31 December 2024. Since 2015, the impact of the exchange rate effect has been excluded from the returns on foreign reserves.

from the decline in short-term interest rates (valuation factor). Interest rates in the main markets in which foreign reserves are invested remained at historically high levels during 2024, which generated a positive accrual effect (interest factor) throughout the year. Additionally, due to monetary policy decisions adopted by most central banks in developed economies, short-term interest rates along government bond yield curves declined, leading to an increase in the valuation of shorter-maturity investments (valuation factor).

Conditions in international fixed-income markets influenced the return on foreign reserves. Below is a more detailed overview of the main market events that have taken place in recent years.

As mentioned, the positive performance of the portfolios was driven particularly by the interest accrual effect associated with high-interest rate levels, along with bond price appreciation resulting from less restrictive global monetary policies. Both dynamics were driven by inflation levels in most economies and the consequent markets' reassessment of expectations regarding price stabilization, consumption, and economic growth. Interest accrual refers to the interest gains accumulated on a debt security, implying that, in an environment of high interest rates, it leads to better portfolio performance. On the other hand, the appreciation of debt securities arises from the inverse relationship between interest rates and securities prices: a decline in market interest rates increases the value of debt securities, as they become more attractive by offering a fixed rate that is higher than current market rates. Conversely, when interest rates rise, bond prices fall, as their fixed return becomes less competitive under the new market conditions.

Additionally, portfolio performance benefited from the modification to the benchmark index implemented in the management of foreign reserves during 2023 and 2024. These adjustments aimed to increase duration, which, consistent with market expectations of a gradual decline in interest rates, could lead to higher portfolio returns. Accordingly, the composition of the benchmark was defined with the purpose of reducing the exposure on short-term bonds and increasing it on long-term bonds. For example, the share of U.S. bonds with maturities of 0 to 1 year in the passive portfolio of the short-term tranche declined from 77% at the beginning of 2023 to 50% at the end of 2024, while the share of U.S. bonds with maturities of 0 to 3 years in the medium-term tranche decreased from 91% to 29%. By contrast, bonds with maturities greater than 10 years in the short-term tranche increased from 0% in 2023 to 6.0% in 2024.

The period began in an environment of high global inflation which, despite its gradual moderation, remained above market expectations. The inflationary peaks reached during the COVID-19 pandemic led central banks to raise policy rates in mid-2022 to levels not seen in fifteen years (the highest since the 2008 crisis). This restrictive monetary policy stance eventually led prices towards a stabilization path: in the United States, the consumer price index (CPI) declined from a peak of 9.1% in June 2022 to 3.0% in June 2023; in the European Union, the CPI fell from 8.6% in January 2023 to 2.9% in December 2023; and in Australia, the CPI declined from 7.8% to 3.6% over the same period. This suggested that the period of interest rate hikes was approaching its end. However, signs of persistently high core inflation made that path less certain.

As a result of global economic dynamism, central banks, especially the Federal Reserve (Fed), kept their policy rates unchanged at elevated levels for longer than anticipated, repeatedly delaying the start of a less restrictive monetary policy

cycle. Ultimately, a gradual process of rate cuts began in 2024. While headline inflation in the United States and the Euro Zone had reached (and surpassed) its peak by January 2023, core inflation still appeared to be far from doing so, due to sustained wage increases in response to resilient consumer demand (International Monetary Fund, 2023). Based on this, for most of the period, central banks had to decide between two possible paths: maintaining a contractionary monetary policy stance for longer to mitigate potential inflationary upturns or beginning a transition toward a monetary policy of lower rates to avoid adverse effects on aggregate demand and to support economic growth.

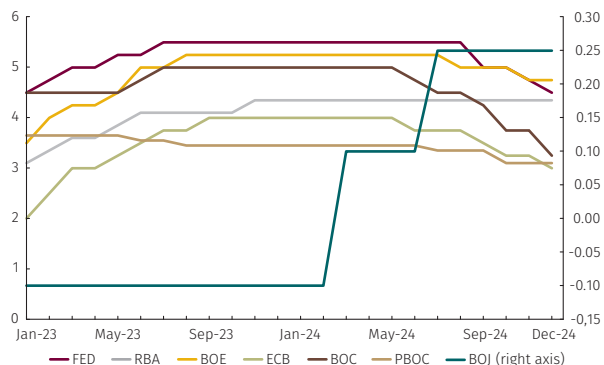
Despite higher borrowing costs and limited access to credit, consumption in the United States remained steady. Household spending grew by 2.3% in the last quarter of 2023 and by 1.3%, 1.9% and 2.5% in the first three quarters of 2024, respectively, although the Fed kept its federal funds rate within a range between 5.50% and 5.25% throughout that period. In addition, unemployment rates remained relatively low, contrary to initial market expectations. In the United States, the unemployment rate remained around 4.0% during the period; in the European Union, it declined from 6.6% in mid-2023 to 6.3% in the fourth quarter of 2024; and in Australia it remained below 4.0%. On the other hand, in an environment of high interest rates, growth forecasts were revised downward: while global economic growth had been reported at 3.1% in 2022, growth of 2.1% was projected for 2023 and 2.4% for 2024 (World Bank, 2023).

The environment of high interest rates exacerbated risks and asset-liability mismatches at financial institutions such as Silicon Valley Bank (SVB) and Credit Suisse, ultimately leading to liquidation and bankruptcy scenarios. The SVB ranked among the twenty largest banks in the United States and focused on providing financial services to U.S. technology start-ups. SVB was undiversified and highly exposed to U.S. Treasury bonds and mortgage-sector securities. The Fed's contractionary monetary policy in 2023, implemented to curb inflation, led to a decline in U.S. Treasury bond prices. As a result, concerns emerged among clients regarding the SVB's solvency, causing a bank run (Evans, 2025). This, together with poor hedging of long-term loans, resulted in SVB's failure.

This episode triggered panic in financial markets, leading to the collapse of Credit Suisse, Switzerland's second-largest bank, which had recorded losses in recent years and had also faced administrative issues (Steer, 2023). The Swiss institution began the biennium with its largest annual losses since the 2008 crisis. This situation, together with the withdrawal of more than USD 110 billion by a significant group of clients in the preceding months, led the Swiss National Bank to extend a loan to Credit Suisse to improve its liquidity conditions; however, given the severity of its insolvency, the bank was ultimately acquired by the Union Bank of Switzerland (UBS).

There were two central banks relevant to the management of foreign reserves that exhibited a different behavior. In the third quarter of 2023, central banks reached the highest rate levels of the period, in most cases exceeding their January levels by 1 percentage point (pp). As shown in Graph 3.3, with the exception of the central banks of Japan and China, the contractionary cycle ended in November 2023 when the Reserve Bank of Australia (RBA) reached an interest rate of 4.35%. Once inflation returned to a stable path, central banks eased their monetary policies and in mid-2024 began a gradual reduction in policy rates, which in most cases resulted in rates close to those prevailing at the beginning of the biennium.

Graph 3.3  
Monetary Policy Rates of Major Central Banks (2023–2024)



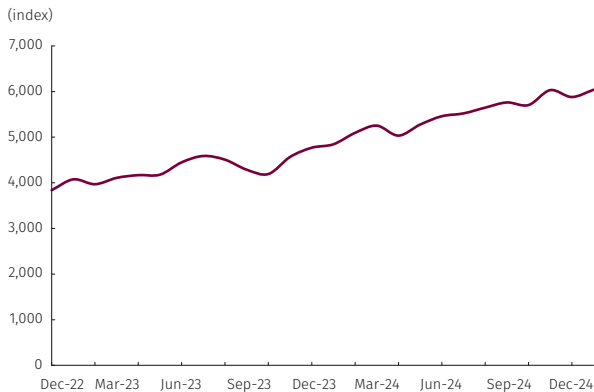
Source: Bloomberg.

The Bank of Japan (BOJ) stood out by exhibiting an increasingly restrictive monetary policy, while the People's Bank of China (PBOC) maintained a cycle of interest rate cuts, an expansionary monetary policy stance throughout the biennium.

On the one hand, the BOJ increased its policy rate repeatedly, placing it in positive territory after eight years of negative rates, which supported investor interest in Japanese government debt within fixed-income markets. The change in Japan's monetary policy arose amid high inflation levels driven by sustained real wage growth. By the end of the biennium, growth in Japanese real wages reached levels close to their highest levels in the past 32 years. This phenomenon stemmed from what the BOJ describes as a "wage-inflation growth cycle," as well as increasing wage pressure exerted by labor unions. This dynamic was reinforced by positive signs in domestic demand, reflected in the strength of leading indicators such as manufacturing surveys. Another key factor driving the BOJ toward the normalization of its monetary policy was the historic weakness of the yen during the period, which led it to trade at its lowest levels in three decades. The weakness of the local currency in a country that exports significant volumes of goods implies an inflationary effect, as consumers must pay a higher amount of domestic currency to purchase the same quantity of goods priced in foreign currency.

Although economic growth was in line with the targets set by the Chinese government, the PBOC maintained an expansionary monetary policy amid persistent disinflationary pressures stemming from weaknesses in consumption and the housing market. In this regard, China reached its 5.0% economic growth target in 2024, supported by factors such as the strong performance of exports, which recorded an annual increase of nearly USD 6.0 trillion (t); growth above 6.0% in the manufacturing sector; and significant investment in green technologies and high-technology industries (Zhou et al., 2025). During this period, the PBOC continuously reduced its policy rate in response to disinflationary data observed since the second half of 2023. In an effort to generate higher inflation, the government allocated significant resources to subsidize households' consumption of goods and services. However, the absence of clear transmission mechanisms for these expansionary measures, which failed to reduce households' incentives to save, contributed to a weaker-than-expected consumption response and to a deterioration in consumer confidence (*EconoTimes*, 2024). Uncertainty surrounding the Chinese housing market, particularly the instability of the sector following Evergrande's bankruptcy in August 2023, further undermined consumer confidence, given that real estate constitutes the primary investment and savings mechanism for Chinese citizens.

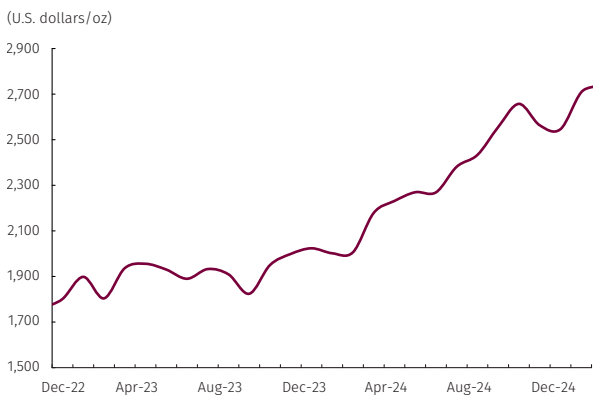
**Graph 3.4**  
Performance of the S&P Index (2023–2024)



Source: Bloomberg.

Given the resilient economic growth scenario, expectations of a less restrictive monetary policy, and the phenomenon referred to by markets as “American exceptionalism”, stock markets reached all-time highs. Since 2023, U.S. stock market indices showed returns significantly higher than those of other countries, reaching record levels: the S&P 500 index reached 6,090.27, from 3,839.50 at the beginning of 2023 (Graph 3.4). Restrictive monetary policy in the United States moderated aggregate demand, which typically has a negative effect on stock market valuation; however, in this case, the exceptional performance of stock markets was supported by resilient economic growth, expectations of a less restrictive monetary policy, and strong corporate earnings driven by expectations of lower tax levels and higher productivity (Peters, 2025). In contrast, other advanced economies experienced stagnation of economic growth and lower returns in the corporate sector.

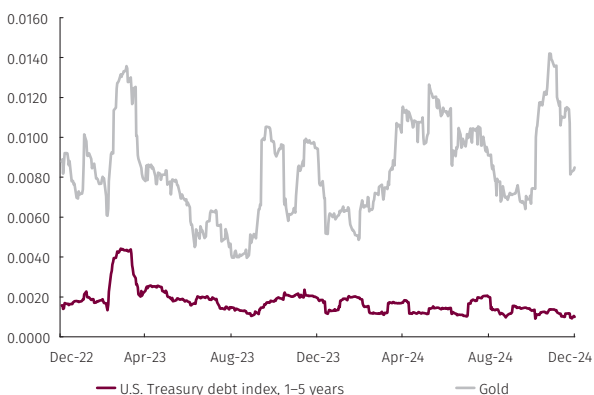
**Graph 3.5**  
A. Gold Price (2023–2024)



Source: Bloomberg.

Gold reached historically high levels amid expectations of less restrictive monetary policies around the world as well as increased demand from some central banks which, in response to geopolitical events, such as the sanctions imposed on Russia’s foreign reserves, decided to accumulate this metal (Graph 3.5, Panel A). On the one hand, expectations of interest rate cuts by the Fed toward the end of 2023 prompted investment flows from bonds toward more attractive assets, such as gold. The reason is that this metal is not tied to the potential returns typically expected from investments in assets that, depending on their risk level, pay a proportional interest rate; instead, gold is an asset with intrinsic value that does not generate returns, dividends, or coupon payments. This characteristic represents a disadvantage during periods of rising interest rates on assets such as bonds, as it leads to reduced appetite for the metal; however, in periods when lower interest rates are expected in the future, it becomes an incentive to invest in gold as a means of avoiding potential losses. Additionally, it is worth noting that gold prices exhibit higher volatility compared to that of a typical asset within foreign reserves portfolios (Graph 3.5, Panel B). On the other hand, some central banks increased their demand for gold in response to the freezing of Russia’s foreign exchange and gold reserves following its invasion of Ukrainian territory.

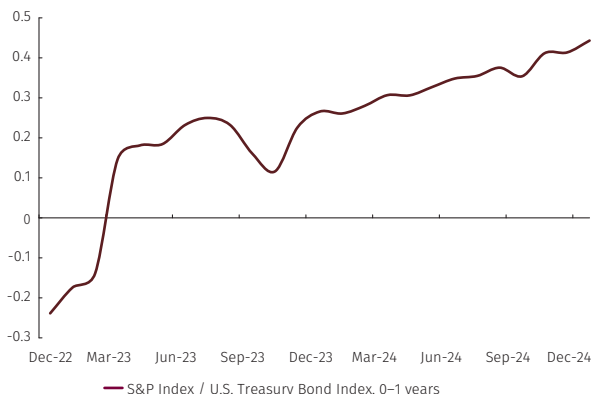
**B. Gold Volatility Versus U.S. Bonds**



Source: Bloomberg.

This period was also marked by an unusual dynamic regarding a positive correlation between equity and fixed income returns (Graph 3.6). Favorable market sentiment, driven by an expansionary monetary policy environment adopted by central banks, contributed to positive returns in both equity and fixed-income assets. First, this expansionary policy environment gave access to affordable financing for firms, generating greater returns potential and implying a positive impact on the firm’s valuation within the stock markets. Second, the decline in interest rates had a positive effect on the value of debt instruments, driven by an increase in their prices in secondary markets, given the inverse relationship

**Graph 3.6**  
Correlation of Returns Between Equity and Fixed-Income Markets



Source: Bloomberg.

between interest rates and the prices of debt securities. In addition, the greater fiscal flexibility of the U.S. Government also raised concerns regarding the status of its public debt as a risk-free asset.

During that period, geopolitical events began to have more relevance on financial assets, giving rise to persistent episodes of high volatility. Among the most relevant factors were the persistent tensions between the United States and China surrounding restrictions on trade in technology and critical minerals; the escalation of tensions in the Middle East, especially in the Israel-Palestine conflict, which reignited in October 2023; and, more acutely, the severe intensification of the war between Russia and Ukraine in March 2022.

Restrictions on commodity supply chains in China, together with concerns over an imminent decline in crude oil supply from the Middle East, contributed to greater resilience in oil prices during the last months of 2024. In addition, the heightened risk of armed conflict in key geopolitical hotspots translated into increased risk perceptions and greater uncertainty across major financial assets.

Finally, toward the end of the period, the U.S. elections added volatility to both stock and debt markets. Expectations surrounding the policies of Donald Trump's second term shaped the performance of financial markets. In particular, financial markets reacted to the prospect of tax cuts (and the resulting increase in the fiscal deficit); amid a misalignment between the Fed's monetary policy and Trump's government plan, and the possible beginning of a new chapter in the trade war between the United States and China, in response to the constant campaign announcements that pointed to higher tariffs on imports from that country.

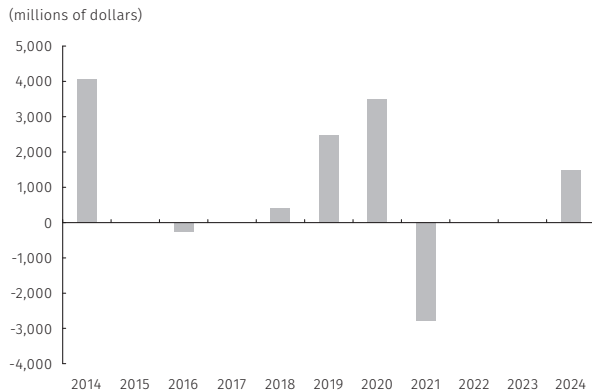
The ability to estimate economic performance in a timely manner is essential for assessing the fixed-income market environment and for the efficient management of foreign reserves. Box 1 examines the development and application of a nowcasting<sup>10</sup> model to anticipate quarterly gross domestic product (GDP) growth using high-frequency data.

### 3.1.2 Foreign Exchange Market Intervention

Intervention through the direct purchase of U.S. dollars in the market is another factor explaining the increase in reserves over the past two years. Graph 3.7 shows *Banrep's* intervention in the foreign exchange market. Positive values represent net reserve purchases during the year, while negative values correspond to net sales. In 2024, the BDBR initiated a gradual

<sup>10</sup> A nowcasting model is a tool that enables economists to anticipate the performance of short-term economic variables, using high-frequency data.

**Graph 3.7**  
Banrep's Intervention in the Foreign Exchange Market



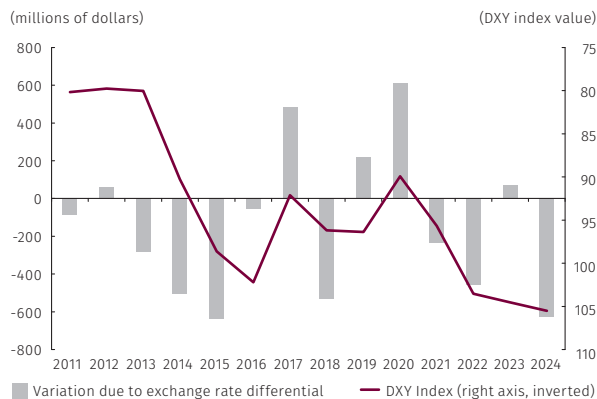
Source: Banco de la República.

process of foreign-reserve accumulation, which contributed to an increase in USD 1,479.4 m. The objective of this measure was to strengthen Colombia's external liquidity, consolidate the positive perception of the country's macroeconomic soundness, prepare for a potential gradual reduction of the amount available to Colombia under the IMF's flexible credit line (FCL), and facilitate access to external financing in an environment characterized by macroeconomic and financial uncertainty, both domestically and internationally.

### 3.1.3 Exchange Rate Differential Change

Foreign reserves are measured in U.S. dollars; therefore, the value of reserve investments in other currencies is modified by variations in exchange rates. Graph 3.8 illustrates the variation in foreign reserves attributable to exchange rate differentials and the U.S. dollar index (DXY), which tracks the performance of the U.S. dollar against the main currencies of developed countries. As shown, in 2024, the U.S. dollar value of reserve investments denominated in other currencies declined, primarily due to the U.S. dollar's appreciation vis-à-vis other currencies. By contrast, the depreciation of the U.S. dollar led to an increase in the value of investments in other currencies in 2023.

**Graph 3.8**  
Variation in Foreign Reserves in Dollars Due to Exchange Rate Differential



Sources: Banco de la República and Bloomberg.

