MONETARY POLICY REPORT

ISSN - 2711 - 1164

07/
2023

BANCO DE LA REPÚBLICA
COLOMBIA

July 2023

MONETARY **POLICY REPORT**

* Presented by the technical staff to the Board of Directors for its meeting on 31 July 2023.

Banco de la República
Bogotá, D. C. (Colombia)

ISSN - 2711 - 1164

Office of the Deputy Technical Governor
Hernando Vargas Herrera
Deputy Technical Governor

Office for Monetary Policy and Economic Information (*)
Juan José Ospina Tejeiro
Chief Officer

Programming and Inflation Department
Carlos Huertas Campos
Director

Inflation Section
Adolfo León Cobo Serna
Head

Édgar Caicedo García
Juan Pablo Cote Barón
Nicolás Martínez Cortés
Franky Galeano Ramírez
Karen Pulido Mahecha
Sergio Restrepo Ángel

Macroeconomic Programming Section
Aarón Garavito Acosta
Head

Luis Hernán Calderón López
Johanna Barbosa Buitrago
Viviana Alfonso Corredor
Marlon Salazar Silva
Darío Perdomo Sanchez

Forecasting Process Management Section
Celina Gaitán Maldonado
Head

Andrea Salazar Díaz
Nicol Rodríguez Rodriguez
Tatiana Mora Arbeláez

Macroeconomic Modeling Department
Franz Hamann Salcedo
Director

Forecasting Section
Julián Pérez
Director

Jose Vicente Romero Chamorro
Sebastián García Echeverry
Laura Acevedo Schoenbohm
Juan Andrés Rincón Galvis
Jonathan Muñoz Martinez

Consultant and Researchers associated with the Macro-Economic Models Department
José David Pulido Pescador
Head

Santiago Forero Alvarado
Sara Naranjo Saldarriaga
Anderson Grajales Olarte

(*) Eliana González, head of the Statistics Section; Deicy Cristiano, Julián Cárdenas, Isleny Carranza, and Ramón Hernández, analysts at the Statistics Section; Jesús Bejarano, Director of the Applied Macroeconomic Analysis Department; Andrés Herrera, David López, and Manuela Quintero, analysts of the Fiscal and Sector Analysis Group; Juan David Bonilla Pérez, Maria Corina Hernández Linares, Federico Meneses Serrato, Joseph Yesid Palomino Velandia, Valeria Ramírez Sánchez, Juan Sebastian Mayorga Guayacán, and Nicolle Valentina Herrera Pinto, student interns, also participated in the making of this Report.

Edited in Bogotá D.C., Colombia
Suggestions and comments: +57 (1) 343 1011 / atencionalciudadano@banrep.gov.co

Monetary Policy in Colombia

Banco de la República (the Central Bank of Colombia) is required by the Constitution to maintain the purchasing power of Colombia's currency in coordination with general economic policy[1]. In order to fulfill this mandate, *Banco de la República*'s Board of Directors (hereafter BDBR) has adopted a flexible inflation-targeting scheme, by which monetary policy actions (MP) seek to lead inflation to a specific target and achieve maximum levels of sustainable output and employment.

The flexibility of this scheme allows the BDBR to maintain an adequate balance between reaching its inflation target and smoothing output and employment fluctuations around their sustainable growth paths. The BDBR has set a 3% inflation target based on annual change in the consumer price index (CPI). In the short term, inflation may be affected by factors outside of monetary policy control, such as changes in food prices due to climate-related phenomena. To factor in this reality, the BDBR has also set a ±1 percentage point range outside its inflation target (i.e., 3.0 ± 1 pp). This range does not represent a monetary policy target, but rather reflects the fact that inflation can fluctuate around the target and will not always be equal to 3%.

The main instrument used by the BDBR to control is the policy interest rate (overnight repo rate, or benchmark interest rate). Given that monetary policy actions take time to have their full effect on the economy and inflation[2], the BDBR assesses the inflation forecast and inflation expectations vis-à-vis the inflation target, as well as the current situation and outlook of the economy, in order to determine their value.

The BDBR meets once a month, producing monetary policy decisions in eight of its meetings (January, March, April, June, July, September, October, and December). In principle, no such decisions are made in the BDBR's four remaining meetings (February, May, August, and November)[3]. At the end of the meetings in which monetary policy decisions are produced, a press release is published and a press conference held by the Governor of the Central Bank and the Minister of Finance. The minutes of the meeting describing the positions that led the BDBR to its decision are published on the third following business day. Additionally, the Monetary Policy Report (MPR), produced by the Central Bank's technical staff, is published in January, April, July, and October, on the second following business day. On the fourth following business day, the Governor clarifies concerns about the minutes, and the Bank's Deputy Technical Governor presents the MPR. This dissemination scheme[4] seeks to deliver relevant and up-to-date information to contribute to better decision-making by the agents of the economy.

---

1 Political Constitution of Colombia (1991), Article 373 and Decision C-481/99 of the Constitutional Court.

2 For further details, see M. Jalil and L. Mahadeva (2010). "Transmission Mechanisms of Monetary Policy in Colombia", Universidad Externado de Colombia, Faculty of Finance, Government, and International Relations, ed. 1, vol. 1, no. 69, October.

3 A Board Member may request an extraordinary meeting at any time to make MP decisions.

4 The current communication scheme was approved by the BDBR in its meeting in May 2023.

Content

Graphs

Tables

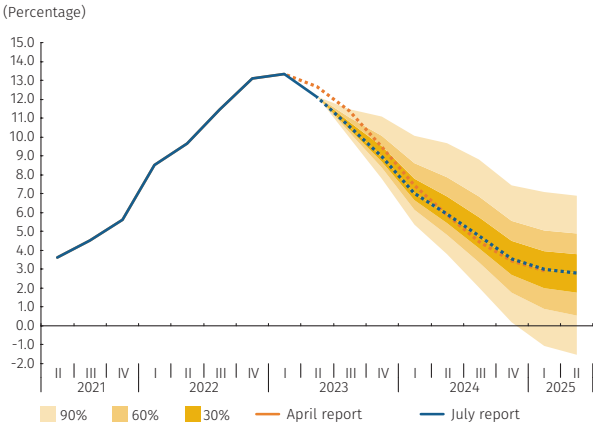
1. Summary

1.1 Macroeconomic Summary

In the second quarter of 2023, total annual inflation fell to 12.1% and the rise of core inflation halted and stood at 10.5%; both measures were lower than those forecasted in the April Report but remained well above the 3.0% target. The aggregate effects of monetary policy actions and the unwinding of certain shocks that affected prices will contribute towards bringing inflation closer to the target in 2024. By component, the annual variations in the CPI for food and the CPI excluding food and regulated items have lessened more markedly than anticipated by the Central Bank's technical staff, underlying the decline in annual inflation. However, prices of regulated items and services continued to rise, nonetheless at a slower pace than expected, particularly in the case of services. For these two groups, price indexation mechanisms have resulted in the transmission of some transitory increases in certain CPI sub-components (e.g., food) to other items (e.g., rents, utilities, etc.), thus generating a greater persistence of already high inflation. This is acerbated by the gasoline price increases required to correct the deficit of the Fuel Price Stabilization Fund (*Fondo de Estabilización de los Precios de los Combustibles*, FEPC). Consequently, the CPI for regulated items forecast increased going forward relative to the April Report given the higher gasoline price adjustments announced by the Government. For the remaining items (food, goods, and services), the forecasted trajectory declined due partly to the lower-than-estimated inflation, a more notable reduction in the international prices of some food items and freight costs, lower exchange rate and cost pressures on prices, and a faster than anticipated decrease in excess demand. This occurs in a contractionary monetary policy environment that aims to reduce inflation towards rates close to the 3.0% target by the end of 2024. Against this background, headline inflation for yearend 2023 is forecast at 9.0% (formerly 9.5%) and 3.5% for yearend 2024 (previously 3.4%) (Graph 1.1). In the same timeframes, the core inflation forecast has been revised downward from 8.9% to 7.9%, and from 3.9% to 3.7%, respectively (Graph 1.2). These projections are subject to high uncertainty, especially surrounding future behavior of international financing conditions and the exchange rate, fluctuations in domestic demand, the possible occurrence of the *El Niño* natural climate phenomenon, and future decisions regarding domestic fuel and electricity prices.