Banrep maintains an equity account for currency fluctuations, which increases in years when other currencies strengthen against the U.S. dollar and declines when they weaken. This implies that exchange rate variations do not affect the comprehensive income statement. As noted above, decisions regarding currency composition are mostly made to hedge exchange rate risk in the balance of payments and not to generate positive returns.

### 3.2 Metrics on the Adequate Level of Foreign Reserves

Since foreign reserves are intended to protect the country against external shocks, which may originate from either the current account or the capital account, foreign reserve indicators should be linked to variables that measure the impact of such shocks. Current account shocks may arise from a sharp decline in exports that makes it more difficult to finance imports. Capital account shocks stem from difficulties in accessing external financing, such as tighter access to international credit or greater capital outflows from both foreigners and residents.

To determine whether a country's foreign reserves are sufficient to prevent and withstand the materialization of external shocks, external vulnerability indicators are used, for example, the ratio of foreign reserves to monetary aggregates, as well as the ratio of reserves to payments of external debt over the next twelve months, plus the current account

deficit. Comparing reserves with monetary aggregates such as M2 or M3 aims to estimate the economy's capacity to respond to capital outflows caused by a speculative attack. In turn, the reserves indicator for short-term external debt plus the current account deficit shows the country's ability to meet its credit obligations to the rest of the world under an extreme scenario where access to international financing is completely closed. Although the reserves-to-GDP ratio is sometimes used as a reference, it has limited relevance, since vulnerability to external shocks depends less on the size of the economy than on a country's trade and financial integration with the rest of the world. Generally, international markets consider low values of these indicators as potential warning signs of external vulnerability of economies.

The accumulation of foreign reserves (FRs) and their returns allowed the indicators used to assess the adequacy of foreign reserves levels at the end of 2023 and 2024 to remain in line with, or even exceed, the levels observed in December 2022. These indicators confirm that the FR level reached is adequate, without exceeding what is necessary to meet the country's external needs.

One of the most widely used measures internationally, known as the extended Guidotti-Greenspan rule, assesses the capacity of FRs to cover 100% of the current account deficit and short-term external debt repayments. In Colombia, this ratio reached 0.99 and 1.09 in December 2023 and 2024. On the other hand, the indicator proposed by the IMF, known as the assessing reserve adequacy (ARA) metric, increased during 2024, reversing the downward trend observed since 2021. This indicator assesses the capacity of foreign reserves to mitigate the main balance-of-payments risks during periods of stress in the foreign exchange market. According to the IMF, this indicator aims to cover the risks associated with the loss of access to external financing, declining confidence in the local currency, reversals of capital flows, and a potential contraction in external demand<sup>11</sup>. As a result of the foreign reserve accumulation program and its returns, the ratio of foreign reserves to the ARA metric improved from 1.21 in December 2023 to 1.29 in December 2024, remaining within the IMF's recommended range of 1.0 to 1.5.

Other indicators used to assess foreign reserves adequacy can provide warning signs regarding the economy's external vulnerability. Among these are the ratios of foreign reserves to monetary aggregates, short-term external debt, and the current account deficit. Table 3.1 presents various indicators of Colombia's foreign reserves, including the IMF's reserve adequacy indicator. Table 3.2 shows the metrics for other countries in the region. Since data collection began, Colombia has maintained an adequate level of reserves with its reserves-to-ARA ratio above 1. In recent years, it has stood at an average level compared to its Latin American peers, with Peru's reserves-to-ARA ratio being 2.67, while Chile's is 0.96 as of December 2024, which represents the region's maximum and minimum reference values, respectively.

The indicators used to assess foreign reserves adequacy suggest that their level is appropriate; however, it is not excessive, but rather sufficient to ensure coverage of the country's external needs and provide solid support against potential external shocks. In the current context, characterized by high global and local uncertainty, maintaining a solid position in foreign reserves is a main element in preserving investor confidence in the country's macroeconomic soundness,

11 IMF (2015). "Assessing Reserve Adequacy: Specific Proposals."

**Table 3.1**  
Foreign Reserves (FRs) Payment-Capacity Indicators

	2018	2019	2020	2021	2022	2023	2024
FR/M3 (percentage)	31.07	31.99	32.71	33.61	35.76	27.78	31.37
FR/GDP (percentage)	14.48	16.46	21.85	18.39	16.67	16.40	14.55
FR in months of imports	8.88	9.71	13.47	8.81	7.62	9.44	9.13
FR/foreign debt service	1.22	1.53	1.66	1.42	1.42	1.23	1.10
FR/foreign debt amortizations	1.41	1.37	1.56	1.43	1.27	1.25	1.29
FR/(foreign debt amortizations + current account deficit)	1.04	1.00	1.22	1.02	0.87	0.99	1.09
FR/adequate level measure (IMF)	1.31	1.38	1.45	1.37	1.29	1.21	1.29

Sources: *Banco de la República*, International Monetary Fund, and Colombian Tax and Customs National Authority (DIAN for the acronym in Spanish).

**Table 3.2**  
Foreign Reserves/IMF adequate level measure

	2018	2019	2020	2021	2022	2023	2024
Brazil	1.69	1.58	1.51	1.49	1.36	1.50	1.27
Chile (with funds)	1.44	1.47	1.37	1.08	1.02	1.02	0.96
Chile	0.90	0.94	0.91	0.91	0.75	0.78	0.74
Peru	2.40	2.82	2.93	3.08	2.41	2.22	2.67
Peru (excluding reserve requirements)	1.90	2.13	2.43	2.46	1.96	1.86	2.09
Mexico	1.17	1.13	1.26	1.31	1.15	1.28	1.29

Source: IMF; *Banrep's* calculations.

enhancing the economy's resilience to adverse scenarios, and ensuring favorable conditions for external financing availability.

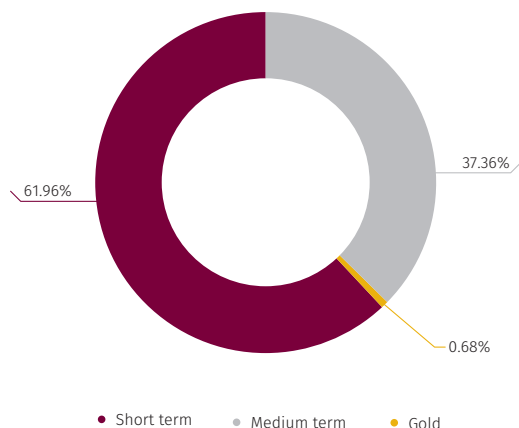
### 3.3 Composition of the Investment Portfolio of Foreign Reserves

#### 3.3.1 Composition by Tranches

*Banrep* divides the investment portfolio of reserves into three tranches: short-term tranche, medium-term tranche, and the gold tranche (Graph 3.9). The shortest-term and most liquid investments are used for potential intervention in the foreign exchange market. Typically, the portion of reserves expected to be used only in exceptional circumstances is invested at longer maturities to seek higher returns. Each tranche is described below:

- The short-term tranche is intended to cover potential liquidity needs of the reserves over a twelve-month horizon. This includes working capital, which is the portfolio into which funds from foreign exchange market intervention are held, and its investments are concentrated in very short-term, U.S. dollar-denominated assets. Working capital is allocated in deposits and investments that can be liquidated overnight at a minimal cost. The remainder of the short-term tranche is invested across a broader set of instruments, with a longer term and a higher expected return than that of the working capital,

Graph 3.9  
Investment Portfolio Tranches



Source: Banco de la República.

while maintaining a high level of liquidity. The return of this tranche in U.S. dollars is expected to be positive with a 95% probability over a twelve-month horizon, and the value of a potential loss is expected not to exceed 1.0%. As of December 2024, the short-term tranche was valued at USD 35,855 m (61.96% of the investment portfolio).

- The medium-term tranche is implemented with a longer term and a higher expected return profile than that of the short-term tranche. Its objective is to maximize risk-adjusted returns in U.S. dollars, the currency in which the value of foreign reserves is reported, for the portion of the portfolio considered less likely to be used within a twelve-month horizon. Having a tranche with such characteristics seeks to increase the expected long-term return of foreign reserves while maintaining a conservative portfolio. The return of this tranche in U.S. dollars is expected to be positive with a 95% probability over a three-year horizon, and the value of a potential loss is expected not to exceed 1.0%. As of December 2024, the value of the medium-term tranche amounted to USD 21,618 m, representing 37.36% of the investment portfolio.
- The last tranche corresponds to investments of foreign reserves in certified physical gold that can be easily traded in international markets. Gold allows for diversification of the investment portfolio, as its price behaves differently from that of the securities in which the short- and medium-term tranches<sup>12</sup> are invested. As of December 2024, the market value of gold held in the foreign reserves amounted to USD 392.40 m, or 0.68% of the investment portfolio. The share of gold in foreign reserves is low, given that the price of this metal tends to exhibit high volatility.

### 3.3.2 Benchmark Indices in Tranches

Most central banks manage their foreign reserves using a theoretical portfolio or benchmark index as a guide. In capital markets, this concept refers to a basket of assets with predetermined weights, subject to specific rules that define their composition. In general, a benchmark seeks to broadly replicate the performance of a financial asset market and serves as a performance indicator for other investment portfolios in that same market<sup>13</sup>.

12 The correlation between the price of gold and U.S. government-issued securities is approximately 0.19, indicating that their price variation tends to differ.

13 For example, some of the most widely recognized benchmark indices in the markets are Colcap in Colombia, and the S&P500 and Dow Jones in the United States.

Most studies conclude that the benchmark index selected for a portfolio explains at least 90% of its returns, making it the most important decision any investor can make. Given that this constitutes the main investment decision for the reserves, the process for selecting benchmark indices is based on international best practices.

Different benchmarks are constructed for each tranche to reflect their distinct investment horizons. The benchmark index concept is not applied to the reserves' working capital, as its objective is to cover immediate liquidity needs.

Once *Banrep* has decided to use benchmark indices for the investment tranches, it is necessary to define their composition in terms of currencies and types of instruments.

### 3.3.2.1 Currency Composition of the Benchmark Indices

In selecting the currency composition of the reserves, the first consideration is that one of the central objectives of the foreign reserves is to be able to intervene in the foreign exchange market. Therefore, the foreign currencies used must facilitate such intervention. To achieve this objective, the working capital is invested exclusively in U.S. dollars, as this is the only currency in which foreign exchange intervention is conducted.

A second consideration in determining the foreign exchange composition is that the reserves may be used, in the event of contingencies, to meet foreign currency obligations arising from both trade in goods and services and capital flows. Therefore, it is necessary to examine the behavior of balance of payments outflows. To this end, *Banrep* considers, among other factors, the prices of imported goods and the currency composition of external debt, both public and private.

Considering that the short-term tranche is the first to be used to satisfy 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 during periods in which other currencies strengthen against the U.S. dollar, offsetting the fact that both the value of the country's imports and external debt denominated in those currencies rise when measured in U.S. dollars. This methodology has successfully met the objective of covering balance of payments outflows, as the value of the currencies included in the currency composition has often performed in line with the country's foreign currency payments, both during periods of increase and decrease. Although transactions are carried out with many countries, only foreign currencies with high daily trading volumes, large public debt markets, and high credit ratings are selected. As of 31 December 2024, the currency composition of the benchmark portfolio approved for the short-term tranche was as follows: 79% in U.S. dollars, 8.0% in Canadian dollars, 7.0% in Australian dollars, 4.0% in euros, and 2.0% in renminbi<sup>14</sup>.

On the other hand, no currency composition constraint is imposed on the medium-term tranche of the foreign reserves, as its objective is to maximize risk-adjusted returns in U.S. dollars, given that this tranche has a lower probability of

<sup>14</sup> As of 30 June 2025, the currency composition of the approved benchmark for the short-term tranche was as follows: 79% U.S. dollars, 8.0% Canadian dollars, 7.0% Australian dollars, 3.0% euros, and 3.0% renminbi.

being used in the short term, and the U.S. dollar is the currency in which the level of reserves is reported. The index for this tranche may include currencies other than the U.S. dollar, provided they are consistent with the tranche's objective. As of 31 December 2024, the benchmark portfolio for the medium-term tranche was composed of 92% U.S. dollars, 2.0% yen, 2.0% euros, 1.0% pound sterling, 1.0% Canadian dollars, 1.0% Australian dollars, and 1.0% renminbi<sup>15</sup>.

### 3.3.2.2 Eligible Instruments for Benchmark Indices

After deciding on the currency composition, it is necessary to define the type and maturity of the instruments that will be part of the benchmark. In this process, instruments that meet the security and liquidity requirements established for the reserves are selected. Currently, the only eligible instruments for the benchmark index are the safest and most liquid assets in international capital markets: government securities with high credit ratings and issuers supported by those governments. Gold is also included as an eligible asset in this process, seeking to determine its optimal allocation within the investment portfolio. Box 2 explains the main considerations made by *Banrep* to determine the eligible markets and asset classes, as well as the maximum allocations that these assets may have in the construction of the benchmark indices.

### 3.3.2.3 Construction of Tranche Benchmark Indices

To construct an appropriate benchmark, it is necessary to define risk tolerance constraints. Considering that there are many combinations of assets with different risk levels, these constraints ensure that the selected benchmark index maintains a level of risk acceptable to the institution.

For *Banrep*, any admissible solution must have a probability of achieving positive returns greater than or equal to 95% and an expected loss value of less than 1.0%. These constraints are highly conservative, as they imply that expected returns will be positive most of the time, and that in extreme cases of negative returns, losses will be limited.

The construction of the constraints for each tranche is detailed below.

- In the case of the short-term tranche benchmark, a twelve-month horizon is defined to comply with the constraints of achieving positive returns with 95% confidence and ensuring that the expected value of a potential loss does not exceed 1.0%, given that this is the tranche most likely to be used in the short term. The exchange effect is excluded from the constraints for this tranche<sup>16</sup>.
- For the medium-term tranche, the constraints of achieving positive returns with 95% confidence and ensuring that the expected value of a potential loss does not exceed 1.0% are defined over a longer horizon (three years), to reflect the lower probability of using this tranche's resources while aiming for higher returns. Since the reference currency for the medium-term tranche is

<sup>15</sup> As of 30 June 2025, the currency composition of the approved benchmark for the medium-term tranche was as follows: 79% U.S. dollars, 6.0% Australian dollars, 4.0% euros, 4.0% yen, 3.0% Canadian dollars, 3.0% pound sterling, and 1.0% renminbi.

<sup>16</sup> The decision on currency composition seeks to achieve volatility similar to that of the balance of payments outflows, rather than to generate higher returns.

the U.S. dollar, the constraint considers the exchange rate risk generated by currencies other than the U.S. dollar.

The benchmarks are estimated using optimal portfolio construction methodologies that are widely applied internationally<sup>17</sup>. Based on the short-term tranche's currency composition constraints, the set of eligible instruments, and the risk tolerance constraints, the following optimization process is applied:

- A set of portfolios or asset baskets that minimizes risks for each level of expected return<sup>18</sup> is constructed for each tranche.
- For each tranche, the portfolio that maximizes *Banrep's* expected return while complying with risk tolerance constraints<sup>19</sup> is selected.

The result of the portfolio construction methodology consists of two theoretical portfolios that serve as benchmark indices, where the eligible assets included are, in turn, baskets of assets developed by specialized institutions, widely consulted and recognized internationally. These indices offer the advantages of being transparent, computable, replicable, and regularly updated. This process also determines the desired share of gold in the investment portfolio. The benchmark indices in effect as of 31 December 2024, along with their components, are shown in Graph 3.10. Both benchmarks have a high allocation to short-term U.S. Treasury bonds, which have low price volatility and high liquidity. As of 31 December 2024, the modified duration of the two indices was 2.90 for the short-term tranche and 3.33 for the medium-term tranche<sup>20</sup>.

### 3.3.3 Passive and Active Management Mandates

There are two approaches for managing the tranches relative to their benchmark indices: passive management and active management. Each approach has different investment guidelines that set limits on the differences allowed with respect to the benchmark index. The benchmark index is a theoretical construction rather than an actual portfolio, so it is necessary to define policies for managing a portfolio relative to its index. As noted, given the different objectives of the reserves, the most important components of the investment portfolio are the short- and medium-term tranches, which have different benchmarks.

- Passive management seeks to replicate the composition of the benchmark index. Investments under this type of management are mainly securities issued by the entities included in the benchmark index. As of 31 December 2024, passive management accounted for 67.71% of the investment portfolio (Graph

17 The main methodology currently used is known as the Black-Litterman model.

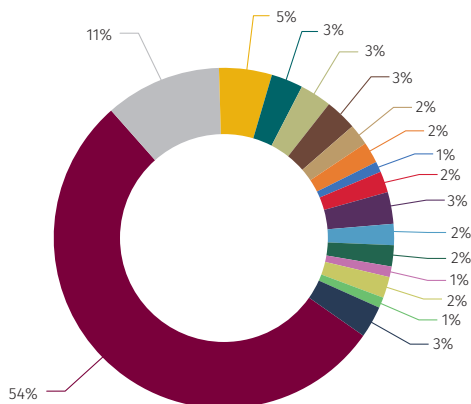
18 Known as the *efficient frontier*. This methodology consists of two phases. The first uses historical data to estimate equilibrium parameters (Capital Asset Pricing Model, CAPM), while the second phase allows these equilibrium parameters to be adjusted using updated information from financial markets. In this regard, long-term trends (equilibrium) are combined with short-term movements (current market conditions) to ensure the most effective use of all available information.

19 The utility function considers portfolio returns, its risk (or volatility), and a parameter that measures *Banrep's* risk aversion.

20 In the first half of 2025, the Foreign Reserves Committee approved adjustments to the benchmarks of both tranches, with a modified duration of 2.73 for the short-term and 3.24 for the medium-term tranche.

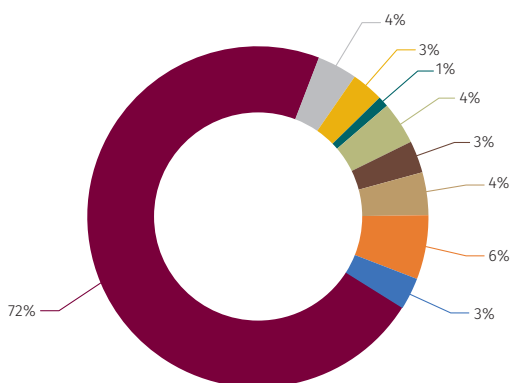
**Graph 3.10**  
**Benchmark Composition of**  
**the Short- and Medium-Term Tranches**  
**(Information as of 31 December 2024)**

**A. Short-Term Tranche**



- U.S. government bonds (0-1 years)
- U.S. government bonds (1-5 years)
- U.S. government bonds (5-10 years)
- U.S. government bonds (+10 years)
- AAA-AA supranational and governments bonds
- U.S. inflation-linked government bonds (1-10 years)
- Australian government bonds (0-3 years)
- Australian government bonds (3-5 years)
- Australian government bonds (5-10 years)
- Australian government bonds (+10 years)
- Canadian government bonds (0-1 years)
- Canadian government bonds (1-5 years)
- Canadian government bonds (5-10 years)
- Canadian government bonds (+10 years)
- German government bonds (0-1 years)
- German government bonds (1-5 years)
- Chinese government bonds (1-5 years)

**B. Medium-Term Tranche**



- U.S. government bonds (0-3 years)
- U.S. government bonds (3-5 years)
- U.S. inflation-linked government bonds (+10 years)
- Chinese government bonds (1-5 years)
- German government bonds
- United Kingdom government bonds
- Japanese government bonds
- Australian government bonds
- Canadian government bonds

Source: Banco de la República.

3.11). Passive management includes a passive portfolio in both the short- and medium-term tranches.

- Active management seeks to achieve higher returns than those of the benchmark index. To achieve this, the composition of actively managed portfolios is allowed to differ from that of the index. Within a controlled risk framework, portfolio managers apply their expertise and resources to design strategies aimed at increasing the long-term returns of the reserves. At the end of 2024, there were eight actively managed portfolios, accounting for 32.29% of the investment portfolio (Graph 3.11). All actively managed portfolios are part of the medium-term tranche.