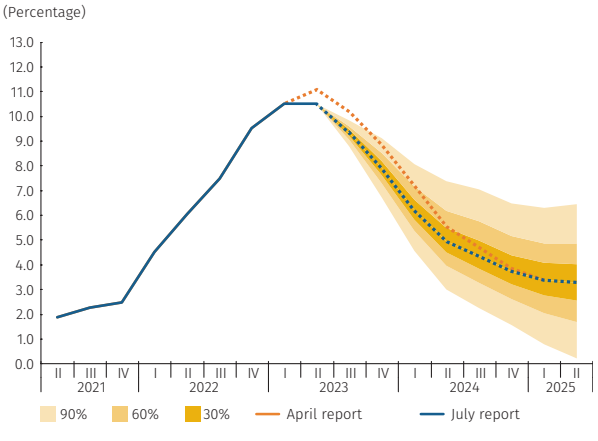
Economic activity is expected to decelerate at a slightly faster pace than projected in the April Report. The

Graph 1.1
Consumer Price Index [a/, b/]
(annual change; end-of-period)



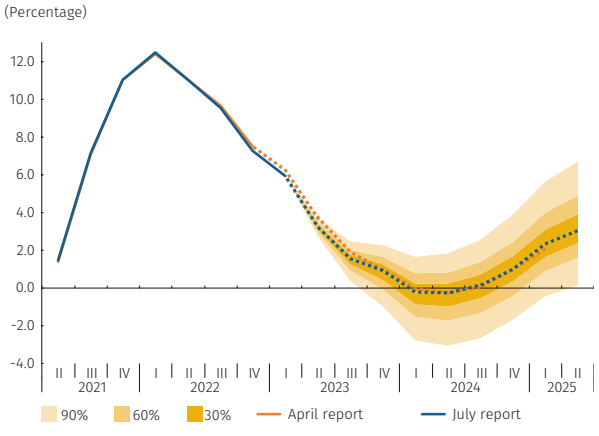
a/ This graph presents the forecast probability distribution on an eight-quarter time horizon. Density characterizes the prospective balance of risks with areas of 30%, 60%, and 90% probability surrounding the central forecast (mode), through a combination of densities from the Patacon and the 4GM monetary policy models.
b/ The probability distribution corresponds to the forecast exercise from the *July report*.
Source: DANE – calculations and projections by *Banco de la República*.

Graph 1.2
CPI excluding food and regulated items [a/, b/]
(annual change; end-of-period)



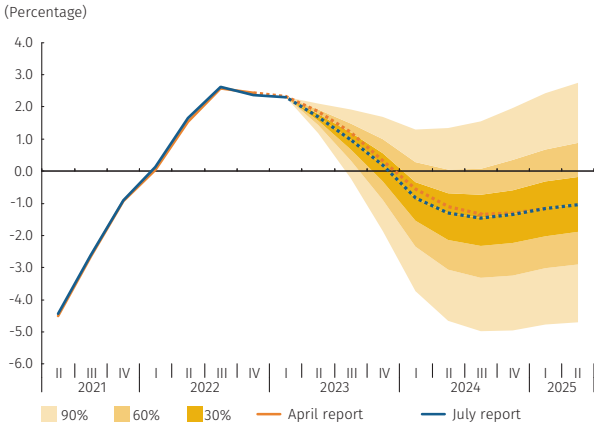
a/ This graph presents the forecast probability distribution on an eight-quarter time horizon. Density characterizes the prospective balance of risks with areas of 30%, 60%, and 90% probability surrounding the central forecast (mode), through a combination of densities from the Patacon and the 4GM monetary policy models.
b/ The probability distribution corresponds to the forecast exercise from the *July report*.
Source: DANE – calculations and projections by *Banco de la República*.

Graph 1.3
Gross Domestic Product, four quarter accumulation [a/, b/, c/]
(annual change)



a/ Seasonally adjusted and corrected for calendar effects.
b/ This graph presents the forecast probability distribution on an eight-quarter time horizon. Density characterizes the prospective balance of risks with areas of 30%, 60%, and 90% probability surrounding the central forecast (mode), through a combination of densities from the Patacon and the 4GM monetary policy models.
c/ The probability distribution corresponds to the forecast exercise from the *July report*.
Source: *Banco de la República*.

Graph 1.4
Output gap [a/, b/, c/]
(four-quarter accumulation)



a/ The historical output gap estimate is calculated as the difference between observed GDP (four-quarter accumulation) and potential GDP (trend; four-quarter accumulation) based on the 4GM model.
b/ This graph presents the forecast probability distribution on an eight-quarter time horizon. Density characterizes the prospective balance of risks with areas of 30%, 60%, and 90% probability surrounding the central forecast (mode), through a combination of densities from the Patacon and the 4GM monetary policy models.
c/ The probability distribution corresponds to the forecast exercise from the *July report*.
Source: *Banco de la República*.

adjustment in domestic demand is anticipated to continue and converge by the end of the year to levels more compatible with the economy's productive capacity. In the first quarter, the seasonally and calendar-adjusted GDP rose by 3.0% on an annual basis. Annual domestic demand contracted due to the poor performance of investments, particularly a drop in machinery and equipment investments. Private consumption growth continued at a moderate pace. This was captured in the significant curtailing of imports, which, together with improved export dynamics - mainly of services - explains a reduction in the real external deficit. For the second quarter, the set of available indicators including the economic tracking index, retail sales, and consumer confidence and credit, suggest a quarterly decline in the levels of economic activity. The revised estimate places annual growth in the second quarter at 0.7%, indicating a quarterly decline in GDP, albeit from the historic high reached in the first quarter. This fall would be mainly attributed to a new decline in investments, while consumption would remain at a level comparable to that observed in the first quarter, though exhibiting a slight year-on-year reduction. In annual terms, exports would fall, yet by a smaller percentage drop than that seen for imports. Weak external demand is expected for the remainder of 2023 amid a backdrop of tight global financial conditions, coupled with lower terms of trade than those noted in 2022. Domestic demand would continue to adjust toward more sustainable rates in an environment of low consumer and business confidence levels, high household indebtedness, and a contractionary monetary policy compatible with a future convergence of inflation to its target. Accordingly, annual growth for 2023 would reach 0.9%, slightly lower than the 1.0% figure forecast for 2024 (Graph 1.3). Excess demand, measured through the output gap, would fade towards the end of 2023 and turn negative in 2024 (Graph 1.4). These estimates remain subject to a high degree of uncertainty owing to external factors such as global political tensions and monetary policy decisions in advanced economies, and domestic factors that include uncertainty regarding the course and impact of the reform proposals presented to Congress, the response of domestic demand to national financial conditions, and the increase in the fiscal deficit expected for 2024, among others.

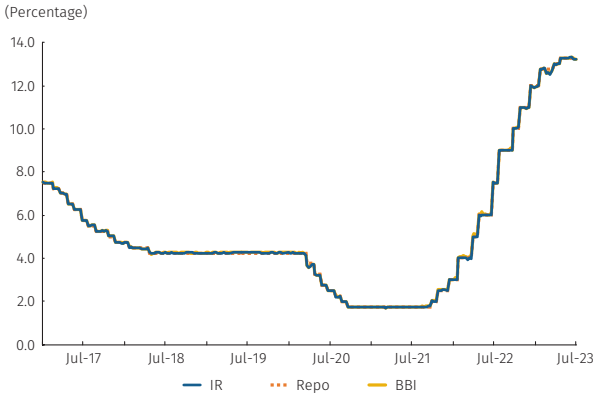
The anticipated adjustment in domestic demand will contribute to narrowing the country's external imbalance. In 2022, strong growth in domestic demand that exceeded the economy's productive capacity largely explained the substantial current account deficit (6.2% of GDP). By 2023, lower domestic demand, consistent with long-term sustainable output levels and the convergence of inflation to the target, would also assist in

reducing the external imbalance. Therefore, in 2023, the current account deficit would drop to 4.0% of GDP, mainly owing to a decline in imports from the high levels recorded in 2022, and lower profits remitted abroad by companies with foreign capital. Although the current account deficit would remain high, the reduction of the external imbalance would make the Colombian economy less vulnerable to significant deteriorations in the global framework.

External financial conditions are expected to remain tight in a context of high - albeit declining - global inflation and a slowdown of the global economy. Nevertheless, there have been general improvements in the risk perception of emerging economies, including Colombia. The supply and cost shocks that affected prices in the global environment continue to ease, resulting in lower international food and fuel prices. However, headline and core inflation continue to exceed their targets across most countries. In addition, the renewal of blockades by Russia on Ukrainian exports would again place upward pressure on international food prices. External demand continues to slow against a backdrop of high international interest rates. Lower global growth prospects, alongside improvements in oil supply, led to a decline in the observed and projected price of Brent. In the United States, the Federal Reserve (Fed) increased the federal funds rate to a target ranging between 5.25% and 5.50%, and it is likely that, given the persistence of high core inflation and a tight labor market, there will be a further hike during the remainder of this year. Meanwhile, the sovereign risk premiums of some emerging economies have declined, and their currencies appreciated. The steeper cost of global financing and the loss of real income due to higher levels of global inflation, among other factors, will continue to impact the world economy and indicate a slowdown in external demand germane to Colombia. In turn, the expected deterioration of the terms of trade would negatively affect national income. Uncertainty surrounding external forecasts and their impact on the country remains high given the unpredictability of the war in Ukraine, geopolitical tensions, the tightening of external financial conditions, and the effect of internal reforms on Colombia's sovereign risk perception, among others.

The macroeconomic context suggests that a contractionary monetary policy should continue in order to bring inflation back toward the target and contribute to returning aggregate demand to levels compatible with the economy's productive capacity and a sustainable external position. Economic activity indicators for the second quarter show that the economic slowdown could be more pronounced than that projected in the April Report. However, the output level continues to exceed the economy’s productive capacity, the labor market exhibits the lowest unemployment levels of the past four years, and the current account deficit remains high despite its recent drop. A worsening of the banking loan portfolio is noted, but the Colombian financial system maintains adequate provisions, solvency, and liquidity levels that would allow it to face significant macroeconomic declines. Concerning price levels, headline inflation decreased in the second quarter while core inflation stagnated, yet they both continue to manifest rates well above the target. The faster-than-expected decline in inflation has occurred within a backdrop of dissipating external and domestic supply shocks previously elevating prices and production costs, a significant appreciation of the peso, and a marked cumulative adjustment of domestic financial conditions. For the remainder of 2023, the downward

Graph 1.5
Monetary policy interest rate, interbank rate and BB[a/]
(weekly data)



a/ IR: interbank rate. BBI: benchmark banking indicator.
Sources: Office of the Financial Superintendent of Colombia and *Banco de la República*.

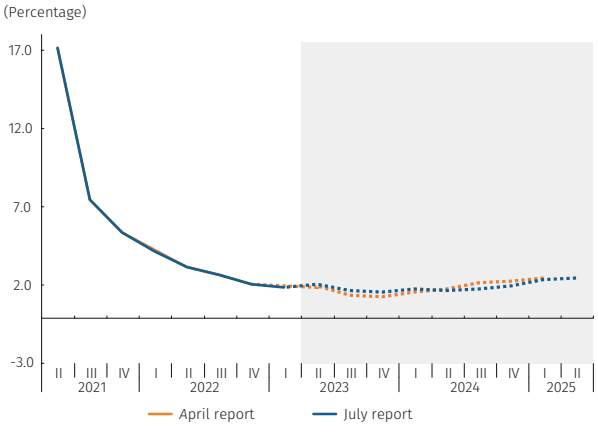
inflationary trend is expected to continue in an environment of lessening exchange rate pressures on prices as supply shocks continue to fade, albeit as domestic fuel prices face greater increases. As such, the technical staff reduced their headline and core inflation forecast for 2023 yet expect levels still above 3.0% and continue its convergence towards the target by yearend 2024. Inflation expectations for the end of this year and two-year ahead expectations have moderated but remain above 3.0%. The macroeconomic context, characterized by high inflation with forecasts and expectations above the target, as well as continuing excess demand, requires maintaining a contractionary monetary policy that seeks to meet the inflation target by yearend 2024 and achieve sustainable output levels. This contractionary monetary policy, in a setting of positive financial soundness indicators, does not suggest a trade-off between price stability and safeguarding financial stability.

1.2 Monetary Policy Decision

At its June and July 2023 meetings, the Board of Directors of Banco de la República (BDBR) voted unanimously to maintain the monetary policy interest rate unchanged at 13.25% (Graph 1.5).

2. Macroeconomic Forecast and Risk Analysis

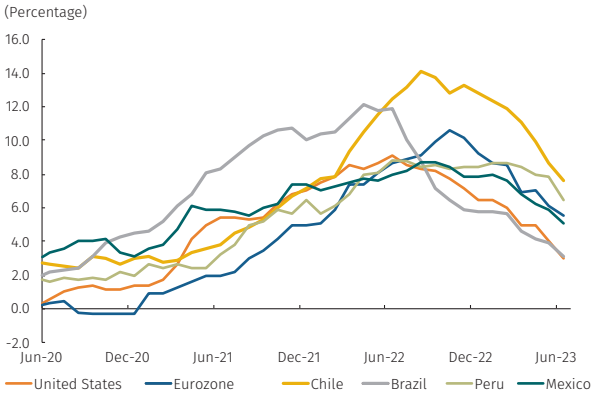
Graph 2.1
Real GDP, main trade partners
(annualized change, projections according to full-year assumption)



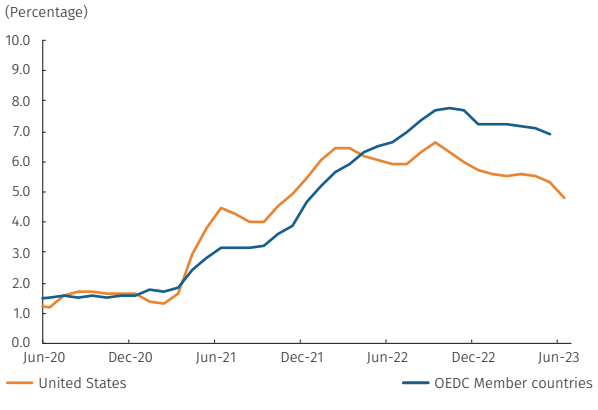
Sources: Bloomberg, statistics offices and central banks, calculations, and projections by *Banco de la República*.

Graph 2.2
Total inflation, select main trading partners

A. Headline Inflation



B. Inflation excluding food and energy



Source: Bloomberg and the Organization for Economic Development and Cooperation (OEDC).