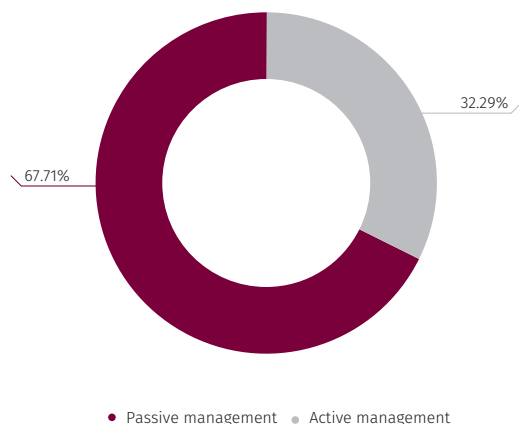
The Foreign Reserves Committee has established that active management should represent between 30% and 37% of the portfolio. This range provides an appropriate balance between the advantages of passive management (lower administrative costs and reduced risk relative to the benchmark index) and those of active management (higher expected returns and better portfolio diversification).

The share of active management and the number of managers assigned to this type of management are determined based on the following factors:

- Having few managers is inefficient: there are significant diversification benefits in having several actively managed portfolios, as the unfavorable performance of one manager can be offset by the favorable performance of others. As the number of managers increases, diversification allows overall risk to decline.
- Having too many managers is also inefficient: working with many entities reduces the amount of assets managed by each of them, leading to higher management fees. Additionally, the greater the number of managers, the higher the monitoring costs.

The observed returns of the reserve portfolios are compared with the returns of the benchmark index to assess whether portfolio managers have been successful. In the case of passive management, the objective is for the portfolio's return to be similar to that of the benchmark index. By contrast, under active management, managers are expected to achieve higher returns than the index, doing so in accordance with the investment guidelines defined by the Foreign Reserves Committee and under a controlled risk budget. To ensure robust monitoring of these programs, various indicators have been implemented to identify key characteristics of the different mandates (Box 3).

Graph 3.11  
Type of Management



Source: Banco de la República.

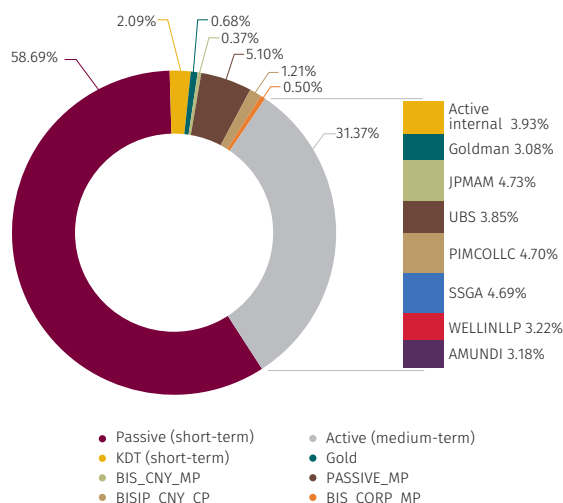
### 3.3.4 External Management Program

The management of foreign reserves resources is carried out through portfolios directly managed by the Sub-Directorate for Portfolio Management of the International Investments Department, as well as through portfolios managed by specialized external firms. Graph 3.12 presents the composition of the investment portfolio, as well as the details of portfolios managed internally and externally.

The Sub-Directorate for Portfolio Management is responsible for managing the working capital, the passive portfolio of the short-term tranche, the passive portfolio of the medium-term tranche, the gold tranche, and one of the actively managed portfolios within the medium-term tranche<sup>21</sup> (Graph 3.12). For the management of the remaining resources, the Foreign Reserves Committee adopted the external management program in 1994, through which actively managed portfolios of the medium-term tranche are managed.

External managers are entities specialized in investment portfolio management, and many central banks use them to manage their foreign reserves. This is partly done to enhance the professionalism with which their portfolios are managed, but also because of the access to international market analysis the professionals at these entities can provide, as well as the training given to central bank staff involved in foreign reserves management.

Graph 3.12  
Investment Portfolio Composition



Source: Banco de la República.

As external managers actively manage portfolios, they are authorized to invest in different assets and in proportions different from the benchmark, in accordance with the investment policies and limits established by the Foreign Reserves Committee. These are referred to as “investment guidelines.” External managers may deviate from the benchmark index through interest rate and exchange rate strategies. Interest rate strategies include buying or selling bonds based on expectations regarding interest rate performance, while exchange rate strategies adjust the currency composition of the portfolio according to expectations regarding the performance of currencies. The Bank monitors portfolios daily to ensure that institutions comply with the established limits. Contractually, external managers are responsible for any costs stemming from deviations from the investment guidelines.

The external management program aims to generate added value to the reserve's portfolio through greater investment diversification. The selected firms are experienced and well versed in the world's financial markets and have sophisticated infrastructure, all of which can be leveraged when defining investment strategies for the foreign reserves. The

21 The internally managed non-indexed portfolio is managed similarly to those included in the external management program, but with stricter limits.

foreign reserves assets managed by external managers are held in custody accounts managed by *Banco de la República*.

As of 31 December 2024, the external firms participating in the active management program with dedicated portfolios included JPMorgan Asset Management (UK) Limited (JPMAM), Wellington Management Company LLP (WELLINLLP), Goldman Sachs Asset Management L.P. (Goldman), State Street Global Advisors Trust Co. (SSGA), UBS Asset Management (Americas) Inc. (UBS), Amundi Asset Management (Amundi), and Pacific Investment Management Company LLC (Pimco LLC) (Graph 3.12). The purpose of employing multiple external administrators is to ensure that the program, as a whole, outperforms the benchmark index while keeping a low risk level, which is possible through diversification.

In addition to these entities, a small portion of reserves is invested in funds managed by the BIS, which are exclusively available to central banks and multilateral entities, and intended to diversify foreign reserves through a cooperative effort among different countries. As of 31 December 2024, these investments included: the fund invested in securities issued by the government and the People's Bank of China (BIS Investment Pool: BIS\_CNY\_MP and BIS\_CNY\_CP), which represented USD 914.79 m, along with placements in the global corporate debt investment fund denominated in U.S. dollars (BIS Investment Pool: BIS\_CORP\_MP), amounting to USD 287.59 m (Graph 3.12). *Banrep* has been a member of the BIS since December 2011, and one of the objectives of this multilateral entity is to help central banks develop the capability to manage their foreign reserves.

The external management program has provided the following benefits to *Banrep*:

- Added value to reserves management: Over the past decade, the net return (after fees) of the external management program has exceeded its benchmark index by an average of 12 basis points (bps) per year.
- Diversification of investment strategies: Having multiple managers allows for more efficient management of the risk of deviation from the benchmark.
- Expertise and analytical capacity: This enables external managers to select investments with a favorable risk/return profile, within the limits established in the investment guidelines.
- Development of qualified staff: External managers have provided training to *Banrep's* staff, which has contributed to improving investment processes and risk analysis within the International Investments Department.
- Access to information and analysis by specialists within financial markets: The International Investments Department receives information and analysis from experts in the financial markets where reserves are invested. In addition, the firms participating in the program have strong credit analyst teams, which complement and enhance the issuer's research received from rating agencies.

The Foreign Reserves Committee defines the evaluation parameters of external managers and regularly monitors these indicators. In this context, external managers with dedicated portfolios are assessed at the following stages:

- **Selection process:** Managers are selected from among leading international fixed-income portfolio management firms. Participating firms must respond to a request for proposal (RFP), which evaluates aspects such as the firm's structure, organization, investment process, risk management, reporting capabilities, technology transfer and training services, and historical performance. The final stage of the selection process involves on-site visits to the finalist firms. The final decision is made based on the quoted fees and the scores obtained throughout the selection process. The Foreign Reserves Committee has determined that external administrator selection processes must be conducted at least every three years.
- **Periodic evaluation:** Once a management contract begins, *Banrep* begins to monitor the manager closely, and reports on its performance are submitted to the Foreign Reserves Committee at least on a bimonthly basis. In addition, the Committee determined that a thorough assessment of the first three years' performance for each manager must be conducted. This period was selected in an effort 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 used for this monitoring include returns, a review of the investment and risk management process, as well as other operational and service-related aspects. Based on the outcome of each manager's evaluation, *Banrep* may decide to modify the delegated amount or to terminate the agreement. The entities that obtain the best results in the annual evaluation manage the larger portfolios, depending on the time they have been working with *Banrep*. Box 3 provides a more detailed explanation of some of the metrics used by *Banrep* to analyze the performance of external managers and to guide the allocation of assets among firms, considering their risk-return profiles and their contribution to diversification within the program.

As a complement to the description of the current status of *Banrep*'s management of foreign reserves, Box 4 outlines the main trends in the management of foreign reserves by other central banks.

## Box 1: Real-Time Forecast of Quarterly GDP Growth Using Nowcasting Techniques

The continuous monitoring of advanced economies is necessary for the International Investments Department (DII for the acronym in Spanish), as their developments affect financial markets and, consequently, the returns of the foreign reserve portfolio. This monitoring requires tools capable of synthesizing movements in aggregate variables to reduce uncertainty in environments where frequent statistical revisions and delays in official publications makes it difficult to assess the macroeconomic situation. Timely assessment of economic conditions requires up-to-date information; however, key variables, such as gross domestic product (GDP), are often published with significant lags. For example, U.S. GDP data are released thirty days after the end of the quarter, whereas the lag in the Euro zone can be even longer. This delay limits the ability to conduct timely analysis, catalyzing methodological advancements to estimate current economic growth using high-frequency data. In this regard, DII decided to implement an approach that allows the real-time integration of key indicators to support decision-making in foreign reserves management.

A widely adopted solution is nowcasting, a technique that combines advanced statistical models with available information to forecast variables prior to their official publication. Unlike traditional forecasting techniques, which estimate values for future periods (such as the next quarter or year) using historical data, nowcasting predicts current data using partial figures. Its advantage lies in its ability to update estimates as new monthly or weekly indicators are released, such as industrial production, retail sales, or confidence surveys. However, the main challenge of this methodology is to synthesize information from numerous indicators without overfitting the model. To this end, Giannone et al. (2008), who coined the term “nowcasting”, proposed a two-stage estimator to identify macroeconomic shocks by combining dynamic factor analysis using a Kalman filter. The core idea of this methodology is to leverage the existing collinearity among the series, summarizing as much information as possible into a few factors. We define the information set as follows:

$$\Omega_{v_j} = \{X_{it|v_j}; t = 1, \dots, T_{iv_j}; i = 1, \dots, n\}$$

This set of information consists of  $n$  variables,  $X_{it|v_j}$ , where  $i$  identifies each series,  $t$  denotes time in months from the first to the last observation, and  $v$  is an index associated with the information release date, which has a higher frequency greater than  $t$ .  $T_{iv_j}$  indicates the most recent period for which series  $i$  in block  $v_j$  has an observed value. For example, the retail sales report is released in month  $v$ , but the information is only available for the previous period,  $T_{iv_j} = v - 1$ . By contrast, manufacturing surveys are released for the current month, in which case  $T_{iv_j} = v$ .

As GDP is a quarterly series, while the information used for nowcasting is monthly, an additional notation is introduced to handle time conventions. Each month or quarter has a fixed number of days, and there are  $k$  periods. However, variables are not necessarily collected at that interval and may be reported at a different frequency. For example, if industrial production data is released monthly, then in a monthly model  $k = 1$ , whereas in a weekly model  $k = 4$ . Accordingly, GDP in a monthly model, where  $k = 3$  and  $t$  is a multiple of  $k$ , which is described by the following equation:

$$\begin{aligned} y_t^k &= Y_t^k - Y_{t-3}^k \approx (Y_t^M + Y_{t-2}^M) - (Y_{t-3}^M + Y_{t-4}^M + Y_{t-5}^M) \\ &= y_t + 2y_{t-1} + 3y_{t-2} + 2y_{t-3} + y_{t-4}, \quad t = 3, 6, 9, \dots \end{aligned}$$

The key feature of this type of approach is that a joint model is specified for  $Y_t^k$  and it has a state-space representation, where the measurement equation links observed variables to unobserved ones. The state-space model is governed by measurement equations, which relate the data to the unobserved states, and by the transition equations, which describe the dynamics of the system:

$$Y_t^k = \mu + \beta X_t + G_t$$

$$X_t = X_{t-1} + H_t, H_t \sim i.i.d N(0, \sigma_{H_t}^2)$$

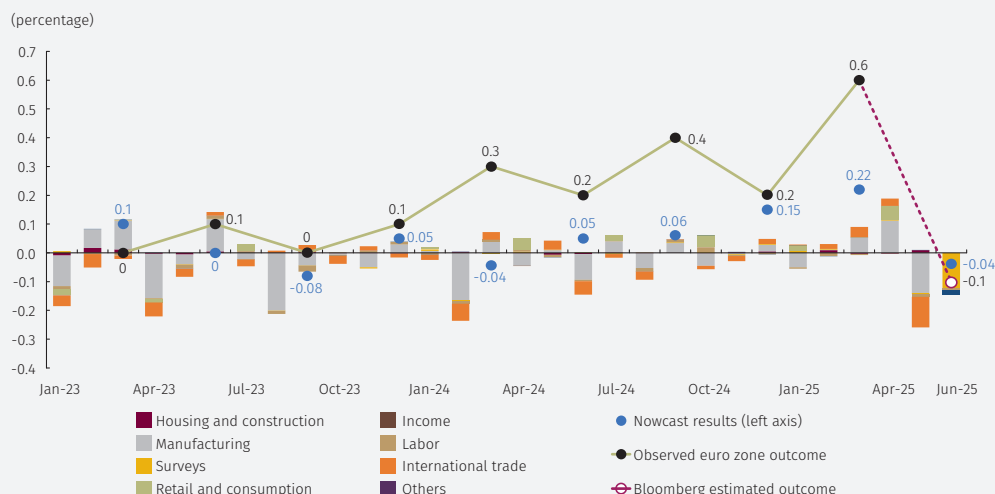
The parameters used in this state-space representation are estimated through principal component analysis applied to a balanced panel of  $Y_t$  for the estimated factors, which is obtained by considering only the sample for which all observations are available. The factors are then re-estimated using the Kalman filter and the EM algorithm. These two steps are repeated until the maximum likelihood estimates are obtained.

It is worth noting that the Kalman filter can efficiently handle any missing observations in  $Y_t^k$  and provide the conditional expectation for them. Consequently, immediate forecasts for the target variable and predictors can be easily obtained, allowing new data to be incorporated and predictions to be updated using innovative components known as news and revisions. In this regard, published data are rigorously weighted, and it is possible to assess how different data categories (surveys, construction, labor market, among others) contribute to signaling changes in economic activity. As a result of this exercise, the model produces a monthly GDP forecast broken down by components for the economies to which it was applied, including the United States, Canada, the Euro zone, the United Kingdom, Australia, and New Zealand.

To assess the practical usefulness of the nowcasting approach, its ability to estimate GDP for one of the most relevant economies within the foreign reserve portfolio was compared: the Euro zone (Graph B1.1). To conduct this comparison, a traditional vector autoregressive (VAR) forecasting model was estimated as a benchmark. Accordingly, the developed nowcasting model shows a significant improvement in accuracy, with a 47.1% reduction in error compared to the traditional VAR model in the preliminary GDP estimate released by the statistics office, and a 51.8% reduction compared to the final data for this indicator between the first quarter of 2023 and the second quarter of 2025. These results demonstrate significant progress in anticipating the economic performance of a complex economy.

Additionally, the implementation of the nowcasting forecasting model offers several practical advantages, ranging from the automatic integration of tens of macroeconomic variables via filtering algorithms to the ability to handle missing data in historical series without compromising the robustness of the estimates, unlike many traditional forecasting models. Moreover, this model enables the processing of information on economic activity as it is received by market agents (in real time), since data releases are monitored, expectations are formed, and projections are subsequently reviewed in response to significant updates in the figures. In this regard, the result becomes more accurate as the quarter progresses, facilitating the assessment of growth direction prior to the official dissemination of results by the statistics office. Finally, the forecast broken down by sectors enables assessment of each one's contribution to the aggregate output and the identification of vulnerable segments, thereby supporting a more informed investment decision-making process.

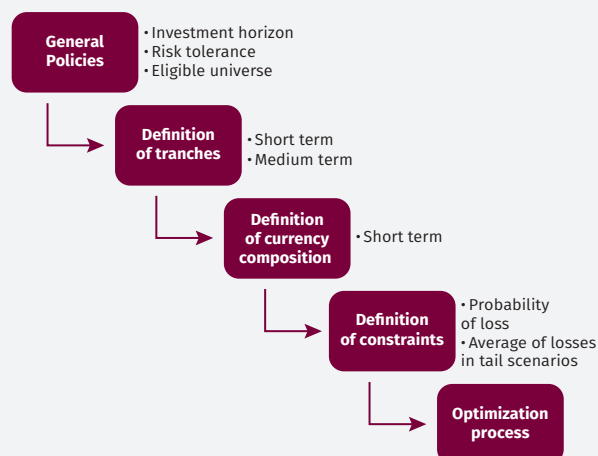
**Graph B1.1**  
**Euro Zone**



Source: Calculations by Banco de la República.

## Box 2: Criteria for Defining the Eligible Asset Universe and its Maximum Participation in Strategic Asset Allocation

Diagram B2.1  
Foreign Reserves Strategic Asset Selection Process



Source: Banco de la República.

One of the most relevant processes carried out by the International Investments Department (DII for the acronym in Spanish) is the strategic allocation of the foreign reserve assets. To conduct this process, it is necessary to consider the degree of risk aversion of the foreign reserves' administrator in relation to variables such as numeraire, the investment horizon, and the eligible asset universe (see Diagram B2.1). It is relevant to emphasize that general policies must be defined before conducting the strategic asset allocation, as the investment guidelines (in general) delimit and establish criteria for investing the reserves. These policies have been established based on market best practices and recommendations from multinational institutions, such as the International Monetary Fund (IMF) and the Bank for International Settlements (BIS), in line with international criteria. This box presents a framework that helps explain the process for defining the eligible asset universe for strategic asset allocation.

The methodology takes three aspects into consideration:

- 1. Currency liquidity:** According to the BIS' triennial survey, minimum liquidity criteria is defined for various foreign exchange markets. Within the list of currencies, ranked from highest to lowest by total over-the-counter (OTC) transaction volumes, reserve currencies<sup>2</sup> with a turnover above the threshold defined as highly liquid by Banco de la República's Foreign Reserves Committee are selected. Currencies meeting this criterion include: the U.S. dollar (USD), euro (EUR), Japanese yen (JPY), pound sterling (GBP), Chinese renminbi (CNY), Australian dollar (AUD), Canadian dollar (CAD), and Swiss franc (CHF).
- 2. Positive interest rates:** The relevant interest rates of each currency must be positive, thus markets with negative rates are excluded. Currently, this guideline does not exclude any of the currencies that meet the criterion contained in the previous section.
- 3. Government bond market liquidity:** for currencies that meet the first two criteria: The maximum position size that can be held is estimated so that the corresponding transactions can be carried out within a maximum of two days.

Generally, the methodology aims to ensure that exposure to each index can be liquidated within two days or less. In particular, the shortest-term index available for each currency<sup>3</sup> was selected, and its

1 Bank for International Settlements (BIS). *Triennial Central Bank Survey of foreign exchange and Over-the-counter derivatives markets in 2022: Preliminary Results*, December 2022, available at: <https://www.bis.org/statistics/rpfx22.htm>

2 Banco de la República reserve currencies include: Danish krone (DKK), Norwegian krone (NOK), Swedish krona (SEK), Australian dollar (AUD), Canadian dollar (CAD), U.S. dollar (USD), Hong Kong dollar (HKD), New Zealand dollar (NZD), Singapore dollar (SGD), euro (EUR), Swiss franc (CHF), pound sterling (GBP), Chinese renminbi (CNY/CNH), Japanese yen (JPY), and South Korean won (KRW).