2.1 International Outlook

2.1.1 Foreign Demand

In 2023, the country is expected to experience a deceleration in foreign demand expansion, albeit at a more gradual rate than initially anticipated in the previous *Report* (Graph 2.1). This trend unfolds against a backdrop of heightened worldwide uncertainty, with headline and core inflation registering year-end levels above target in multiple nations (Graph 2.2), and elevated monetary policy interest rates (Graph 2.3). Furthermore, the persevering incursion of Russia into Ukraine and the ongoing deceleration in global trade continue to affect the economy.[1] Concerning the nation's trade partners, an average growth rate of 1.8% is projected for 2023, sustaining a downward trajectory after the 3.0% registered in 2022 (Table 2.1). The current-year figures surpass the 1.6% reported in the previous *Report*, owing in part to stronger-than-expected growth outcomes in the initial quarter and annual outlook, particularly for the United States, Mexico, Brazil, and Chile.[2] Looking ahead to 2024, the country's outlook for foreign demand growth foresees a 1.8% expansion, trailing the 1.9% projection stated in the previous *Report* and the historical norm for this metric.[3] Risks associated with global economic expansion are skewed toward the downside, attributable in part to a more enduring inflationary environment on a global scale and a more restrictive monetary policy than stated in initial projections. These challenges are compounded by apprehensions regarding laggard economic growth in China, as well as the continued conflict in Ukraine[4] alongside additional geopolitical tensions and other relevant variables.

2.1.2 International Prices

Within the forecast horizon, the oil price assumption has been downwardly revised, prompted by its downward price trajectory experienced during the initial half of the year, the abundant availability of crude oil, and reservations about the performance of the global economy (Graph 2.4). During the second quarter, the average international crude Brent price neared USD 78 per barrel (bl), a drop from the previous quarter's price

1 For 2023, the World Bank, in its June report, estimates a 1.7% slowdown in world trade, after the 6.0% growth observed in 2022.

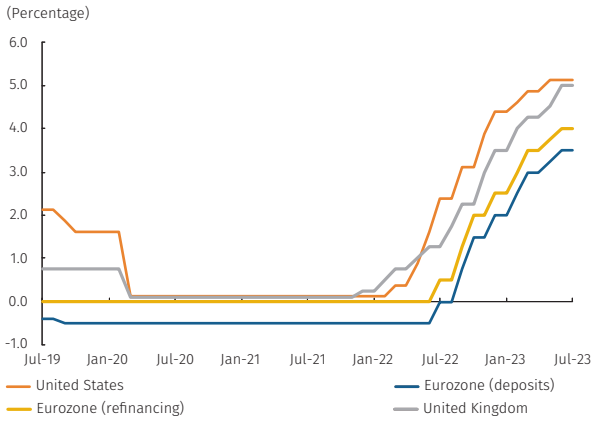
2 It is worth noting that for 2023, both the Organization for Economic Co-operation and Development (OECD) and the International Monetary Fund (IMF), in their most recent reports, revised upwards their world growth projections from 2.6% to 2.7% and from 2.8% to 3.0%, respectively.

3 The historical average annual growth of trading partners between 2001 and 2022 is 2.82 %.

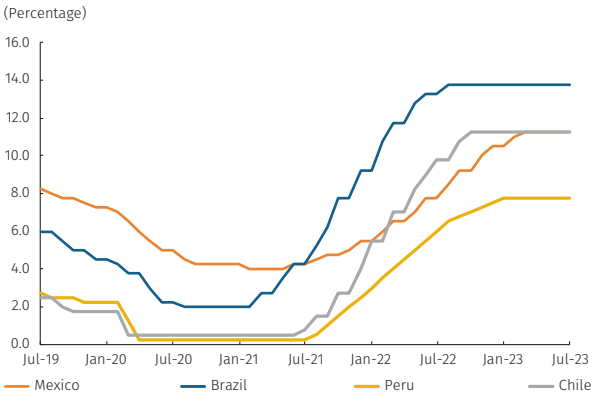
4 In mid-July 2023, Russia suspended its participation in the Black Sea grain agreement, which affects food exports from Ukraine and the prices of some products such as wheat.

Graph 2.3
Monetary policy interest rate, select main trading partners

A. Developed Economies



B. Latin America



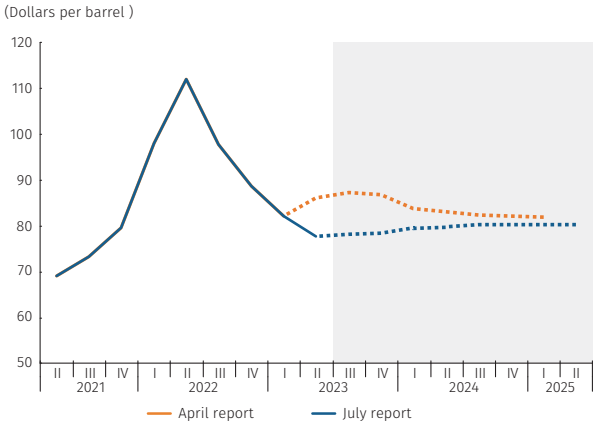
Note: July 2023 includes data observed on the 24th of said month.
Source: Bloomberg.

Table 2.1
Economic Growth among Major Trade Partners [a/]

Main partners	2021 (pre)	2022 (pre)	2023 (proj)	2024 (proj)
United States	5.9	2.1	1.4	0.8
Eurozone	5.3	3.5	0.7	1.2
China	8.4	3.0	5.3	4.9
Ecuador	4.2	2.9	1.6	2.2
Brazil	5.0	2.9	2.0	1.2
Peru	13.3	2.7	1.9	2.6
Mexico	4.9	3.0	2.4	1.5
Chile	11.7	2.4	0.1	1.9
All trade partners [a/]	7.1	3.0	1.8	1.8

(pre): preliminary, (proj): projected
a/ Projections based on contribution of non-traditional trade.
Sources: Bloomberg, Focus Economics, statistics offices, and central banks (observed data); *Banco de la República* (projections and calculations).

Graph 2.4
Assumed quarterly oil price



Source: Bloomberg, calculations, and projections by *Banco de la República*.

and the forecast by the technical staff. This downturn is rooted in supply-related variables, including the augmented production observed and anticipated in nations outside the Organization of Petroleum Exporting Countries (OPEC), the redirection of export flows from Russia, and the favorable dynamics governing Iran and Venezuela's export activities. Additionally, this trend can be attributed to the price cap of Russian oil, coupled with the annual growth of commercial inventories encompassing oil and other liquid fuels[5] in OECD countries throughout 2023. On the demand front, the cost of crude oil has also been influenced by global frailty in the manufacturing sector, China's slower-than-expected economic recovery, downside risks to future global economic growth, elevated monetary policy interest rates in key advanced economies, and satisfactory reserves of natural gas across Europe. As we look ahead, the price reductions would be limited by the announced supply reductions resulting from OPEC+[6] measures. Consequently, an average Brent price of USD 79 bl is assumed for 2023, followed by USD 80 bl in 2024. These projections are comparatively lower than the earlier assessments stated in the April Report (USD 86 bl in 2023 and USD 83 bl in 2024). In a broader context, the uncertainty enveloping the future trajectory of this price remains substantial, largely due to the multitude of shocks exerting influence upon this market.