3 The shortest-term index is used because, in a lower risk-taking scenario, it is generally possible to invest exclusively in this asset (when interest rates are low, the optimal solution lies at the shortest possible duration).

maximum share<sup>4</sup> was estimated. This value is used as the maximum share constraint for the remaining indices of each currency. Although liquidity indicators are available for some of the markets or indices used in strategic asset allocation, these do not cover all required assets, and in some cases, are not comparable. Additionally, the survey inquired about the methodologies used by counterparties to assess portfolio liquidity, finding that they likewise rely on similar periodic surveys to this end.

Table B2.1 presents information on the short-term indices and the maximum share under liquidity constraints. The first column indicates the currency; the second and third columns report the index used; the fourth column presents the modified duration; and the fifth column shows the maximum allowed share. Regarding the latter, it is essential to clarify that these are not the weights assigned to assets within reserve portfolios; instead, they constitute constraints imposed on the optimization exercise that prevent the asset's share from exceeding these limits.

Table B2.1  
Short-Term Indices and their Maximum Share Under Liquidity Constraints

Currency	Description	Index	Duration	wmax
USD	U.S. government bonds, 0–1 years	G0QA	0.49	100,0%
CNY	Chinese government bonds, 1–5 years	GVCN	2.63	53,0%
JPY	Japanese government bonds, 0–1 years	G0YA	0.5	34,0%
EUR	German government bonds, 0–1 years	GADB	0.49	13,0%
AUD	Australian government bonds, 0–3 years	GJBT	1.37	10,0%
CAD	Canadian government bonds, 0–1 years	G0CA	0.43	8,0%
GBP	United Kingdom government bonds, 0–1 years	G0LA	0.52	7,0%

Source: ICE and Banco de la República.

Similarly, within the short end of the curve, the currency basket is imposed as a constraint, together with the outcome of applying the weights defined by the currency basket to the shortest-duration securities of each currency included in the basket.

$$4 \quad w_{maxliq}^{proposed} = \min\left(\frac{MaxBond * \# Bond * 2}{VM_{portfolio}}, 100\%\right)$$

## Box 3: Active Management of Foreign Reserves

The management of foreign reserves follows two investment styles: passive and active. The objective of the former is to replicate, as closely as possible, the risk characteristics of a benchmark index while aiming to generate positive returns and minimize transaction costs. The latter allows deviations from the benchmark index composition within predefined limits to obtain higher returns. In 1994, *Banco de la República* established an active management program under which portfolio managers invest the allocated resources in accordance with specific investment guidelines and a defined risk budget. Since its inception, active management has outperformed the benchmark index by 9 basis points (bps) and by 10 bps over a five-year window; that is, had the portfolio been managed exclusively under a passive approach, its performance would have been lower<sup>1</sup>.

The participation of multiple managers within the active management program provides several key benefits. First, it allows for diversification across investment styles, as each administrator may apply different approaches, thereby reducing the risk of concentration in a single market view. Second, it improves the portfolio's risk-return profile, since combining heterogeneous strategies can result in lower volatility for a given level of expected return. Third, it enhances resilience across different market cycles, as some managers may outperform in upward environments, while others may do so in downward or volatile conditions, thereby smoothing overall performance. Finally, it enables a richer comparative assessment, allowing the identification of which strategies add value, and which do not within a common reference framework.

As part of the ongoing evaluation of the external managers' performance, the Bank relies on a set of metrics that enables the identification of which managers are consistent regarding their performance over time and the determination of the share of active management to be allocated to each of them. This box describes some of the indicators<sup>2</sup> used in this monitoring process<sup>3</sup>:

The capture ratio is a metric used to assess the performance of an investment portfolio relative to a benchmark index during periods of market upturns or downturns. This ratio consists of two components:

- The upside capture ratio, which measures the extent to which a portfolio captures the benchmark index's positive returns during upward market trends. When this ratio is above 1, it suggests that the portfolio manager generates returns above those of the benchmark index during market upturns. Conversely, a value below 1 suggests that the portfolio manager generates lower returns than those of the benchmark index under the same conditions.
- The downside capture ratio, which measures the extent to which a portfolio captures the benchmark index's negative returns during downward market trends. A ratio above 1 suggests that the portfolio manager generates lower returns than those of the benchmark index during periods of market downturns. Conversely, values below 1 suggest that the portfolio manager generates returns above those of the benchmark index under the same conditions.

1 Information as of 31 December 2024.

2 All graphs presented in this box are for illustrative purposes and have been constructed using fictitious data; therefore, they do not reflect the actual performance of foreign reserve administrators.

3 The selection of external administrators is conducted through a rigorous process that involves a variety of financial and non-financial criteria, along with a thorough, detailed evaluation. For further information on the administrator's selection process regarding the active management program, see Section 3.3.4: External Management Program.

The capture ratio is calculated as the ratio between the upside capture ratio and the downside capture ratio. Graph B3.1 illustrates different levels of these ratios for six hypothetical administrators in the active management program over twelve-month and ten-year periods.

The graph is divided into four quadrants that allow portfolios to be classified according to their performance in upward and downward markets:

- Upper-left quadrant (best outcome): Represents portfolios that effectively capture positive returns during market upturns while simultaneously limiting their exposure to losses during market downturns.
- Lower-left quadrant (conservative): Represents portfolios with low capture of both positive and negative returns, suggesting a more defensive or conservative approach.
- Upper-right quadrant (aggressive): Represents portfolios that strongly capture positive returns but also experience significant losses during market downturns.
- Lower-right quadrant (worst outcome): Represents portfolios with limited participation in positive returns and high exposure to losses, reflecting unfavorable performance in both scenarios.

It is worth noting that it is not necessarily desirable for all external managers to be positioned within the same quadrant. This is because each manager exhibits distinct characteristics and investment styles, which contribute to diversification and to the overall portfolio's risk-return.

Another indicator is the batting average, which measures the ability of a manager to generate positive excess returns relative to the benchmark index; in other words, their ability to "beat the index." This indicator is calculated as the number of periods in which the manager outperforms the benchmark index, divided by the total number of observations during a given period. Graph B3.2 presents the results of this indicator for twelve-month and ten-year periods.

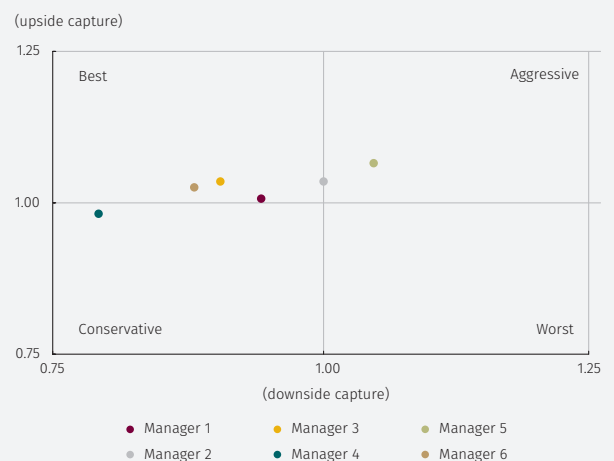
In Panels A and B, the batting average is shown as a percentage, and the green line represents the 50% threshold. Panel A shows that Manager 4 outperformed the benchmark index in fewer than 50% of the observations over a twelve-month period. In contrast, Manager 6

Graph B3.1  
Example Performance Metrics for Hypothetical Managers

#### A. 12 Months



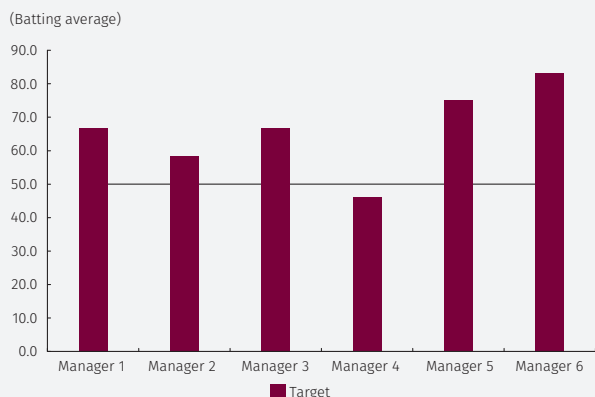
#### B. 10 Years



Source: Banco de la República, International Investments.

Graph B3.2  
Example of Batting Average for Hypothetical Managers

A. 12 Months



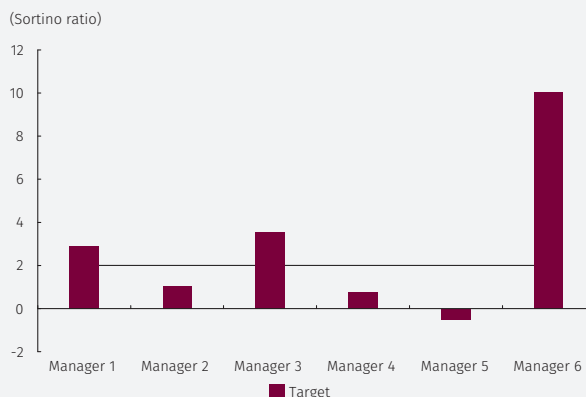
B. 10 Years



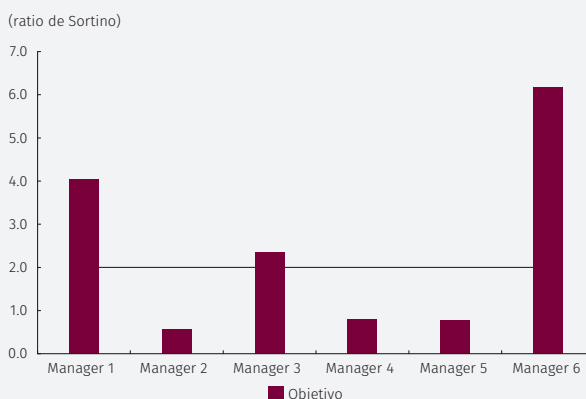
Source: Banco de la República, International Investments.

Graph B3.3  
Example of Sortino Ratio for Hypothetical Managers

A. 12 Months



B. 10 Years



Source: Banco de la República, International Investments.

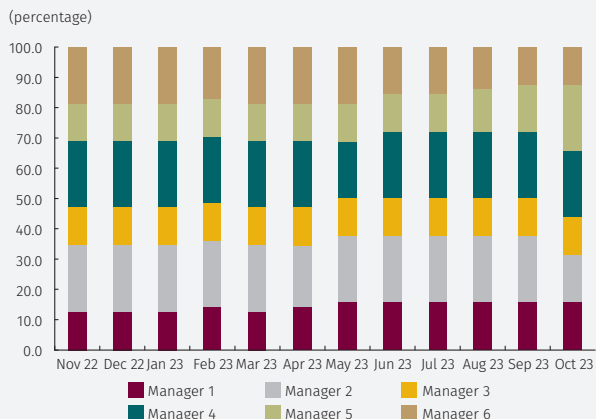
was the one that most frequently outperformed the benchmark index, exceeding the 50% threshold both over the twelve-month and ten-year horizons.

A third index includes the Sortino ratio, which measures the excess return of an investment relative to a predefined target, adjusted for risk. In the active management program, the target return corresponds to the returns of the benchmark index. Unlike other metrics, this ratio considers only the volatility of negative excess returns, based on the premise that investors are more sensitive to downturns than upturns regarding returns.

Graph B3.3 presents the Sortino ratio results for six hypothetical managers within the active management program. A negative value in this ratio reflects a negative excess return relative to the benchmark index, as observed for Manager 5 over a twelve-month period (Panel A). In contrast, a positive value indicates that excess returns have been positive. Regarding Manager 6, their high positive Sortino ratio can be attributed to two factors: a significant positive excess return and low volatility in negative returns over the evaluated period. In summary, this ratio captures the balance between generating high excess returns and maintaining low exposure to the risk of negative excess returns.

On the other hand, a monthly optimal allocation exercise is conducted to distribute resources among the managers of the active management for foreign reserves, based on information about their historical performance: returns, risk, and correlation with other managers. The objective of the optimization exercise is to maximize the excess return of the entire active management program, subject to its total risk, a metric known as the information ratio. This optimization enables the identification, over time, of those managers to whom a larger allocation of resources should be assigned, given their ability to generate risk-adjusted

**Graph B3.4**  
**Example of Batting Average for Hypothetical Managers**



Source: Banco de la República, International Investments.

excess returns. For example, Graph B3.4 illustrates the hypothetical allocation across five managers, in accordance with the optimization model<sup>4</sup>.

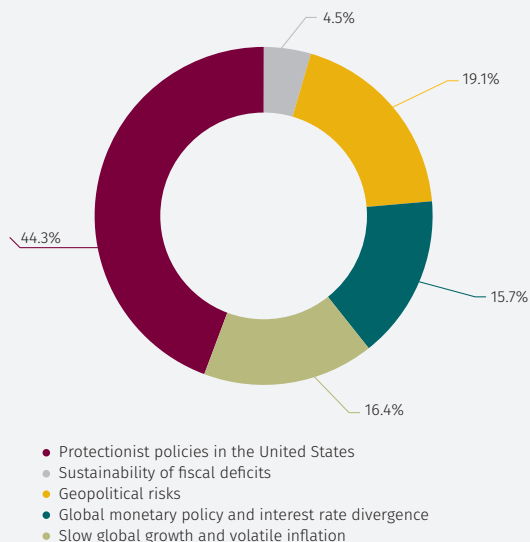
Graph B3.4 exhibits that, as of the most recent reporting date and based exclusively on historical performance, Manager 4 could maintain its current share of resources under management. On the other hand, for both Manager 5 and Manager 2, the exercise indicates a potential change in their resource allocation. This type of tool complements the monitoring of managers’ performance and provides deeper insight into the reasons why the model would suggest a higher or lower allocation to a given manager, which could ultimately affect the future number of resources managed by the firms participating in the program. Currently, the allocation of resources among managers within the program considers, in addition to performance, other variables such as the firm’s assets under management, quality of client service, investment and risk management processes, and knowledge transfer. The indicators presented in this box, which are based exclusively on financial information, serve to complement the evaluation and support decision-making regarding resource allocation among managers. This has contributed to strengthening the active mandate’s performance over time, resulting in favorable outcomes that benefit the foreign reserve investment portfolio’s performance.

<sup>4</sup> The allocation represents the percentage of the program’s total size under management.

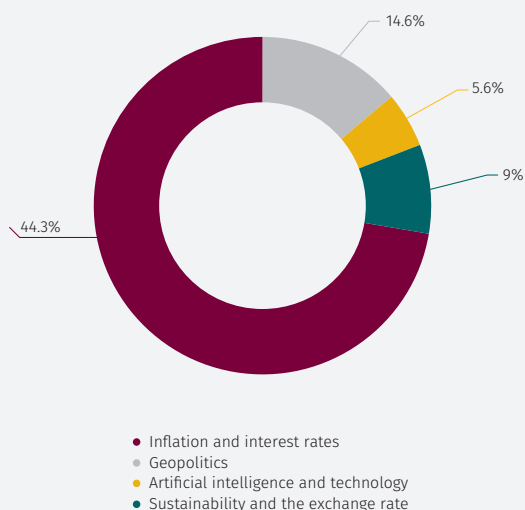
## Box 4: Trends in Reserve Management

Graph B4.1  
Risks and Relevant Factors in Reserve Management for Central Banks

A. In your opinion, what is the most important risk facing reserve managers in 2025?



B. What do you think will be the most important factor affecting the management of the reserves over the next five years?



Source: HSBC Reserve Management Trends, 2025.

### Introduction

The management of foreign reserves has evolved with the objective of ensuring safety, liquidity, and return. Safety requires effective management of investment-related risks, while liquidity refers to the ability to convert assets into cash quickly and at low cost. In turn, return refers to the potential of financial assets to increase in value over time. To achieve these objectives, central banks and various international institutions implement asset allocation and currency distribution strategies across different sectors and markets. This section outlines the main trends in reserve management adopted by various central banks, based on information from the most recent surveys on reserve management practices and international portfolios of central banks and official institutions.

### Macroeconomic Risks

In the current macroeconomic environment, investors perceive a range of significant risks that could affect reserve management and investment decisions in 2025. According to the Hong Kong and Shanghai Banking Corporation (HSBC) and the Central Banking<sup>1</sup> survey conducted among 88 central banks in the first quarter of 2025 and published in May, U.S. protectionist policies are identified as the main concern, reflecting fears of a potential fragmentation in global trade. Additionally, persistently high inflation and interest rates above pre-pandemic levels stand out as the most influential factor in medium-term planning (Graph B4.1). Reserve managers anticipate an interest rate divergence between the United States and the Euro zone that could exceed 175 basis points (bps), hindering duration and liquidity strategies. In response to the Federal Reserve's (Fed) stance of maintaining high interest rates for an extended period, nearly half of the central banks have adjusted their portfolios. Finally, the shift toward a more multipolar world has intensified discussions around de-dollarization, with a growing number of countries exploring alternatives to the U.S. dollar in international trade, adding an additional layer of uncertainty to the global financial outlook.

### 1. Strategic Asset Allocation

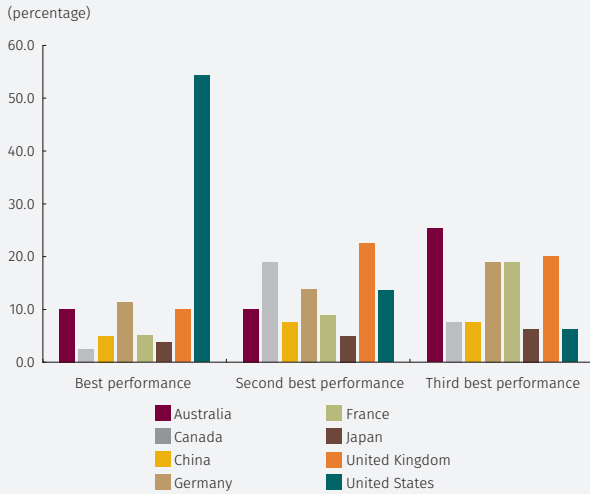
According to the Central Banking survey, the most favorable performance expectations are concentrated in markets within the U.S., the United Kingdom, Australia, Canada, France, and Germany. Graph B4.2 shows that 54% of the surveyed central banks expect the United States to perform the strongest, while 22% identify the United Kingdom as the second best-performing market. Consistent with this outlook, the benchmark index of *Banco de la República's* foreign reserve portfolio allocates a significant share to these markets, reflecting their relevance within the investment strategy.