A contraction in the terms of trade is anticipated for 2023, stemming from lower US dollar valuations of the products earmarked for export. Presently, the terms of trade for Colombia continue declining in the current year, experiencing a more pronounced deterioration compared to the expectations out-

5 This includes natural gas plant liquids, biofuels, refined and other liquids.

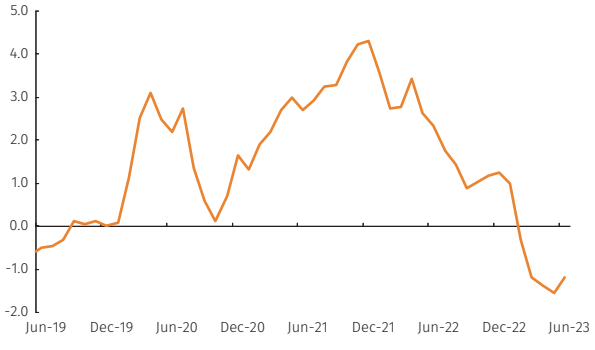
6 OPEC+ extended oil extraction cuts until the end of 2024, along with an additional cut by Saudi Arabia of one million barrels per day in June and August of this year, which could be extended until the end of 2023. In addition, Russia established new oil export cuts of 500,000 barrels per day, while Algeria established production cuts of 20,000 barrels per day, both policies to be implemented in August 2023.

lined in the prior Report. This trajectory is attributed to the anticipation of heightened reductions in the international benchmark price for raw materials exported by Colombia. Notably, products such as oil, coal, and coffee are anticipated to be subject to this trend. Nevertheless, this adverse trend could be partially counterbalanced by the decline in the dollar-denominated prices of intermediate goods imported by the nation, along with decreased expenses associated with freight charges for the transport of goods.

The moderating trajectory of global inflation would endure throughout 2023, although accompanied by a deceleration in core inflation. After the elevated inflation levels recorded in 2022, the first semester of 2023 witnessed a subsiding of global headline inflation, attributed to an extensive regimen of monetary policy tightening across a wide range of nations (Graph 2.3). This decrease was further shaped by the backdrop of a worldwide economic deceleration, the normalization of global supply chains (Graph 2.5), and declining energy and food prices, among other contributing factors. According to the OECD, the mean headline inflation within its member countries is expected to subside from 9.4% in 2022 to 6.6% in 2023, followed by a further reduction to 4.3% in 2024. However, core inflation, while tapering, remains high. The trajectory of core inflation is predicted to decrease more gradually, from 6.6% in 2022 to 6.5% in 2023, and subsequently to 4.5% in 2024. This dynamic is primarily attributed to the intricate dynamics governing the pricing of services, underscored by the recalibration of demand patterns from tangible goods to services, and robust labor markets. Specifically, within the United States, the annualized figures for both headline and core inflation exhibited a reduction in June, standing at 3.0% and 4.8% respectively, compared to the preceding May figures of 4.0% and 5.3% (Graph 2.2). In parallel, during the same month, the annualized headline inflation within the Eurozone registered a decline to 5.5% from May's 6.1%, whereas annualized core inflation increased from 5.3% to 5.5% (Graph 2.2). Looking ahead, the headline inflation rates within these nations are expected to display a decline, yet to remain above their stipulated targets as we approach the end of 2023.[7]

Graph 2.5
Global Supply Chain Pressure Index [a/]

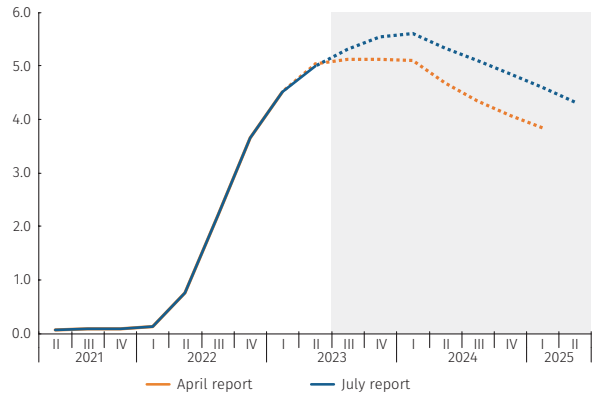
(Standard deviations from average value)



a/ For its construction the authors used international shipping indicators (Baltic Dry Index (BDI), Harpex index, among others) and certain subcomponents of the Purchase Manager Index (PMI) surveys for the Eurozone, China, Japan, South Korea, Taiwan, the UK, and the US.
Sources: Gianluca Benigno, Julian di Giovanni, Jan J. J. Groen, and Adam I. Noble, "A New Barometer of Global Supply Chain Pressures" Federal Reserve Bank of New York Liberty Street Economics.

Graph 2.6
Assumed U.S. Federal Reserve quarterly interest rate

(Percentage)



Source: Federal Reserve Bank of Saint Louis, calculations, and projections by *Banco de la República.*

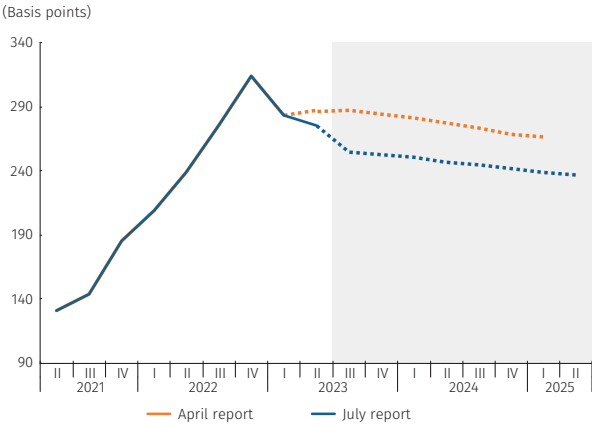
2.1.3 International Financial Developments

The presumption concerning the monetary policy interest rate in the United States has undergone an upward revision compared to the previous Report (Graph 2.6). During its July meeting, the Federal Open Market Committee (FOMC) decided on a 25-basis point (bps) increase in the monetary policy interest

7 In the United States, the median of the New York Federal Reserve's survey of one-year inflation expectations of consumers was 3.8% (4.1% in May) in June. In the Eurozone, according to the European Central Bank survey, median harmonized headline inflation would be 3.2% and 2.4% for the last quarter of 2023 and 2024, respectively. Moreover, by the end of 2023, the median of the June FOMC projections for core PCE increased to 3.9% (3.6% in March) and the ECB's average of expected core inflation in the Eurozone increased to 4.1% in June (3.8% in May).

rate, positioning it within the range of 5.25% to 5.50%.[8] This increase surpassed the figures forecast by the technical team in the April Report, which ranged from 5.00% to 5.25%. Furthermore, by yearend 2023 and looking towards 2024, the median figures from the FOMC's projections, published in June, signal a higher tier for the monetary policy interest rate when contrasted with the forecasts made by this committee in March.[9] Moreover, looking at the monetary policy interest rate futures associated with this period, they depict a trajectory that exceeds the earlier projections made months ago.[10] These expectations of an augmented policy rate trajectory are framed within a context where the labor market remains tight, the core inflation component persists at elevated levels, and stress in the financial system demonstrates signs of moderation. In light of these dynamics, the present outlook incorporates a heightened path for the monetary policy interest rate in the United States in comparison to that presented in the April Report.[11] Notably, in addition to the July adjustment, an additional 25 bps increment is foreseen for the latter half of 2023. Consequently, the rate is projected to hover between 5.50% and 5.75% by yearend. As we approach 2024, the interest rate would subsequently recede, settling within the range of 4.50% to 4.75% come December of that year, insofar as inflation nears its target.

Graph 2.7
Colombia's assumed quarterly risk premium (CDS)[a/]



a/ Five-year credit default swaps.
Source: Bloomberg, calculations, and projections by *Banco de la República*.