Regarding sectors and asset types, government bonds, supranational bonds, deposits, and Treasury bills continue to play a predominant role in the preferences of central banks. Graph B4.3 shows that 85.9% of the central banks surveyed report investing in government and

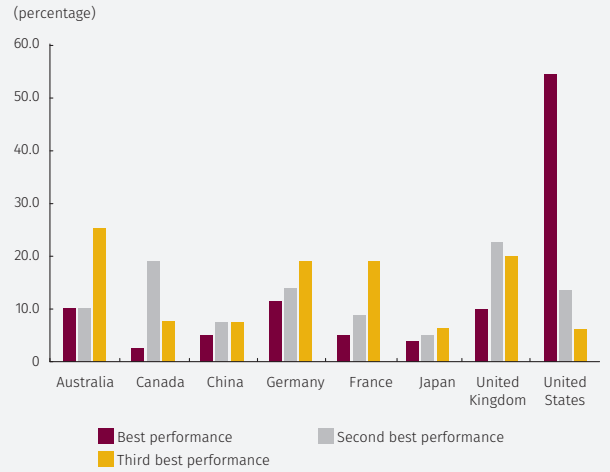
<sup>1</sup> HSBC Reserve Management Trends, 2025: <https://www.centralbanking.com/hsbc-reserve-management-trends-2025>

**Graph B4.2**  
Performance Expectations Across Fixed-Income Markets

**A. Which of the bond markets of the following countries do you believe will experience superior relative performance?**



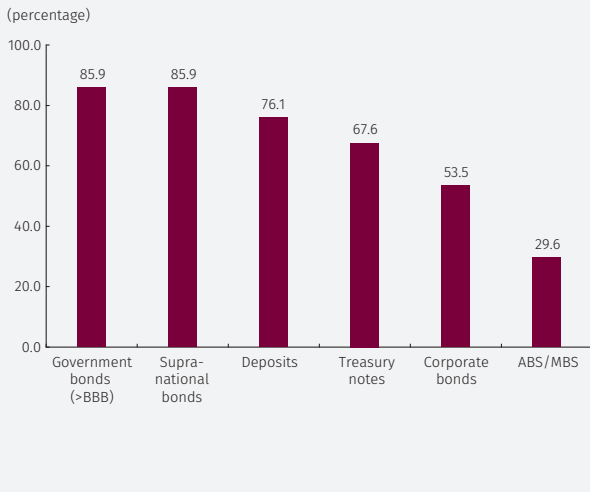
**B. Which of the bond markets of the following countries do you believe will experience superior relative performance?**



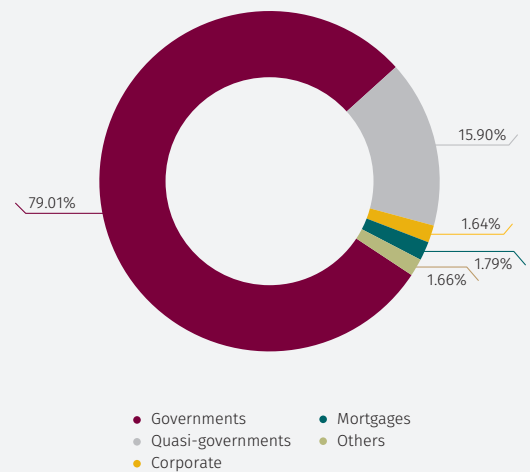
Fuente: HSBC Reserve Management Trends, 2025.

**Graph B4.3**  
Trends in Investment Instruments and Sectors

**A. Main Investment Instruments Used by Central Banks**



**B. Portfolio Composition by Sector (percentage of total)**

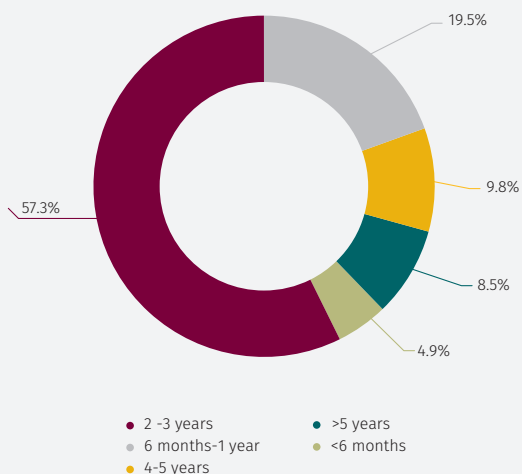


Source: HSBC Reserve Management Trends, 2025.

supranational bonds. Consistent with this international trend, the sector exposure of *Banco de la República's* reserve portfolio, as of May 2025, exhibits a preference for these instruments: 79% is allocated to government instruments, while 16% remains in quasi-government instruments.

It is worth noting that other assets, such as digital assets (e.g., cryptocurrencies, stablecoins, etc.), are not yet included in the portfolios of surveyed central banks, nor in *Banco de la*

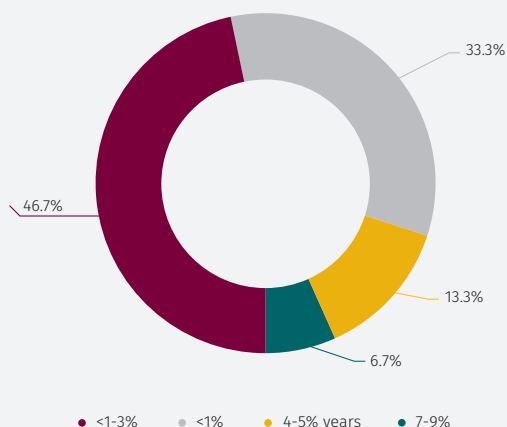
**Graph B4.4**  
Duration Profiles of Central Bank Fixed-Income Portfolios



Fuente: HSBC Reserve Management Trends, 2025.

**Graph B4.5**  
Central Banks Exposure to the Renminbi

If you invest, what proportion of your reserves is allocated to renminbi?



Source: HSBC Reserve Management Trends, 2025.

*República's* portfolio. According to a World Bank study, high volatility, limited liquidity, elevated transaction costs, operational risks, and the lack of adoption in global trade and financial flows make these assets incompatible with the objectives of stability and immediate availability required by central banks. Additionally, the absence of a clear and coordinated international regulatory framework reinforces these institutions' reluctance to include crypto-assets in their investment portfolios<sup>2</sup>.

Exposure to interest rate risk is relevant because it reflects market participants' expectations regarding market performance. An increase in interest rates can adversely affect portfolio values; as a result, central banks rigorously control this risk. According to the surveys analyzed, the portfolios of most central banks exhibit a duration of between two and three years (see Graph B4.4), implying a relatively low exposure to interest rate risk compared to other types of portfolio managers. As of May 2025, *Banco de la República's* reserve portfolio records a duration of 2.86 years, in line with trends observed among other central banks.

The strategic asset allocation by central banks has shown a significant evolution regarding their exposure to China. The renminbi (RMB) continues to attract interest as an investment currency, and expectations remain that its share in global reserves will gradually increase over the next decade. Currently, most reserve managers investing in RMB maintain a share between 1.0% and 3.0% (Graph B4.5). In line with this trend, as of May 2025, *Banco de la República* holds an exposure to China of approximately 2.15%, which has increased in recent years. This dynamic suggests that, while strategic interest in China remains in place, central banks are adopting a more selective, gradual, and prudent approach to its inclusion in reserve portfolios. In turn, investments in Australian and Canadian dollars remain an attractive alternative for most central banks, although with exposures lower than 10% of their portfolios.

Regarding de-dollarization, most of the surveyed central banks stated that this trend is increasing and being implemented gradually (77%), while 17% consider it is not growing (Graph B4.6). In this regard, *Banrep* has gradually reduced its exposure to the United States by updating its benchmark index.

As for gold, despite record-high prices, only 37.5% of central banks indicated that they expect to increase their allocation to this asset over the coming year. Among those planning to increase this allocation, the majority consider gold as a portfolio diversification instrument. In 2024, the primary buyers were China and India, with purchases totaling 116 tons of gold bars.

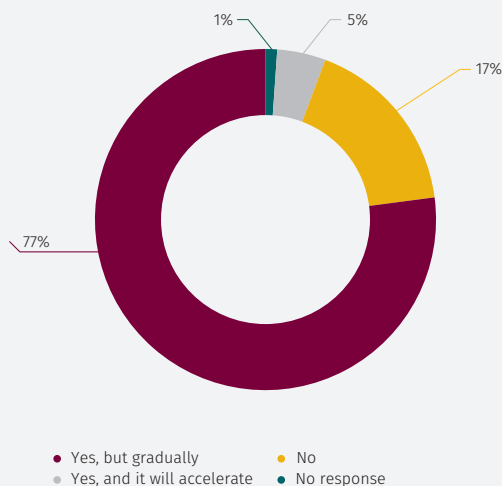
Additionally, according to the Official Monetary and Financial Institutions Forum's (OMFIF)<sup>3</sup> survey conducted among ninety official institutions between March and May 2025 (and published in May), regarding assets beyond traditional foreign currencies, although the shift toward public equities and corporate bonds has temporarily stalled, their relevance is expected to strengthen over the next decade. These asset classes are projected to be in the highest demand over the long term (five to ten years), with a net appetite exceeding 25%. In addition, exchange-traded funds (ETFs) are considered as a diversification

2 The World Bank-International Bank for Reconstruction and Development, 2024. Can Crypto-Assets Play a Role in Foreign Reserves Portfolios? Available at: <https://documents1.worldbank.org/curated/en/099553102232444409/pdf/IDU1c16366af173fa148931a28b189e8eca412f3.pdf>

3 Global Public Investor, 2025: <https://www.omff.org/global-public-investor-2025/>

Graph B4.6  
De-dollarization Trends

Do you believe that the pace of de-dollarization is increasing?



Source: HSBC Reserve Management Trends, 2025.

tool. About 21% of central bank reserve administrators intend to increase the share of ETFs in their portfolios.

## 2. Sustainability

The management of foreign reserves continues to evolve in response to changes in the global economic and financial environment, with one of the most significant developments over the past decade being the incorporation of sustainability criteria into investment decisions. This transformation has driven interest in instruments such as green, social, and sustainability bonds, and has led central banks to adopt socially responsible investment (SRI) practices. Indeed, a share of survey respondents (18%) reported an increased prioritization of these practices over the past year, while another group (36%) indicated that sustainability has been incorporated as the fourth objective in reserve management, although allocations remain limited. According to Graph B4.7, 81% of the surveyed banks have incorporated, or are considering incorporating, some SRI elements, and the vast majority of the sample currently invests in “green instruments.”

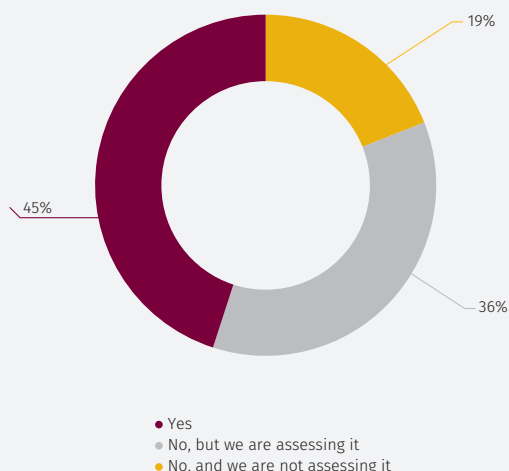
In line with this global trend, *Banco de la República* has initiated discussions on incorporating environmental, social, and governance factors into its investment criteria and is currently measuring and monitoring these factors within its portfolio. This reflects a growing commitment to a more responsible management of reserves, aligned with sustainability principles.

## 3. Geopolitical Risk and Alternative Markets

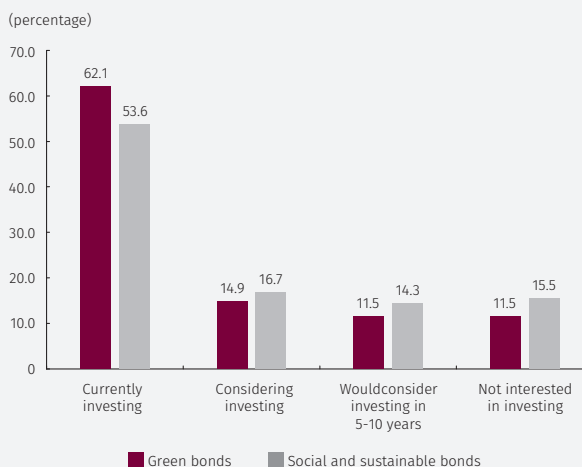
Geopolitical risks have become increasingly significant in the management of foreign reserves, reflecting a global environment that is progressively more fragmented and uncertain. In 2025, a large share of the surveyed central banks reported that they have been

Graph B4.7  
Trends in Responsible and Sustainable Investment Practices

A. Does your central bank incorporate any elements of SRI (Socially Responsible Investment) in reserve management?



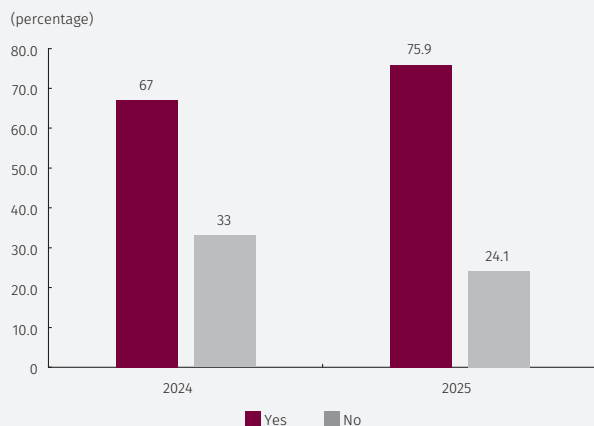
B. Which view best describes your approach toward the following asset classes?



Source: HSBC Reserve Management Trends, 2025.

**Graph B4.8**  
**Importance of Geopolitical Risks in Reserve Management**

Is geopolitical risk incorporated into your risk management and asset allocation process?



Source: HSBC Reserve Management Trends, 2025.

incorporating these risks into their asset allocation and risk management decisions, representing a significant increase compared to the level recorded in 2024 (Graph B4.8). This trend is particularly pronounced in regions such as Africa, Asia-Pacific, Europe, and the Euro zone.

Reserve managers are assessing the implications of geoeconomic fragmentation, including the decoupling between the United States and China, as well as the imposition of economic sanctions, which could reshape foreign currency preferences and encourage greater diversification of reserves. In addition, geopolitical conflicts, such as tensions in the Middle East and the South China Sea, along with energy security-related risks, are directly influencing asset valuation and the development of investment strategies that are more resilient to high-volatility scenarios. In line with global trends, *Banco de la República* has strengthened systematic monitoring of geopolitical conflicts and their potential impact on international financial markets. This ongoing monitoring enables timely assessment of risks associated with events such as regional tensions, economic sanctions, or shifts in trade dynamics, with the aim of incorporating these factors into strategic investment decisions and the prudent management of foreign reserves.

#### 4. Conclusion

The management of foreign reserves is undergoing continuous transformation, driven by a global environment marked by macroeconomic uncertainty, geopolitical fragmentation, and rising demand for sustainable investment practices. Central banks, including *Banco de la República*, have responded to these challenges through more sophisticated strategies for asset allocation, exchange rate diversification, and risk management. Attention to factors such as persistent inflation, interest rate divergence, gradual de-dollarization, and exposure to emerging economies, such as China, reflects a more strategic and adaptive approach. At the same time, the gradual incorporation of ESG criteria and the active monitoring of geopolitical tensions demonstrate a commitment to responsible and resilient management aligned with the principles of financial sustainability. In this context, strengthening analytical capabilities and continuously updating investment frameworks will be relevant to preserving stability and efficiency in the management of foreign reserves in the coming years.

## 4. Management of Risks Associated with Reserve Investments

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Risk is inherent in all investments, including those traditionally considered the safest. For example, government bonds issued by developed countries, which are considered the safest assets in the markets, are exposed to the risk of price fluctuations or countries' defaults. Cash stored in a vault is also exposed to risks, for example, theft or deterioration. Gold, commonly associated with safety criteria, sometimes exhibits sharp declines in price. Additionally, any investment decision is made in an environment of uncertainty, as the future performance of investments cannot be predicted with certainty, which means that any investor is exposed to different types of risk at all times.

The safety criterion underpinning the management of foreign reserves in Colombia entails adequately controlling the risks to which investments are exposed. To manage risks within acceptable parameters and levels, the Foreign Reserves Committee establishes strict limits on exposures to each of the different risks faced by foreign reserves. Additionally, there is an internal structure for risk monitoring and management, as investments considered safe at any given time may become risky due to changes in the economic environment or in the financial condition of each issuer.

### 4.1 Internal Structure for Foreign Reserve Risk Management

The International Investments Department is part of the Office for Monetary Operations and International Investments and is responsible for: implementing the investment policies established by the Foreign Reserves Committee; executing investments for internally managed portfolios; managing the external management program; monitoring the financial and non-financial risks related to the management of foreign reserves; and ensuring compliance with investment guidelines.

An internal infrastructure is in place to oversee the management of reserves. To maintain rigorous risk management practices throughout all stages of foreign reserves management, functional areas are segregated to minimize, among others, fraud, operational, and legal risks. A core aspect of the risk management framework at *Banrep*, as in many other central banks, is the segregation of functions assigned to the so-called front, middle, and back offices, as well as the separation of these functions from the internal control, auditing, and accounting areas. This division of duties ensures that the exposures assumed remain within the limits set by the defined governance and minimizes opportunities for fraud. The main components of this risk management scheme are as follows:

- *Banrep'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. This area is responsible for planning and executing operations of internally managed portfolios, in accordance with the policies and guidelines defined by the Reserves Committee.

- The back-office functions for the management of reserves are carried out by the Booking and Control of International Settlements Department (DRCPI for the Spanish acronym). DRCPI belongs to the Office for Payment Systems and Banking Operations, and is responsible for the confirmation, settlement, and reconciliation of transactions carried out during the investment process, including the operational aspects of relationships with custodians<sup>22</sup>, counterparties, correspondent banks, and external managers. DRCPI also independently performs the valuation and accounting registration process of all transactions related to the foreign reserve portfolios, which are subsequently incorporated into *Banrep's* official accounting records.

Accordingly, there is a separation between the staff responsible for executing financial transactions and those responsible for recording, confirming, and reconciling them. This segregation between execution and record-keeping functions helps mitigate the risk of fraud. The International Investments Department is part of the Office for Monetary Operations and International Investments, which in turn is part of the Office of the Deputy Technical Governor. On the other hand, DRCPI as part of the Office for Payment Systems and Banking Operations reports to the Office of the Deputy Executive Governor.

The Office for Risk Management, which reports to the Office of the Deputy Executive Governor, is the area responsible for *Banrep's* Integrated Risk Management System (IRMS)<sup>23</sup>. This system has strengthened the Bank in a transversal manner by enhancing standards for third-party risk management, environmental risk, financial risk assessment models, and the consolidation of risk appetite, among other aspects. On the other hand, the Office for Risk Management has further consolidated its role as a second line of defense (middle office) with a transversal scope across all *Banrep's* processes, by enhancing its policies, procedures, and technological tools. In this improvement process, efforts continue to maintain the risk culture through training and awareness programs aimed at the entire *Banrep's* community. These programs include issues related to the code of conduct, operational risk, and business continuity, among other aspects of integrated risk management. Additionally, this department supervises that the first line of defense performs its appropriate function regarding control, monitoring, and tracking risks, as well as compliance with investment guidelines.

The Office for Risk Management performs functions under its responsibility through its constituent departments and units, as well as with other areas of *Banrep* located in different organizational units that perform second-line defense functions for specific processes, such as the case of the Office for Risk Management within the foreign reserves management process. The latter unit, which is attached to the International Investments Department, is part of the Office for Monetary Operations and International Investments and is responsible for the daily monitoring of all portfolios, to verify that managers comply with the investment policies and guidelines established by the Reserves Committee. As a result, the Office for Risk Management prepares financial and operational reports that are presented to the Reserves Committee and the Foreign Reserves Operating Committee, respectively.

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22 Custodians are the financial institutions where *Banrep's* securities are held. The major custodians of securities in foreign reserves are the Federal Reserve Bank of New York, Euroclear Bank, JPMorgan Chase Bank, and State Street Bank.

23 The IRMS is defined as the set of policies, limits, methodologies, and monitoring and control schemes established by *Banrep* to manage the organization's risks and support the institution's decision-making.

In addition, the team analyzes the investment strategies implemented across the different portfolios and is responsible for the management and implementation of the Financial Risk Management System (liquidity, market, credit, and foreign exchange risks) of foreign reserves, in accordance with the policies set by the Foreign Reserves Committee and the Risk Committee.

In accordance with the Integrated Risk Management Policy, risk management at *Banrep* is based on a three-line defense model that enables the identification, management, and control of risks in a scheme of checks and balances. In this regard, the separation of duties is not restricted to the back and front office areas. There is also a separation between those who execute transactions and manage financial exposures (front) and those who measure them (middle).