The forecast horizon incorporates a lower risk premium assessment in comparison to the expectations outlined in the April Report (Graph 2.7). Notably, the principal volatility indicators within international markets, namely the VIX and Vstoxx, have recently undergone a considerable reduction, having converged to pre-pandemic levels. Furthermore, the attenuated inflationary circumstances within the United States, coupled with the envisaged culmination of the interest rate elevation cycle, have boosted the performance of global equity markets. Against this backdrop, the risk premiums associated with numerous emerging economies experienced a contraction in July vis-à-vis the readings recorded over the preceding two months (Graph 2.8, panel A). For Colombia, the average five-year credit default swap (CDS) recorded a drop from 295 bps in May to 233 bps by July 20. The recent contraction in the risk premium and the appreciation of the Colombian peso against the US dollar is significant in the case of Colombia relative to other countries in the region (Graph 2.8, panel B). Within this environment, a forecasted trajectory of diminished risk premiums emerges, when contrasted with the expectations outlined in the April Report. Specifically, this trajectory assumes an average of 266 bps throughout 2023 and a

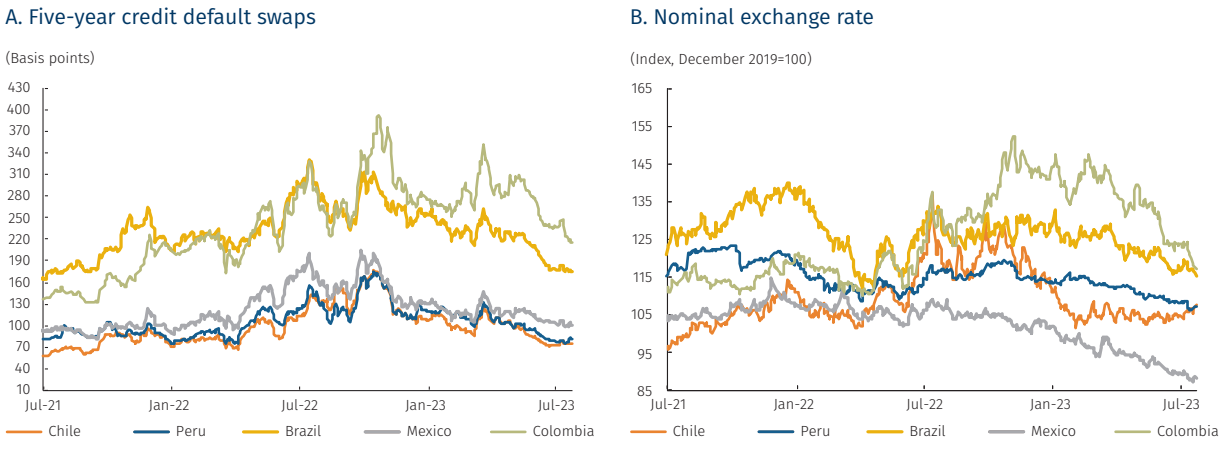
8 At its July 27 meeting, the European Central Bank (ECB) raised its benchmark interest rates by 25 bps.

9 The median of the June FOMC interest rate projections increased for yearend 2023 to 5.6% (March 5.1%) and for December 2024 to 4.6% (March 4.3%).

10 For year-end 2023 and 2024, the futures associated with the policy rate taken on 20 July 2023 are at 5.4% and 4.1%, respectively; this in contrast to 4.6% and 3.1% for the futures taken on April 28, 2023.

11 In the April report, the monetary policy rate assumption in the United States was set in the range of 5.00% to 5.25% by the end of 2023 and between 3.75% and 4.00% by December 2024.

Graph 2.8
Behavior of nominal exchange rate and risk premium for select Latin American countries



Note: Data to July 24, 2023.
Source: Bloomberg, calculations by *Banco de la República*.

further drop to an average of 246 bps in 2024.[12] This projection takes into consideration a portion of the recent decline in this metric, the tempered fluctuations in volatility observed across international financial markets, and the reductions observed and foreseen in Colombia's balance of payments and current account deficit. Notwithstanding this downward revision, it's important to note that the levels at which the risk premium for Colombia is expected to remain continue to surpass historical averages. This prognosis is grounded in a broader understanding of the elevated and enduring monetary policy interest rates in most primary advanced economies, the continued global uncertainty, and distinctive factors, such as the lack of investment grade status and the heightened public indebtedness that surpasses pre-pandemic levels, among other relevant determinants.

2.1 Macroeconomic Projections [13]

2.2.1 Inflation

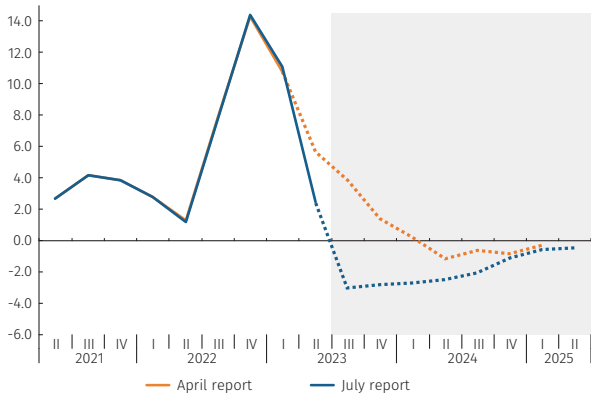
Over the forecast horizon, the trajectory of annual consumer inflation is expected to continue to fall, converging toward its target. This trend can be attributed to the cumulative ramifications stemming from monetary policy measures, the appreciation of the peso, and the unwinding of assorted shocks that have exerted influence on price dynamics. The central forecast path delineated in this Report encapsulates a projection characterized by lower pressures exerted on both core inflation and food prices in the forthcoming quarters, in contrast to the assessments made in the previous Report. These mitigating effects serve to counterbalance the projected heightened increases anticipated in the Consumer Price Index (CPI) concerning regulated items. This amalgamation of factors has precipitated a downward revision of the forecast trajectory for headline inflation, spanning the remainder of 2023 and the initial phase of 2024. This decline in inflation foreseen for the upcoming quarters is set against a backdrop marked by the dissolution of excess demand, primarily attributable to the conjuncture of factors including but not limited to monetary policy actions, a continuing depreciation in international prices and costs, and the normalization of the domestic food supply. Notably, a substantial contribution to this downward trend is anticipated from lower exchange rate pressures, a phenom-

12 The April Report's assumption for Colombia's five-year CDS was 285 bps for 2023 and 275 bps for 2024.

13 Projections assume active monetary policy wherein *Banco de la República's* monetary policy interest rate is adjusted to guarantee compliance with the inflation target.

Graph 2.9
Quarterly RER inflationary gap[a/]
(annual change, end-of-period)

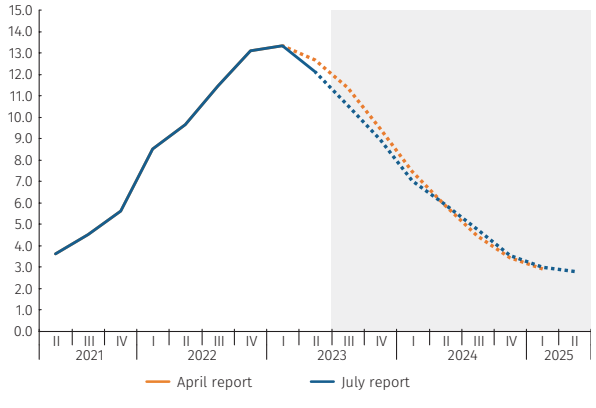
(Percentage)



a/ The real exchange rate (RER) inflationary gap captures inflationary pressures caused by the exchange rate. Positive values imply upward inflation pressures. The gap is calculated as the deviation in the real exchange rate relative to a non-inflationary trend estimate under the 4GM monetary policy model.
Source: *Banco de la República.*

Graph 2.10
Consumer Price Index (CPI)
(annual change, end-of-period)

(Percentage)



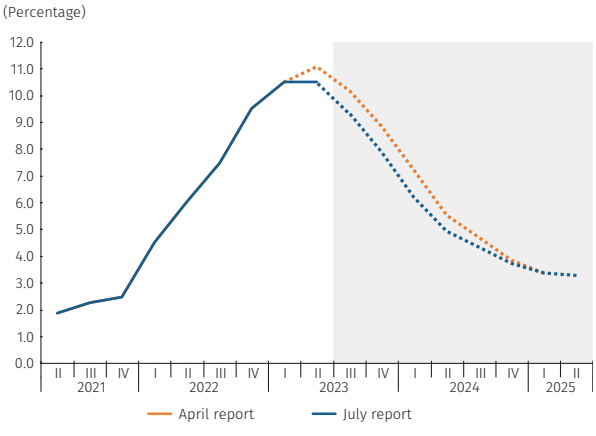
Source: DANE, calculations and projections by *Banco de la República.*

enon suggested by the real exchange rate inflation gap. This gap is expected to dwell in negative territory during the latter half of this year and throughout the entirety of 2024 (Graph 2.9). This shift is, in part, attributed to the significant appreciation observed in the peso during the last two months. These downward pressures are expected to exercise a more substantial influence on the trajectory of headline inflation when contrasted with the upward pressures emanating from the regulated sector, particularly prevalent in 2023 due to fuel price adjustments. Additionally, as mentioned in the final part of this section, inflation expectations have already begun to experience a decline, a trend that is likely to consolidate insofar as the monetary policy stance continues to convert towards its target, which, in turn, is expected to contribute to the ongoing alleviation of the elevated inflation levels currently recorded. Given the above, annual headline inflation is expected to stand at 9.0% and 3.5% by yearend 2023 and 2024, respectively. These projections deviate from the April report figures of 9.5% and 3.4% (Graph 2.10). Notably, these forecasts do not encompass the prospective impact of a potential *El Niño* phenomenon, which specialized agencies have determined is highly likely to occur, with a moderate to strong intensity. Similarly, these projections do not factor in recent developments, such as the grain export agreement cancellation between Ukraine and Russia or newly emerging domestic infrastructure challenges. These external events are integrated into the macroeconomic forecast risk assessment presented in Section 2.3.

Multiple contributing factors, including the dissipation of excess demand and the alleviation of exchange rate pressures in comparison to those presented in the previous Report, among other elements, support an anticipatory assessment of a more rapid deceleration in core inflation than previously envisioned. The improved prospects for core inflation, denoted by the Consumer Price Index (CPI) excluding food and regulated items, arise from the reduction in both observed and projected exchange rate pressure, in addition to more substantial declines in both domestic and external costs, as evidenced by the significant downturn recently seen in the Producer Price Index (PPI). Furthermore, compared to earlier estimations in the previous Report, the cumulative impact of a monetary policy geared towards closing the output gap at an accelerated pace has also contributed to this more favorable position. Most of these downward pressures on prices have been accentuated compared to that presented in the April Report, resulting in a downward revision of the forecast. The receding trend observed in the goods sub-basket excluding food and regulated items (which comprises 27.8% of the CPI for goods excluding food and regulated items) can also be predominantly ascribed to the mitigation of shocks associated with the reversion of indirect taxes and VAT-free days.[14] This sub-basket's annual variation is expected to begin a swifter decline, particularly picking up pace as of the third quarter of

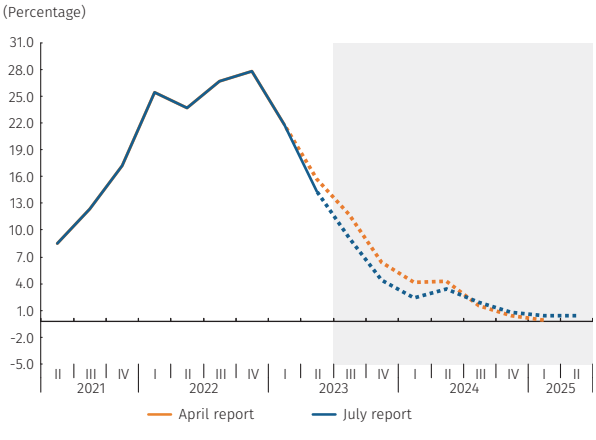
14 VAT exemptions on toiletries and personal hygiene products and the final VAT-free day would have lost their effect on the CPI by September 2022, thus the annual adjustment figures would disappear twelve months later.

Graph 2.11
CPI excluding food and regulated items
(annual change, end-of-period)



Source: DANE, calculations and projections by *Banco de la República.*

Graph 2.12
CPI for foods
(annual change, end-of-period)



Source: DANE, calculations and projections by *Banco de la República.*

the current year, approaching 3.0% in the initial half of 2024. Additionally, the aforementioned dynamics also underpin the expectation of a reduction in the annual variation of the CPI concerning the services sub-basket excluding food and regulated items. This deceleration is expected to progressively occur beginning yearend 2023, with a more pronounced effect anticipated for 2024. A portion of this reduction in pressure is attributed to lower food prices, impacting food away from home (FAH), as well as the dissipation of an upward shock related to changes in indirect taxes.[15] Similarly, the declining trajectory of annual consumer inflation expected for both 2023 and 2024 would translate into moderated adjustments within the services sub-basket through indexation mechanisms. However, the influence of indexation within this sub-basket is likely to temper the rate of decline, resulting in a comparatively slower fall than that of other CPI groups. Consequently, the annual increment within the CPI for services is expected to remain high when contrasted with core and headline inflation throughout 2024 and even mid-2025. Given the above, core inflation is expected to stand at 7.9% and 3.7% by yearend 2023 and 2024, respectively, representing a shift from the figures presented in the April Report, of 8.9% and 3.9% (Graph 2.11).

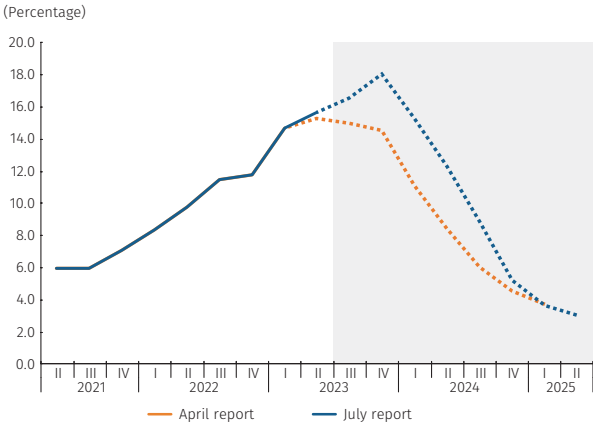
Annual changes within the Consumer Price Index (CPI) for food are anticipated to exhibit an accelerated decrease throughout the remainder of 2023 and a significant portion of 2024. This projection is underpinned by the complete dissipation of supply-related shocks, the absence of external pressures, and the appreciation of the peso. The forecasted reduction in external costs and prices is more pronounced, which coupled with the behavior of the exchange rate and the steady availability of essential food supplies, is poised to sustain the downward momentum within the annual variation of the CPI for this sub-basket over the upcoming months. The intensity of this downward trajectory is even more marked in this Report than previously anticipated, attributed to the series of downward surprises observed in recent months, particularly in terms of perishable foods. These occurrences signal a broader supply availability, a trend that could potentially endure for the remainder of the year, contingent on prevailing weather conditions. Moreover, this trend is reinforced by a downward revision in the inflationary gap of the real exchange rate, complemented by the persistent marked reduction in costs, as discerned within the Producer Price Index (PPI) of inputs utilized in food production. In broad terms, a reduction is anticipated in the annual price adjustments for both perishable and processed foods, a dynamic that is projected to drive the annual variation of the CPI for food to 4.3% by yearend 2023. This descending trajectory is set to continue throughout 2024, resulting in a projection of 0.7% for the end of that year (Graph 2.12). These forecasts presuppose the presence of favorable weather conditions and assume that, in the event the *El Niño* phenomenon is confirmed, its impact on the prices of perishable foods would not be significant. It's worth noting

15 On account of the full reinstatement of indirect taxes on airline tickets, services associated with tourism and FAH.

that the risk assessment within the macroeconomic forecast encompasses these aspects and other conceivable upward influences, the potential ramifications of which are expected to be concentrated predominantly in 2024.