In the same regard, there are other departments within the Issuer involved in reserves management and are part of the risk management framework. The Accounting Department is responsible for independently generating *Banrep's* official accounting records, into which the economic facts of foreign reserve portfolios, recorded by the DRCPI, are incorporated. The Foreign Exchange Affairs Department manages the Society for Worldwide Interbank Financial Telecommunication (SWIFT) system, which enables the secure exchange of messages among financial institutions worldwide, and whose access is restricted. The International Investments Department and the DRCPI have access to SWIFT under different profiles, allowing separate areas to participate in the process of capturing, verifying, and releasing payment messages. This process mitigates the risk of fraud, among other operational controls in place throughout the process. The Internal Control Department, which serves as the third line of defense, reports directly to the Office of the Deputy Executive Governor, verifies the effectiveness of process controls, and ensures that all procedures are duly documented and executed in accordance with internal regulations. Additionally, it suggests opportunities for improvement to ensure that processes are carried out with the highest level of security. Process and procedure manuals are published on *Banrep's* intranet and are defined consistently by the guidelines of the institution's Process-Based Management model, managed by the Office for Risk Management. These manuals are updated frequently and serve as a tool to instruct new staff and clearly define the responsibilities of each area and position. Finally, the General Directorate for Human Resource Management requires that each position has a job manual that clearly delineates the responsibilities and authority of each position. Hiring processes ensure that personnel joining the Bank meet the profile required for each position.

The General Auditor conducts frequent on-site visits to the International Investments Department and the DRCPI to analyze the control environment, with the aim of issuing recommendations that improve the security of processes and procedures. The Office of the General Auditor, who acts as the fourth line of defense, attends meetings of the Reserves Committee with the right to speak but without voting rights. In addition, the General Auditor conducts visits to custodians and external administrators to verify their control mechanisms.

#### **4.2 Risks associated with Foreign Reserve Investments**

The following is an explanation of the main risks to which a central bank is generally exposed in managing its foreign reserve portfolios, as well as the way *Banrep* manages them.

### 4.2.1 Market Risk (or Interest Rate Risk)

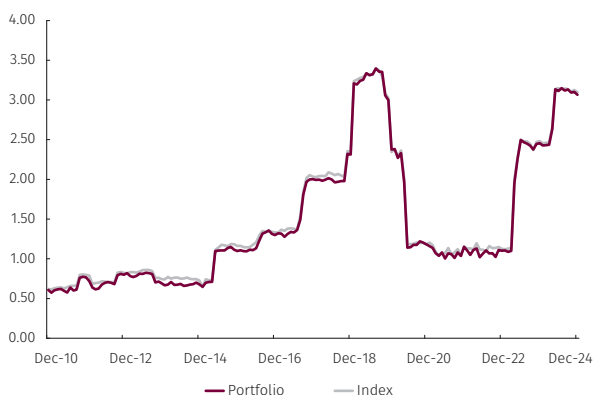
In the case of investments in foreign reserves, market risk materializes when the investment price declines. As for fixed-income instruments, which account for most reserve investments, their prices decline when interest rates in the world’s major financial markets rise. This occurs because these instruments pay fixed interest, which becomes less attractive in such a scenario. Conversely, when international interest rates fall, reserves appreciate.

*Banrep* seeks to limit market risk by investing in instruments that, on average, exhibit low sensitivity to interest rate increases. In addition, the institution monitors market risk using methodologies recognized in financial theory, such as duration, value at risk (VaR), conditional value at risk (CVaR), and stress tests, which are used to measure the volatility of financial asset prices and of the portfolio as a whole. Duration is defined as the percentage change in the value of the portfolio resulting from a 1.0% change in interest rates. For example, if interest rates increase by 1.0%, a portfolio with a duration of two will experience a 2.0% depreciation. A portfolio with a higher modified duration entails a higher expected return over the long term, as the yield rate on long-term bonds is typically higher than that of short-term bonds. However, market risk in the portfolio also increases as modified duration rises. On the other hand, VaR is a metric widely used across countries that estimates the maximum loss a portfolio could incur, with a given level of confidence, over different time horizons. In turn, the CVaR is a measure that complements the VaR by providing the expected value of losses when they exceed the VaR threshold. Finally, stress tests estimate portfolio returns under extreme scenarios that have been observed in the past or could occur in the future. These measures are reviewed to identify changes in risk levels under different market conditions.

As of 31 December 2024, the duration of the investment portfolio was 3.06<sup>24</sup>, which implies that the value of reserves could fall by 3.06% in response to a 1.0% increase in the rates of all the bonds within the portfolio. Additionally, the one-day VaR at a 95% confidence level was 0.30%<sup>25</sup>. Both measures remain at low levels, suggesting that the foreign reserve portfolio exhibits moderate market risk or sensitivity to price changes. Graph 4.1, Panels A and B, shows the historical evolution of both measures for both the benchmark index and the portfolio. From 2023 onward, the portfolio’s duration has increased,

Graph 4.1  
Duration and VaR of the Investment Tranche

#### A. Duration of the Investment Tranche and its Benchmark



#### B. One-day Value at Risk (VaR) of the Investment Tranche and its Benchmark at 95% confidence



Source: Banco de la República.

24 The reported measure is the effective duration, calculated by estimating the prices of all securities in the portfolio under a uniform change in interest rates. This measure is considered more robust than the modified duration, as it allows for the consideration of securities performance with embedded options.

25 VaR is calculated under the assumption that market prices have a performance similar to their historical trend (in statistical terms, asset returns are assumed to follow a normal distribution). In extreme cases, meaning those not previously observed in historical data up to that time (e.g., the 2008 financial crisis), the percentage decrease may be higher.

as rising interest rates in the United States, as well as other markets relevant to the portfolio, have led to higher interest accruals and greater capacity to assume market risk and invest in assets with higher expected returns and volatility.

It is worth noting that, in recent years, geopolitical events have exerted significant influence on market risk, increasing uncertainty and volatility in international financial markets. International conflicts, trade tensions, energy crises, and abrupt changes in the monetary policy of advanced economies have triggered episodes of high volatility, affecting asset prices and global interest rates, which in turn directly impact foreign reserves. These circumstances have made it essential for market risk management to incorporate ongoing monitoring of geopolitical factors, thereby enabling timely anticipation of and a response to episodes of extreme risk.

Box 5 provides a more detailed discussion of the management *Banrep* has undertaken in response to geopolitical events, as well as the impact these events have had on managed portfolios.

#### 4.2.2 Credit Risk

It refers to the risk to which the portfolio is exposed due to the possible occurrence of credit events such as 1) deterioration in the credit quality of issuers/issuances of investment assets; or 2) defaults (non-payment) by issuers.

To limit this risk, it has been determined that portfolio losses from credit risk must remain minimal, even under extreme scenarios. Specifically, the objective is that default events in the worst 1.0% of scenarios do not exceed 1.0% of the portfolio's value<sup>26</sup>.

The measures employed by *Banrep* to comply with this policy and thereby control credit risk include both setting a minimum allowable credit rating and establishing issuer-specific limits. The institution uses the ratings assigned by international agencies Standard & Poor's, Fitch Ratings, and Moody's Investors Service as a reference. In the scale used by these institutions, the highest long-term rating is AAA (extremely strong capacity to meet obligations), followed by AA (very strong creditworthiness) and A (strong creditworthiness). The lowest rating is D, which corresponds to issuers that have defaulted on their payments. For an average investor, investing in debt securities with long-term ratings above BBB is considered safe and is referred to as investment-grade securities. Currently, the minimum long-term credit rating for debt securities eligible for the reserve portfolio is A-<sup>27</sup>, in accordance with *Banrep's* guidelines, that is, three levels above what most investors consider safe. The guidelines specify that an eligible issuance must have at least two ratings, with the lower of the two being used as reference.

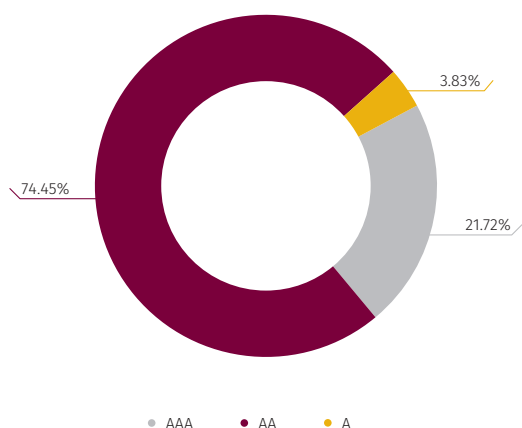
Additionally, the Bank has established maximum concentration limits by issuer to ensure diversification and reduce the impact of a credit event. The methodology used to define these limits is designed to capture the key factors that influence an issuer's credit risk: default risk and rating downgrade risk. This methodology sets limits so that each issuer's contribution to the portfolio's overall credit risk is similar.

<sup>26</sup> Statistically, this implies calculating the average value of credit risk losses within the 1.0% of the loss distribution.

<sup>27</sup> The investment guidelines for actively managed portfolios allow investments in corporate bond exchange-traded funds (ETFs) with investment-grade ratings. Consequently, the investments comprising these funds may have credit ratings ranging from AAA to BBB-.

In this regard, the credit risk contribution is determined by two variables. The first includes each issuer’s contribution to default risk, while the second includes each issuer’s contribution to credit rating downgrade risks to speculative grade. Information on default and credit rating downgrade risks for a specific type of issuer can be found in the transition matrices produced by credit rating agencies. These indicate the historical probability of migrating between ratings over a one-year period<sup>28</sup>, that is, experiencing both upgrades and downgrades. The established limits imply that investments are concentrated in government bonds from developed countries with high credit ratings. Within strict limits, debt investments issued by other high-quality issuers, including quasi-governments<sup>29</sup> and corporate issuers, are also permitted. Additionally, investments in U.S. agency mortgage-backed securities are allowed. *Banrep* also sets restrictions on the types of assets allowed and their characteristics; for example, investments in jurisdictions with weak regulatory frameworks or inadequate enforcement of anti-money laundering and terrorist financing measures are prohibited. Only issuances with senior (non-subordinated) payment priority in the event of liquidation are considered acceptable, and the maximum aggregate exposure to issuers other than the governments included in the benchmark index is limited to 50% of the portfolio. In addition to continuously monitoring changes in credit ratings and compliance with issuer limits, *Banrep* assesses the maximum potential loss from default events that the portfolio may incur at a given confidence level over a one-year horizon<sup>30</sup>, to ensure that overall portfolio risk remains within the established limits. In addition to credit risk associated with issuers, there are also risks related to custodians, current accounts correspondents abroad, and futures agents, arising from cash balances deposited with these institutions. To mitigate this risk, limits are imposed on the balances held in these accounts, and a minimum credit rating of A- is required.

Graph 4.2  
Distribution of Investments by Credit Rating



Source: Banco de la República.

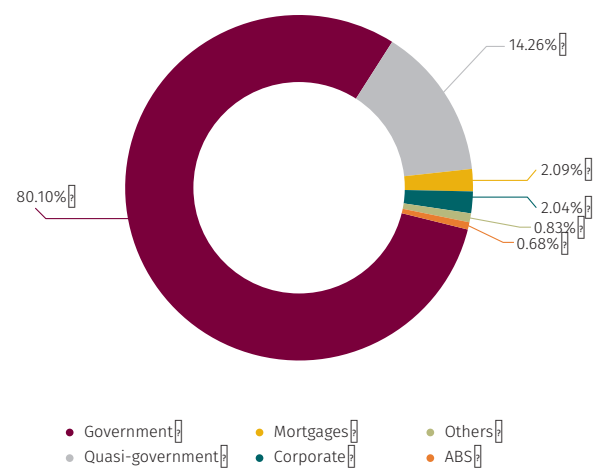
The composition by credit rating highlights the high quality of the assets in which the portfolio is invested: Graph 4.2 shows that 74.45% was allocated to AA-rated instruments, while 21.72% to AAA-rated instruments. *Banrep* uses the lowest investment-grade rating assigned by at least two of the three main credit rating agencies (S&P, Moody’s, and Fitch Ratings) as a reference. The risk of credit events for these issuers is low, as historical data indicate that the one-year probability of default for sovereign issuers and regional or local authorities

28 Credit rating agencies also construct transition matrices for time horizons longer than one year.

29 Quasi-government entities are issuers related to governments. This category encompasses supranational institutions, agencies, and governments that issue debt in foreign currency. Local authorities (e.g., states and provinces) are also included in this group.

30 This variable is closely related to what is known in the literature as credit value at risk (or credit VaR). The main distinction is that credit VaR incorporates all possible returns associated with credit rating upgrades or downgrades, whereas the calculated measure focuses exclusively on default events.

Graph 4.3  
Investment Portfolio Composition by Sectors



Source: Banco de la República.

rated A or higher is 0%, as is the case for corporate issuers rated AAA. For corporate issuers rated AA, the one-year probability of default is 0.02%, and for those rated A+, it is 0.05%<sup>31</sup>.

Regarding sector composition, as of late December 2024, the investment portfolio was primarily composed of securities issued by governments and government-related entities. Graph 4.3 exhibits the composition of the investment portfolio by sector. 94.36% of the portfolio is invested in securities issued by governments or government-related entities (quasi-government issuers and mortgages)<sup>32</sup>.

#### 4.2.3 Liquidity Risk

Liquidity is one of the criteria defined by law for the investments of foreign reserves. Its risk lies in the possibility that the central bank may be unable to convert its reserve assets into cash quickly and at low cost, when needed. This risk poses a constant challenge for managers, as market liquidity conditions can change suddenly.

Central banks mitigate liquidity risk by investing in financial assets that are easily tradable in secondary markets or short-term assets. *Banrep* has established several specific policies to ensure that the liquidity risk of its investments remains low. First, investment tranches are defined based on different liquidity and return objectives. Additionally, investments are concentrated in highly liquid assets, for example, each security must have a minimum issue size depending on their currency of denomination (i.e., above USD 300 million for U.S. dollar-denominated issuances), and purchases of that issuance cannot exceed 10% of its outstanding value<sup>33</sup>.

To enhance liquidity, the institution has adopted additional measures. In this regard, for example, access to the Federal Reserve repo facility was obtained. *Banrep* would use this facility only if, after deciding to sell U.S. dollars in the spot market, liquidity in the market for the purchase and sale of government bonds is likely to be exceptionally low at that time. Similarly, the institution has access to liquidity facilities provided by the BIS, which complement the availability of external liquidity from foreign reserves. Under these facilities, the investments held by central banks at that institution serve as collateral for the liquidity provision by the BIS. In this

31 According to reports published by Moody's Investors Service: "Sub-Sovereign Default and Recovery Rates, 1983–2022"; "Sovereign Default and Recovery Rates, 1983–2024"; and "Annual Default Study: Corporate Default Rate Will Rise in 2023 and Peak in Early 2025."

32 The securities in question correspond to issuances by entities guaranteed or sponsored by governments (e.g., the agencies Fannie Mae and Freddie Mac), supranational institutions (i.e., the World Bank and the Inter-American Development Bank), and local authorities (e.g., cities and states), among others.

33 These limits do not apply to money market assets.

regard, *Banrep* may access immediate and contingent liquidity without having to sell assets in the foreign reserve portfolios invested in BIS instruments, which may be particularly valuable in extreme circumstances of low liquidity in global fixed-income markets or during episodes of high-risk aversion. Notably, in the first half of 2025, the BIS renewed these facilities for *Banrep* for a total of USD 2,000 m, to be used exclusively in the event of extreme market conditions. Accordingly, *Banrep* considers these facilities as precautionary lines that complement the availability of external liquidity from foreign reserves.

Finally, the Bank monitors liquidity risk indicators that allow to assess the time and costs required to liquidate the portfolios<sup>34</sup>. According to these indicators, it is estimated that the entire portfolio could be liquidated within a period of fifteen days, with 82% being sold on the first day. The indicator is constructed by grouping securities into different categories based on the market where they trade and their maturities, thereby calculating the amount that can be sold each day without affecting market conditions. Box 6 addresses additional considerations on liquidity risk management in foreign reserves.

#### 4.2.4 Exchange Rate Risk

Exchange rate risk refers to the possibility that the value of foreign reserves may decline if currencies in which they are invested depreciate. The level of foreign reserves is reported in U.S. dollars; however, *Banrep*, like most central banks worldwide, holds currencies other than the U.S. dollar in its currency composition to diversify the portfolio and potentially cover the country's external payments. This means that investments denominated in other currencies are converted into U.S. dollars at the prevailing market exchange rates, implying that the portfolio's value in U.S. dollars may decline if the currencies in which investments are held depreciate against the U.S. dollar. Currency exchange rates are highly volatile and often lack well-defined long-term trends. This makes it very difficult to forecast their performance reliably. The accounting impact of exchange rate risk on *Banrep*'s balance is mitigated through the "exchange adjustment" in the equity account referred to in section 4 of Article 62 of Decree 2520 of 1993 (Statutes of *Banco de la República*), which increases in years when reserve currencies appreciate vis-à-vis the Colombian peso and decreases in years when they weaken. Therefore, currency fluctuations do not affect the comprehensive income statement.

The investment portfolio comprises currencies characterized by high daily trading volumes and issued by countries with high credit ratings, with the U.S. dollar accounting for the largest share. As explained in the previous chapter, the currency composition of foreign reserves is primarily determined through the definition of a benchmark index. The Foreign Reserves Committee determines both the share of each currency within the benchmark and the maximum deviations allowed relative to that index. Graph 4.4 shows the currency composition of the investment portfolio as of 31 December 2024.

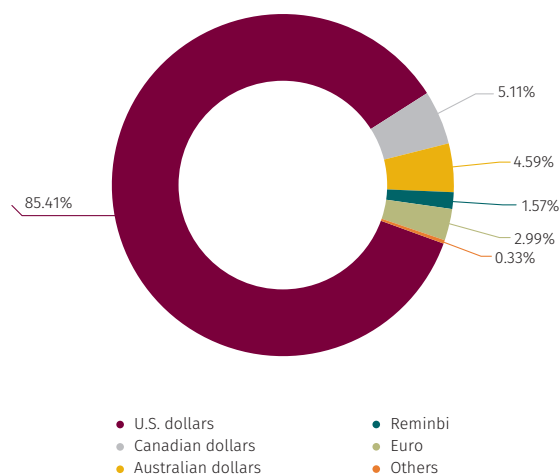
#### 4.2.5 Counterparty Risk

Counterparty risk refers to the possibility of incurring losses due to a counterparty's default on a previously agreed purchase or sale transaction, which may

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<sup>34</sup> These indicators are described in greater detail in Box 1 of the 2021 *Foreign Reserves Management Report*.

Graph 4.4  
Foreign Exchange Composition of the Investment Portfolio



Source: Banco de la República.

occur for various reasons, including operational errors or credit events affecting the counterparty.

To reduce exposure to this type of event, “payment-on-delivery” mechanisms are used, exposure requirements and limits are established for counterparties with which portfolio transactions are carried out, and master agreements are executed with such counterparties (for example, the ISDA Master Agreement)<sup>35</sup>. Payment-on-delivery mechanisms aim to ensure that the exchange of securities for cash occurs simultaneously to contain the impact of a default. Regarding foreign currency trading, *Banrep* relies on continuous linked settlements (CLS), the most widely used payment-on-delivery mechanism for foreign currency settlement. For the trading of fixed-income instruments, counterparties are required to be market makers in one of the countries whose currency is eligible to be included in the foreign reserve portfolio. For foreign currency trading, counterparties must have a minimum credit rating of A if they hold an ISDA master agreement. If they do not hold such an agreement, the minimum credit rating is A+. Additionally, foreign currency transactions are performed in short terms, and maximum counterparty exposure limits are established.

#### 4.2.6 Operational Risk

Operational risk refers to the possibility of incurring losses due to failures in internal processes, technology, infrastructure, personnel, or events arising from external sources or fraud.

To manage operational risk in line with the policies established for *Banrep*, the management of foreign reserves applies the non-financial risk assessment methodology proposed by the Office for Risk Management and approved by the Risk Committee. This methodology allows to assess 1) the inherent risk in the management of reserves<sup>36</sup>; 2) the mitigating effect of the controls; and 3) the level of exposure to residual risk<sup>37</sup>. In this methodology, risk exposure level is defined as the combination of a risk’s likelihood and its impact to assess whether controls are sufficient and appropriate to mitigate the risks, as well as whether the level of exposure to those risks is aligned with the risk tolerance established for *Banrep*. Otherwise, treatment plans are defined for their management. Operational risk policies, procedures, and methodologies are applied across all processes. This means that the identification, measurement,

35 The master agreement established by the International Swaps and Derivatives Association (ISDA) is intended to set the terms and conditions governing over-the-counter derivatives traded between entities, including procedures to follow in the event of default.

36 Inherent risk refers to the risk assessment excluding the effect of its controls.

37 Residual risk refers to the outcome after incorporating the effect of their control environment.

control, and monitoring of risks are standardized, allowing the bank to consolidate its risk profile for periodic reporting to the Risk Committee.

Within the framework of foreign reserves, corresponding updates have been made regarding the exposure to risks inherent to the process, and risk events have been managed in accordance with the defined policies, with the respective approvals, records, improvement plans, and reports. Efforts have also been made to identify critical suppliers that support the achievement of this process objectives, seeking to strengthen the due diligence for those with the greatest impact and thereby improving resilience to disruptive events. In this regard, contractual clauses related to risk management in agreements with these third parties have been strengthened, monitoring mechanisms for high-impact events have been implemented, and training sessions on risk management have been conducted, covering aspects such as business continuity and information security, among others. On the other hand, as part of strengthening the business continuity plan, the Office for Risk Management is updating the business impact analysis (BIA), which includes the foreign reserves management as a critical process. This update also supports efforts on recovery strategies (processes, technology, infrastructure, key staff) to enable a coordinated and timely response to disruptive events. These strategies are implemented periodically to verify their effectiveness in achieving the process objectives under contingency conditions.

Finally, in line with global trends and emerging challenges, the growing relevance of cyber risk is recognized as one of the main threats to the secure and efficient operation of critical processes. Accordingly, actions have been undertaken to strengthen institutional capabilities in cyber risk management, including the definition of strategies for prevention, detection, response, and recovery from cybersecurity incidents. These strategies include updating policies, implementing technical controls, strengthening the organizational culture regarding the protection of information assets, and developing specific plans to reduce exposure and the impact of potential digital incidents.

#### 4.2.7 Legal Risk

It refers to the risk to which *Banrep* is exposed due to contracts not legally enforceable or not properly documented, or to changes in legislation that affect the Bank's obligations.

*Banrep* seeks to mitigate this risk by ensuring that the terms and conditions agreed upon in contracts reflect financial market practices and are compatible with the technical conditions of the transactions. The Bank's Legal Department includes a Legal Foreign Affairs Unit, which is responsible for reviewing all the contracts related to foreign reserves management and receives advice from law firms that specialize in international financial legislation. The Sovereign Funds and Technical Support Section of the International Investments Department is responsible for supporting the Legal Foreign Affairs Unit on the technical aspects related to contracts required for the management of the foreign reserves.

#### 4.2.8 Reputational Risk

This risk refers to the possibility that the reputation and credibility of reserve management may be questioned due to perceived mismanagement. To manage this risk, *Banrep* has a robust infrastructure for the investment of foreign reserves and

is transparent in its management policies. The two annual reports to the Congress of Colombia, plus the *Foreign Reserves Management Report*, published every two years, the public is informed about the investment criteria applied to reserve management and their results.

#### 4.2.9 Risks associated with Environmental, Social, and Governance (ESG) Factors

ESG factors encompass environmental, social, and governance issues that may shape an issuer's environment and its ability to operate successfully. The consideration of these factors in foreign reserve investment is essential because if an issuer fails to manage them properly, its ability to generate long-term returns may be affected, and market, credit, legal, or reputational risks, among others, might arise. Accordingly, *Banrep* incorporates ESG factors into the investment processes and risk monitoring of the foreign reserves through strategies that are consistent with the safety, liquidity, and return criteria defined in the legal mandate assigned to the Bank regarding the foreign reserves management. Box 7 presents the main findings and conclusions from monitoring the exposure to ESG factors in the foreign reserve portfolios, as well as trends, challenges, and opportunities related to this matter.

## Box 5: Monitoring Geopolitical Factors in the Investment Portfolios of Foreign Reserves

Following the recent increase in geopolitical events that have affected the performance of assets traded in capital markets, the International Investments Department (DII for the acronym in Spanish) decided to establish the Geopolitical Monitoring Group (GSG for the acronym in Spanish) in 2023, through which geopolitical events are monitored, and their impact on managed portfolios is assessed through the publication of a quarterly bulletin. Simultaneously, the GSG has been working on a project to quantify geopolitical risks using various metrics.

Geopolitical risk is often cited as a determining factor in policymakers' and investors' economic decisions. Caldara and Iacoviello (2022)<sup>1</sup> define this risk as “associated with wars, terrorist attacks, and tensions between States that affect the normal and peaceful course of international relations,” meaning it captures both the likelihood of disruptive events occurring and the potential escalation of existing events. This implies that geopolitical dynamics may increasingly influence the performance of investment portfolios, and therefore, it is necessary to understand the nature, causes, and consequences of these factors.

### 1. GSG Motivation: Case Studies

In recent years, the geopolitical factor has become increasingly relevant due to the direct involvement of developed countries in conflicts, trade tensions, and strategic disputes. In the past, instability hotspots were primarily concentrated in developing regions; however, today prominent actors such as the United States, China, Russia, and members of the European Union (EU) are at the center of disputes affecting global security, international trade, and financial stability. The involvement of advanced economies has intensified the impact of geopolitical events on markets, supply chains, and global investment decisions, creating a more uncertain and volatile environment for governments, businesses, and citizens, with repercussions that can be either transitory or, in some cases, structural.

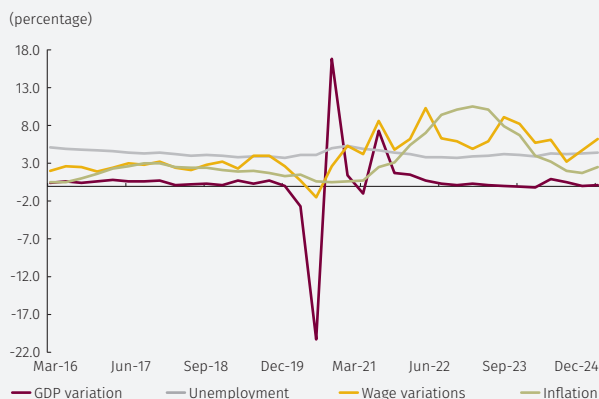
Although numerous cases illustrate how geopolitical factors have affected international security and the global economy, the GSG has focused its analysis on events with the greatest impact on assets eligible for the foreign reserve portfolios. The following three cases are presented, as they have generated structural transformations in international relations due to their scale, duration, or depth, and provide a better understanding of the complexity of current geopolitical challenges:

1. *The United Kingdom's exit from the EU (Brexit)*: A referendum to determine the United Kingdom's future in the European Union was held on 23 June 2016. As the results started to become public, the pound sterling (GBP) fell by approximately 12% against the U.S. dollar (USD) within 24 hours and it has not recovered to pre-Brexit levels. Finally, the United Kingdom officially left the European Union on 31 January 2020.

Although the pandemic caused distortions across various indicators for the United Kingdom, since Brexit, moderate impacts have been observed on trade, GDP, and investment, along with a temporary increase in inflation and interest rates. The labor market has exhibited tensions, reflected in a mismatch between job vacancies and

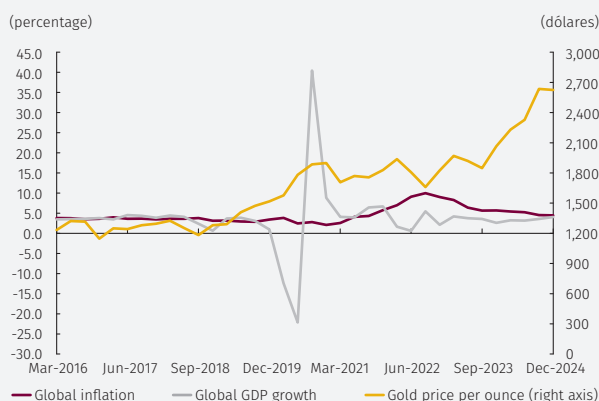
<sup>1</sup> Caldara, D.; Iacoviello, M. (2022). “Measuring Geopolitical Risk,” *American Economic Review*, Vol. 112, No. 4, p. 1194-1225, <https://doi.org/10.1257/aer.20191823>

**Graph B5.1**  
United Kingdom Economic Variables (2016–2024)



Source: Bloomberg; Calculations by Banco de la República.

**Graph B5.2**  
United Kingdom Economic Variables (2016–2024)



Source: Bloomberg; Calculations by Banco de la República.

unemployment, partly due to a decrease in labor migration from the EU<sup>2</sup> (see Graph B5.1). Sectors such as construction, manufacturing, transportation, and accommodation and food services have been particularly affected. It is estimated that the Brexit decision cost the United Kingdom approximately GBP 140 billion (b)<sup>3</sup> and medium- to long-term projections suggest that by 2035, GDP could be roughly 10% lower than the level it would have reached had it remained in the European Union<sup>4</sup>.

2. *Volatility in the price of gold and other commodities during the escalation of conflicts in Europe and the Middle East:* Although the conflict between Russia and Ukraine began in 2014, the escalation following the 2022 military incursion had social, political, and economic effects that disrupted certain supply chains. Ukraine, a major exporter of corn, wheat, sunflower oil, and other products, experienced constraints on its export capacity, which in turn affected inflation and economic growth in several regions. These inflationary pressures, in turn, prompted central banks to maintain interest rates high for longer periods. The resulting uncertainty led investors to seek refuge in assets commonly considered safe, such as gold.

The scenario became even more complex in October 2023, following the Hamas terrorist attack in southern Israel and Israel's military response in the Gaza Strip. In both cases, the price of gold per troy ounce increased by 8.5% and 8.9%, respectively, in less than a month (see Graph B5.2).

3. *U.S. elections and a potential new tariff regime:* In 2024, the GSG analyzed the potential impact of the U.S. presidential elections, anticipating a possible shift in trade policies, as well as increased market volatility and uncertainty regarding the direction of monetary policy. The high volatility of the U.S. dollar amid electoral uncertainty drove the exchange rate to three-week lows vis-à-vis the euro and the yen. Following the confirmation of the election outcome, fiscal and trade expectations temporarily increased demand for dollar-denominated assets, leading to a revaluation of the U.S. dollar.

## 2. Monitoring Process of Geopolitical Factors

Through the publication of a quarterly bulletin outlining the main geopolitical situations that could affect the performance of assets eligible for the portfolios, the GSG has become familiar with current monitoring matters beyond the usual financial market issues. It currently reports to the DII team on the potential impacts of these events under different scenarios, while also sharing the DII's perspective on the international situation with other areas of the Bank, with a focus on the performance of foreign reserve portfolios.

Additionally, the bulletin includes the Geopolitical Risk Index (GPR) as a component of the analysis. This index is the most widely used

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- 2 Casey, B. H.; Mayhew, K. (2024). "The Labour Market Implications of Brexit: A Beveridge Curve Analysis," *National Institute Economic Review*, Vol. 268, No. 1, p. 3-14. <https://doi.org/10.1017/nie.2024.11>
  - 3 Greater London Authority (2024). "New Report Reveals UK Economy is Almost £140 Billion Smaller because of Brexit," [London.gov.uk](https://www.london.gov.uk/press-releases/npr-2024-01-11), 11 January.
  - 4 Cambridge Econometrics (2024). "London's Economy After Brexit: Impacts and Implications," Greater London Authority.

publicly available tool for measuring the impact of geopolitical risks. This index is based on news reporting of adverse geopolitical events. It counts the number of articles containing words related to geopolitical tensions as a proportion of the total number of articles in the ten leading international newspapers<sup>5</sup> from which it derives an overall index: the GPR, along with two sub-indices that distinguish events into risks and threats.

Similarly, through the project focused on quantifying geopolitical risk, the GSG has collected and analyzed information on the quantification methods used by other market participants. To this end, a review of the academic literature on existing quantification methodologies was conducted, and external administrators of the active management program, banking counterparties, and rating agencies were consulted regarding the methodologies and tools they use to quantify this risk. As a result, the analysis found that the predominant analysis method is natural language processing (NLP). Particularly, word counting, sentiment analysis, topic modeling, and named-entity recognition stand out as the NLP techniques that enable the automated collection and analysis of data required to assess geopolitical risk. Currently, the DII is working to quantify this risk by identifying the correlation between geopolitical events and the market performance of assets eligible for foreign reserve portfolios. It is worth noting that a diversified portfolio, such as the one currently held, allows for mitigating and managing market volatility that may arise from geopolitical events.

Finally, the GSG analysis indicates that such events not only affect asset valuations but have also altered the dynamics among them, thereby impacting their correlation and risk perceptions. In line with this, the relevance of diversification is highlighted as follows: 1) assets eligible for the portfolios; 2) accounts across different currencies; 3) geographic location of counterparties and custodians; and 4) sources of liquidity, to address the impact of geopolitical events on markets.

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<sup>5</sup> Chicago Tribune, The Daily Telegraph, Financial Times, The Globe and Mail, The Guardian, Los Angeles Times, The New York Times, USA Today, The Wall Street Journal, and The Washington Post.

## Box 6: Liquidity Risk Management in Foreign Reserves

*Banco de la República*, in fulfillment of its constitutional mandate to manage foreign reserves, conducts this activity in accordance with the criteria of safety, liquidity, and return established by Law 31 of 1992. This box aims to explain liquidity risk and its management in foreign reserves.

First, liquidity is defined as the ability to convert an asset into cash in the shortest possible time and at the lowest possible cost. In this context, liquidity risk refers to the difficulty of converting an asset into cash or the likelihood of incurring a loss in the process. Liquidity risk represents a constant challenge for portfolio managers, particularly for those who need to maintain liquid resources at a specific moment. The main causes of this type of risk include:

- *Asset type*: The nature of each asset largely determines its degree of liquidity. For an asset to be considered liquid, it must be traded in a market with a large number of available buyers and sellers, tight bid-ask spreads, and low transaction costs. Additionally, the transfer of ownership must occur in a secure manner and without significant operational frictions. Among the most liquid assets are cash and financial instruments that can be converted into cash immediately, such as short-term securities issued by developed-country governments, particularly U.S. Treasury bonds. On the other hand, the least liquid assets include real estate, private equity, and hedge funds.
- *Deterioration of market conditions and economic slowdown*: The socioeconomic environment and market conditions influence how easily assets can be traded. During periods of stability and economic growth, investors typically buy or sell assets with minimal price impact, supported by active market participation. Conversely, in contexts of economic contraction, especially during financial crises, market participants tend to withdraw due to increased volatility and uncertainty. This leads to wider bid-ask spreads and lower trading volumes, thereby impairing asset liquidity.

### 1. Liquidity Risk Management in Foreign Reserves by Banco de la República

*Banrep* designs and implements specific policies to maintain low liquidity risk across its investments. Accordingly, from a liquidity perspective, the investment portfolio is divided into two segments: working capital and the investment tranche.

- Working capital refers to the most liquid portion of the portfolio and is intended to cover short-term liquidity needs. In this segment, securities must be able to be liquidated within one day, except for those issued by governments or quasi-governments with the highest credit rating, which may be held for up to forty days.
- Regarding the investment tranche, eligible securities with maturities greater than one month traditionally have a broad secondary market. Additionally, a substantial portion of the reserves is invested in instruments defined as high-quality liquid assets (HQLA) in accordance with the Basel Committee on Banking Supervision (BCBS) standards. Furthermore, restrictions are applied to the various portfolios comprising the investment tranche. In general, the issuance amount of eligible securities must exceed the minimum issuance threshold required for inclusion in the Bloomberg Global Aggregate Index. This requirement varies by currency and instrument type and is intended to ensure that selected assets have sufficient market depth and liquidity. The purchase of private issuances is not permitted, and only money market instruments with maturities of less than one hundred days and CDs under forty days are held until maturity. Finally, purchases on an issuance are limited to 10% of the

total amount issued, preventing excessive concentration in individual instruments and facilitating their potential sale without significantly affecting prices.

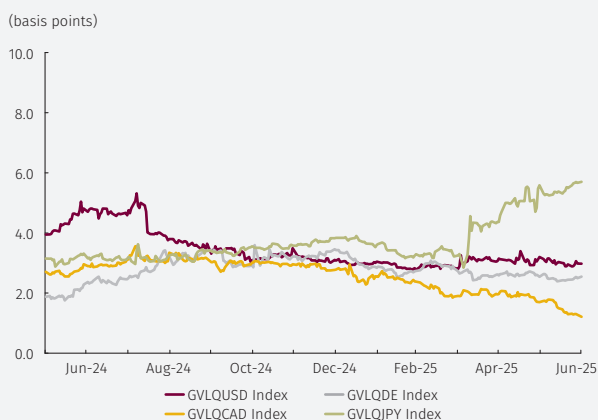
Since the COVID-19 pandemic, the rebound in volatility has translated into a marked deterioration in global fixed-income market liquidity conditions, even in traditionally deep segments. Credit spreads widened, and transaction costs increased, causing abrupt movements in asset prices. Thus, liquidity has declined to levels not seen in recent history, as reflected in various indicators, many of which have yet to return to pre-pandemic values. In response to these pronounced changes in liquidity, the International Investments Department created a team dedicated to monitoring the market’s liquidity, responsible for overseeing key liquidity indicators, analyzing publications from other central banks and international institutions, tracking and measuring the impact of proposed or approved regulatory changes across different jurisdictions, and synthesizing market-relevant news. This multidisciplinary team, with expertise in trading, risk, and regulatory analysis, ensures the dissemination of timely, data-driven information, thereby strengthening proactive risk management and strategic decision-making in an environment where stable market functioning has become a key determinant of investment portfolio performance.

Within the market monitoring and analysis framework, the liquidity team continuously tracks a set of indicators that reflect trading conditions across major sovereign bond markets. One of the main indicators is the government securities liquidity index in U.S. dollars (GVLQUSD), along with its equivalents for other markets included in the benchmark index, such as GVLQJPY for Japan, GVLQDE for Germany, among others.

These indices measure liquidity conditions in each country’s sovereign debt market by comparing the effective yield of bonds with maturities greater than one year to the theoretical yield estimated by an adjusted yield curve calculated by Bloomberg. From this comparison, an average deviation (yield error) between the observed yields and the fair-value yields projected by the curve is calculated based on the bonds’ maturities<sup>1</sup>. In market conditions with ample liquidity, deviations are corrected through market-maker activity and arbitrage mechanisms, resulting in lower index values. In contrast, under conditions of higher volatility and limited liquidity, deviations tend to persist due to a lack of participants able to arbitrage prices, which is reflected in a higher average yield error and, consequently, a higher index value.

Thus, a high level of the GVLQUSD (or its equivalents in other jurisdictions) indicates a lower-liquidity environment, whereas a low value suggests a market where quotes are aligned with the fair value. Graph B6.1 shows the indicator’s performance across major bond markets over the past year. The United States had been exhibiting a rising trend until August 2024, when it reached a peak of 5.32, a level not seen in decades. This episode of volatility was driven by uncertainty over the future of the global economy, along with fears of a U.S. recession, and by geopolitical tensions in the Middle East. Germany and Canada, in turn, have maintained relatively low and stable levels,

**Graph B6.1**  
Liquidity Indicator for Major Bond Markets



Source: Bloomberg

1 GVLQUSD: Government Securities Liquidity Index, Bloomberg.

suggesting sustained liquidity conditions, although the latter has shown a downward trend so far this year.

A case of particular interest is Japan. In April 2025, the GVLQJPY index exhibited a marked deterioration in liquidity conditions in the Japanese sovereign bond market. After reaching a minimum of 2.85 bps on 4 April, the index spiked sharply on 9 April, marking the start of an upward trajectory that persisted in the following months, reaching a peak of 5.70 bps in June, well above its annual average of 4.08 bps. This performance was driven by a combination of factors, including increased global risk aversion following the announcement of reciprocal tariffs by the United States, the gradual withdrawal of the Bank of Japan from its sovereign bond market interventions, domestic fiscal concerns, and weaker demand from large local holders. The lower market depth amplified yield distortions relative to the curve, hindering efficient price formation, as captured by the index's evolution.

Additionally, the liquidity team monitors the bid-ask spread, defined as the difference between the ask price (the minimum price at which a seller is willing to sell an asset) and the bid price (the maximum price a buyer is willing to pay). This spread represents an implicit transaction cost, as an investor who buys at the ask price and immediately sells at the bid price is likely to incur a loss equivalent to the spread. The size of the spread is a key indicator of market liquidity and efficiency: Narrow spreads indicate high liquidity and competition among participants, with bid and ask prices closely aligned, while wide spreads reflect lower liquidity or greater uncertainty, whether due to a scarcity of active market participants or high volatility conditions.

### Liquidity Risk Measurement

The liquidity of a financial market can be analyzed from multiple dimensions, each reflecting key aspects of its functioning:

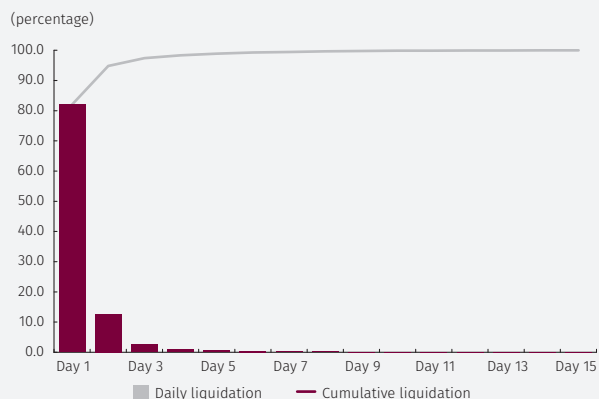
- *Tightness*: The difference between bid and ask prices. A market is more liquid the smaller this spread is.
- *Immediacy*: The speed at which buy or sell orders are executed. The higher the speed, the greater the market liquidity.
- *Depth*: The presence of a significant number of buyers and sellers.
- *Breadth*: The market's capacity to absorb large-volume transactions without causing abrupt price fluctuations.
- *Resilience*: The market's ability to correct imbalances during periods or scenarios of stress.

The literature addresses various metrics for assessing market liquidity, which are often complementary and grouped based on the dimension they aim to capture. These include—bid-ask spread, traded volume, turnover rate, the Hui-Huebel liquidity index, and market efficiency coefficient (MEC), among others.

While these metrics allow for the general assessment of market liquidity, the Bank internally implements specific indicators to characterize the liquidity profile of the investment portfolio in the context of foreign reserves:

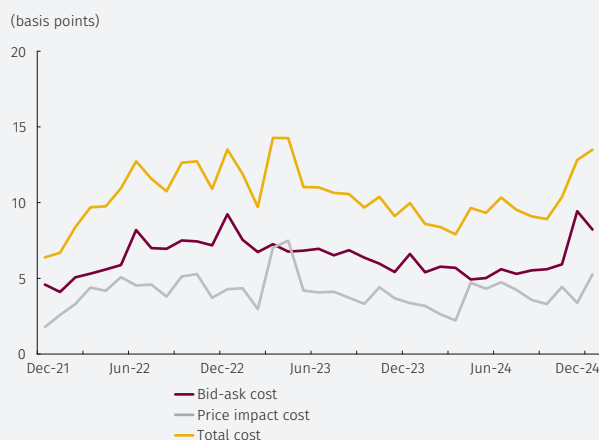
- *Portfolio liquidation time*: This aims to estimate how many days it would take to fully liquidate the investment portfolio and to determine what share of it could be sold over different time horizons. Securities in the portfolio are grouped into categories according to the market in which they are traded and their maturity. Each category is assigned, based on expert estimates, a maximum daily sale amount that can be executed without disrupting normal market conditions. Using this information, the number of days required to sell the total exposure in each security is calculated, based on the maximum

**Graph B6.2**  
Portfolio Liquidation Time



Source: Banco de la República.

**Graph B6.3**  
Portfolio Liquidation Cost



Source: Banco de la República.

allowed daily volume and position size. The results are then aggregated across all securities to obtain the liquidity profile of the entire portfolio. Graph B6.2 shows that, as of late December 2024, the foreign reserves investment portfolio could be liquidated under normal conditions in an estimated of fifteen days: during the first three days, approximately 97% of the portfolio could be sold (82.05% on the first day, 12.74% on the second day, and 2.61% on the third day). In this regard, the total portfolio exhibits a relatively short liquidation time, reflecting its high liquidity, and minimizing significant disruptions in market prices.

- *Portfolio liquidation costs:* This is estimated by summing up the individual liquidation costs of all assets in the portfolio. This cost accounts for the bid-ask spread of each security and potential variations in its valuation associated with the time it remains in the portfolio before being sold. The latter reflects the risk that the entire position cannot be liquidated in a single day, thereby exposing the portfolio to adverse price fluctuations. The liquidation cost is expressed as follows:

$$\text{Liquidation Cost} = \sum_{i=1}^N \sum_{t=1}^T s_i \cdot \alpha_{it} + (\alpha_{it} \cdot \sigma_i \cdot \sqrt{t}) \quad (1)$$

Where  $i$  represents each security in the portfolio,  $N$  is the total number of securities,  $T$  is the total time to liquidate each security,  $s_i$  is the bid-ask spread,  $\alpha_{it}$  is the amount sold on day  $t$  of the security,  $i$ ,  $t$  is the day on which the security is sold, and  $\sigma_i$  is the daily price volatility of each security. Graph B6.3 presents the evolution of the total liquidation cost, disaggregated into the bid-ask spread component and the market movement cost. It can be observed that the cost of liquidating the portfolio has remained moderate. After peaking near 15 bps in 2022, it declined to a range of 8–11 bps in 2023 and rose again to 13–14 bps at the end of 2024, still below historical stress levels.

Finally, the dominant component is the bid-ask spread, which accounts for most of the variations, while the cost due to price fluctuations remains stable below 5 bps.

It is worth noting that, in the event of liquidity needs, it is not always necessary to sell the assets comprising the portfolio, as Banrep has external contingent lines that complement liquidity risk management, such as the Federal Reserve Repurchase Agreement (Repo) Facility (FIMA) and the liquidity facility provided by the Bank for International Settlements (BIS).

In conclusion, as is the case with Banrep, effective liquidity risk management strengthens resilience to external shocks that may impact trade and financial flows by ensuring the necessary backing for the balance-of-payments required from the Bank. Likewise, controlling this type of risk helps maintain the confidence of international investors, who consider the level of reserves as an indicator of the country's ability to meet its foreign currency obligations, thereby facilitating access for both the government and the private sector to international capital markets. Additionally, it reinforces Banrep's credibility and the effectiveness of monetary policy. Finally, it ensures the availability of tools, such as foreign exchange intervention, should they be required.

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Sarr, A.; Lybek, T. (2002). “Measuring Liquidity in Financial Markets”. IMF Working Paper, no. 02/232, obtained from SSRN: <https://ssrn.com/abstract=880932>

## Box 7: A Review of Sustainability Practices and the Adoption of Sustainability Criteria in the Management of Foreign Reserves

**Practices aimed at promoting responsible and sustainable investment have continued to gain acceptance among investors due to their impact on the security and soundness of companies, as well as on the real and financial economy.** According to the Principles for Responsible Investment (PRI), responsible investment involves considering environmental, social, and governance (ESG) factors when making investment decisions, such as in financial analysis, portfolio construction, and influencing companies or assets<sup>1</sup>. Investors' motivations for incorporating such factors may include achieving financial returns, managing risks, generating a positive social impact, and aligning their values with their investments, among others.

**In the case of central banks, interest in considering responsible investment practices in the management of foreign reserves is also growing; however,** the degree of progress in incorporating these practices varies depending on the type of mandate assigned to each institution and across central banks. In this regard, some have integrated sustainability as an additional pillar in their reserve management policy (for example, the central banks of the European System of Central Banks), while others operate under mandates that prioritize criteria such as safety, liquidity, and return (as is the case for Banco de la República). According to the HSBC Reserve Management Trends 2025<sup>2</sup>, 81% of surveyed central banks have incorporated elements of responsible and sustainable investment in their reserves or are considering doing so, and 14 central banks (36% of the sample) include sustainability as a fourth objective in reserve management.

In turn, the current macroeconomic and geopolitical outlook poses challenges for central banks in managing foreign reserves, including their approach to responsible and sustainable investment practices. An increasing number of geopolitical events and conflicts, changes in trade policies, high and persistent levels of global debt, and a growing protectionist sentiment are among the factors that have generated significant uncertainty in the economy and financial markets, affecting long-term growth and inflation prospects. This, in turn, directly influences the investment strategies of central banks and their asset allocation, as they seek investment alternatives to mitigate the exposure to various risks and diversify sources of returns. According to the results of the 2024 Invesco Global Sovereign Asset Management Study, among 57 central banks surveyed, 53% planned to increase their reserves over the next two years, while 52% intended to diversify their investments as a protective measure against risks and potential shocks. This could be reflected in changes in the composition of investments by type of asset and currency<sup>3</sup>. In this regard, the consideration of responsible and sustainable investment practices represents an alternative for central banks, particularly for monitoring and mitigating investment risks. Additionally, as institutions responsible for formulating policies, central banks play a key role in promoting measures that encourage investments and financing flows aligned with sustainability, such as 1) transparency and disclosure policies; 2) risk management and supervisory policies; 3) credit allocation policies; and 4) monetary policies<sup>4</sup>.

1 Principles for Responsible Investment. "Introduction to Responsible Investment," available at: <https://www.unpri.org/download?ac=19157>

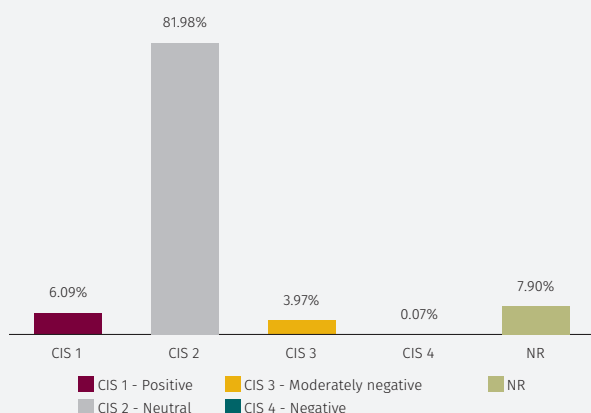
2 "HSBC Reserve Management Trends 2025", available at: <https://www.centralbanking.com/hsbc-reserve-management-trends-2025>

3 Invesco (2024). "Invesco Global Sovereign Asset Management Study.", available at: <https://www.invesco.com/content/dam/invesco/apac/en/pdf/insights/2024/july/invesco-global-sovereign-asset-management-study-2024.pdf>

4 Aligning finance with climate goals. Organization for Economic Co-operation and Development. [https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/12/aligning-finance-with-climate-goals\\_6b70b161/aa7c23b2-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/12/aligning-finance-with-climate-goals_6b70b161/aa7c23b2-en.pdf)

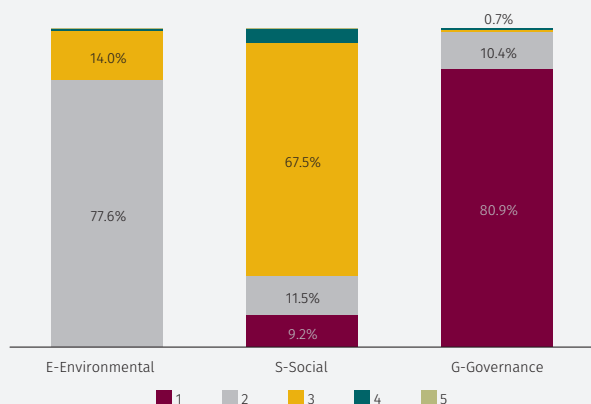
Graph B7.1  
ESG Profile of the Foreign Reserves Portfolio  
as of 30 May 2025

A. Credit Impact Scores (CIS)



NR: refers to issuers for which Moody's have not issued a credit rating yet.

B. Issuer Profile Scores – E, S, G Factors  
(percentage market value of the actively managed portfolio)



Source: Authors' calculations based on ESG data from Moody's Analytics, Inc.

**In its particular case, Banco de la República recognizes the importance of ESG factors as criteria associated with relevant sources of risk and seeks to become familiar with the best practices of other central banks in their role as manager of foreign reserves.** The above is always carried out in accordance with the legal mandate granted to Banco de la República and the safety, liquidity, and return criteria that govern foreign reserve management. Accordingly, in 2023, the International Investments Department created a working group to deepen sustainability-related issues within the Department and to promote coordinated initiatives aimed at advancing the incorporation of ESG factors into risk monitoring and investment oversight processes for foreign reserves. The primary responsibilities of the group include (i) updating the ESG rating profile of the investment portfolio and (ii) exploring sustainability metrics that could be implemented in the portfolio, taking best practices from other central banks as a reference.

**Regarding the ESG rating profile of the foreign reserve portfolio managed by Banco de la República, it remains high and stable across environmental, social, and governance factors.** Periodically, the Department evaluates the issuers in the portfolio using the ESG Score methodology employed by Banco de la República in 2023, based on information from Moody's Analytics, Inc. The methodology establishes a Credit Impact Score (CIS) on a scale from 1 to 5, where CIS-1 indicates that ESG factors have a positive influence on the credit profile, and CIS-5 indicates a negative impact of ESG attributes that may affect the credit rating. As of 30 May 2025, 88% of issuers in the foreign reserve portfolios fall within the CIS-1 and CIS-2 categories, indicating that the investment portfolio has a high ESG rating profile. For issuers in categories CIS-3 and CIS-4, the Department continuously monitors their evolution, while the portfolio remains free of issuers in CIS-5 or with a "Highly negative" rating (see Graph B7.1). In factor-based monitoring, 77.6% of the portfolio holds a neutral rating for the environmental factor, 67.5% receives a rating of 3 for the social factor, 81% is rated positive for the governance factor. These results indicate a strong ESG profile for the portfolio, suggesting low exposure to ESG-related risks.

**Regarding other specialized metrics, the literature identifies two approaches: forward-looking and backward-looking.** Backward-looking metrics are the most widely used, as they allow for the assessment of climate impact at the security or portfolio level and, therefore, contribute to measuring progress toward net-zero targets. Table B7.1 presents the metrics recommended for measuring transition risk in accordance with the Task Force on Climate-related Financial Disclosures (TCFD) and the Network for Greening the Financial System (NGFS). Total Carbon Emissions (TCE) measures the total emissions attributable to a portfolio, therefore providing a clear indication of its overall climate impact. Other measures, such as carbon footprint (CF), weighted average carbon intensity, and carbon intensity, are also highly useful, as they allow for comparisons across different loan portfolios. Taken together, these indicators provide a deeper understanding of a portfolio's exposure to transition risk, consistent with NGFS recommendations<sup>5</sup>.

On the other hand, understanding future trajectories toward net zero is also essential, given the growing interest in transition plans and the assessment of physical and transition risks. In this regard, forward-looking metrics are gaining relevance, and some that have been under development include carbon transition score, carbon

5 NGFS (2024). "Decarbonization Strategies for Corporate Portfolios of Central Banks". *NGFS Report*, available at: [https://www.ngfs.net/system/files/import/ngfs/media/2024/05/16/ngfs\\_technical\\_document\\_on\\_decarbonisation\\_strategies\\_for\\_corporate\\_portfolios\\_of\\_central\\_banks\\_0.pdf](https://www.ngfs.net/system/files/import/ngfs/media/2024/05/16/ngfs_technical_document_on_decarbonisation_strategies_for_corporate_portfolios_of_central_banks_0.pdf)

**Table B7.1**  
Metrics for Measuring Transition Risk

Backward-looking metrics		Forward-looking metrics	
Total carbon emissions	Absolute greenhouse gas (GHG) emissions financed by a portfolio, measured in tons of CO <sub>2</sub> equivalent.	Carbon transition score	Assess companies as leaders or laggards in relation to the risks and opportunities arising from the transition to a low-carbon economy, using a categorical classification or a score (0–1).
Carbon footprint	Total carbon emissions of a portfolio, normalized by the portfolio's market value, measured in tons of CO <sub>2</sub> equivalent per million dollars invested.	Carbon budget	Estimates how much a company can emit while remaining within the limits required to meet a 1.5 °C or 2 °C warming scenario by 2100.
Weighted average of carbon intensity	Average volume of carbon emissions, expressed in tons of CO <sub>2</sub> equivalent per million dollars of revenue, weighted by the share of each investment in the portfolio.	Climate value at risk	Measures the percentage change in a company's market value as a result of the potential effects of climate change.
Carbon intensity	Volume of carbon emissions, expressed in tons of CO <sub>2</sub> equivalent per million dollars of revenue.	Implied temperature rise	Indicates the increase in global temperature, in degrees Celsius (°C), that would occur at the beginning of the next century if the entire economy behaved similarly to the company in terms of exceeding or failing to meet the carbon budget required to keep global temperatures below 2 °C.

Source: Network for Greening the Financial System.

budget, climate value at risk, and implied temperature rise. In practical terms, these indicators enable the analysis of the extent to which a company is aligned, or expected to align, with a net-zero trajectory. Despite their growing use, the availability of comparable forward-looking and backward-looking data remains limited, which hinders their implementation. However, investors require a consistent manner to assess exposure to transition risk to identify the winners and losers in the transition to net-zero emissions.

**Some central banks, in their role as investors in capital markets, have demonstrated their commitment to contributing to the transition toward a low-carbon economy and aligning their portfolios with climate objectives, and have therefore been considering and implementing carbon emissions-related metrics.** Accordingly, there are cases in which metrics recommended by institutions such as the TCFD and the NGFS have been incorporated into central bank practices, such as the Eurosystem<sup>6</sup>, one of the pioneers in this area. Since 2023, the European Central Bank (ECB) has disclosed financial information on climate-related aspects, including data on carbon footprint and exposure to climate risks for the Eurosystem's loan portfolios related to monetary policy, the ECB's foreign reserves, and the ECB's non-monetary policy loan portfolios<sup>7</sup>. Regarding the ECB's foreign reserves, they reached a market value equivalent to EUR 103.1 trillion as of the end of 2024, comprising foreign currency portfolios (the U.S. dollar, yen, and renminbi), physical gold, and special drawing rights (SDRs)<sup>8</sup>. The metrics included in the information disclosed by the ECB are total carbon emissions, carbon footprint, weighted average carbon intensity, and carbon intensity for its holdings of sovereign, supranational, and agency bonds (with a nominal value equivalent to EUR 40.0 trillion), while cash, physical gold, and SDRs are excluded due to the lack of methodological guidelines for their treatment. Although the ECB does not define emission-reduction targets for its foreign reserves, the calculation and monitoring of these metrics promote transparency regarding the climate impact of its portfolios and their exposure to

6 The Eurosystem comprises the European Central Bank and the national central banks of the European Union member states that have adopted the euro.

7 The ECB's non-monetary policy loan portfolios include pension funds for its employees and its own investment loan portfolio.

8 SDRs are a foreign reserve assets created by the IMF, whose value is based on a basket of five currencies: the U.S. dollar, the euro, the Chinese renminbi, Japanese yen, and the sterling pound.

climate-related risks, and support the net-zero targets and the transition to a low-carbon economy in the European Union.

*Banco de la República* closely monitors developments at other central banks to stay up to date on international best practices. The approach adopted by *Banrep* is primarily focused on monitoring the impact of ESG factors on the credit profile of investments, without considering them as an additional criterion within the institutional mandate. This is because the direct integration of these factors into the investment process presents several challenges, including limited standardization of available data and taxonomies, the market size and depth, and the consistency of these practices with the investment mandate granted. However, *Banrep* is exploring various complementary measures to the ESG profile already calculated, which would enable it to further incorporate ESG factors into the risk management processes of foreign reserve investments.