Prices on regulated items are poised to exert ongoing upward pressures on inflation for the remainder of this year and the next, predominantly driven by noteworthy adjustments expected in fuel prices. Specifically, the adjustments anticipated in fuel prices are expected to be more substantial than initially projected in the previous Report, given that the recent increases over the past months have surpassed earlier forecasts by the technical staff, alongside new governmental announcements. The upward revision of this sub-basket during the year is also influenced by significant rate increases within select public services. These increases stem from their indexation of indicators such as the CPI and the recognition of postponed investments and adjustments from previous periods. However, a pronounced reduction in the annual variation of the CPI for regulated items is anticipated for 2024, attributable to a substantial decline in fuel adjustments. This decrease is further compounded by the expected reduction in headline inflation, which, as governed by the price adjustment regulations that dictate the sub-basket, transmits its effects onto the sub-basket through indexation mechanisms. Moreover, no prominent upward pressures are envisioned on the exchange rate or other cost components that impact the tariffs of specific public utilities. Consequently, the annual variation of the CPI for regulated items is expected to peak at 18.0% by yearend 2023, followed by an ensuing downward trajectory. This trajectory is anticipated to culminate at 5.2% by the end of 2024, and figures are expected to approach 3.0% by mid-2025 (Graph 2.13). It is important to note that these projections do not incorporate the potential occurrence of an *El Niño* phenomenon, which, if it transpires and contingent on its magnitude, could induce escalations in energy rates. Additionally, the potential removal of the rate option mechanism[16] could lead to potential additional energy price increases.

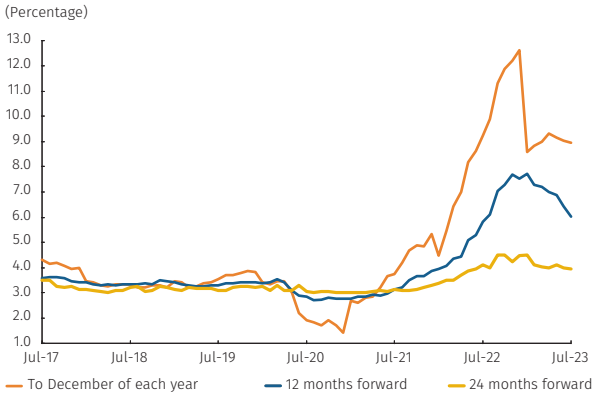
Graph 2.13
CPI for regulated items
(annual change, end-of-period)



Source: DANE, calculations and projections by *Banco de la República*.

The measures of inflation expectation have moderated over the past three months, with certain metrics experiencing noteworthy declines, although they continue to surpass the targeted goal. The expectations of economic analysts obtained from the monthly survey conducted by *Banco de la República* between July 11 and 13 (Graph 2.14), suggest a median headline inflation rate of 9.0% by yearend 2023, a decrease from the 9.3% figure documented in the April survey. Similarly, expectations for inflation excluding food also settled at 9.4%, the same level as observed in the April survey. By yearend 2024, these metrics are poised to stand at 5.0% for headline inflation and 4.8% for inflation excluding food, in line with the estimates from the April survey (5.0% and 4.7%, respectively). Furthermore, in the current survey, expectations for one-, two, and five-year ahead headline inflation fell compared to the April survey from 7.0%

Gráfico 2.14
Bank and stockbroker inflation forecast[a/]



a/ Corresponds to the median response of the Monthly survey of economic analyst expectations conducted by *Banco de la República*.
Source: DANE, calculations and projections by *Banco de la República*.

16 This mechanism entailed relief on electricity rates, especially during the pandemic.

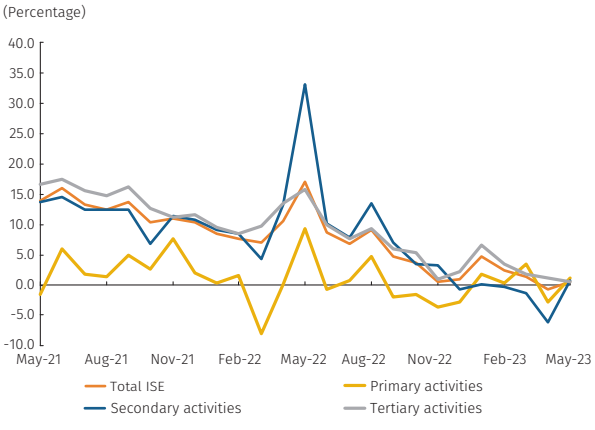
to 6.0%, 4.0% to 3.9%, and 3.4% to 3.0%, respectively. For a five-year horizon inflation has already converged with the target. Moreover, with information to July 24, expectations based on public debt bonds (breakeven-inflation, BEI) adjusted by the inflation and liquidity risk premiums,[17] show a decrease in two-, three- and five-year ahead inflation expectations from 6.7%, 6.1%, and 5.3% to 5.6%, 5.2%, and 4.6%.[18]

2.2.2 Economic Activity

During the second quarter, the Colombian economy would have exhibited a further deceleration in its annual pace, encountering setbacks when compared to the peak historical levels observed merely a quarter ago. For this period, the available sectoral indicators, including the Economic Tracking Index (ISE) as of May (Graph 2.15), along with a few available data points from June such as energy demand, imports, and vehicle registrations, suggest an estimated annual economic growth of around 0.7% for the second quarter of 2023. This projection represents a decrease from the 1.3% growth stated in the April Report. Consequently, this anticipated growth rate would place economic activity at a level lower than the historic peak observed in the first quarter[19] but roughly comparable to that witnessed by yearend 2022 (Graph 2.16). On the supply side, where there is more data, this annual growth is expected to be predominantly driven by the tertiary sectors. This is attributed to the robust performance of art and entertainment activities, especially the surge in online gaming and gaming, alongside the sustained vigor demonstrated by financial and insurance services. In contrast, the primary sectors would have reported subdued annual growth, chiefly attributed to the diminished dynamism in agricultural activities. Meanwhile, the secondary sectors would have witnessed an annual and quarterly decline, mirroring the contraction in the manufacturing industry and construction, particularly evident in civil works.

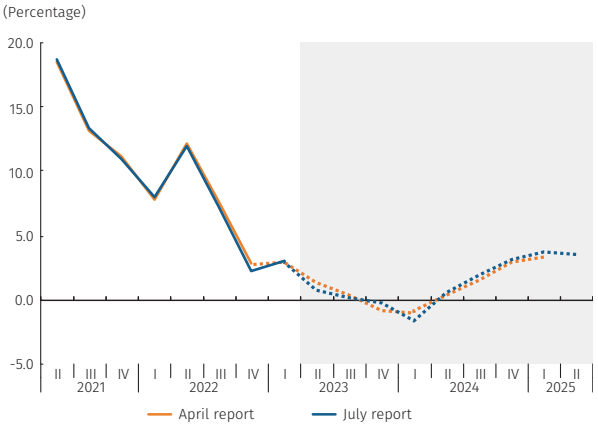
Domestic demand is expected to continue its slowdown, particularly attributable to a weakening in private consumption. As evidenced by various indicators, including the Economic Tracking Index (ESI) for tertiary sectors in both April and May,

Graph 2.15
Economic Tracking Indicator (ISE), and ISE by sectors[a/, b/]
(annual change)



a/ Seasonally adjusted and corrected for calendar effects.
b/ Primary activities: agriculture, hunting, forestry and fishing, mine and quarry exploitation. Secondary activities: manufacturing industries and construction. Tertiary activities: electricity, gas, and water supply; commerce, repairs, transportation and lodging; information and communications, financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support services; public administration and defense, education and health; arts and entertainment
Source: DANE, calculations and projections by *Banco de la República*.

Graph 2.16
Quarterly GDP[a/]
(annual change)



a/ Seasonally adjusted and corrected for calendar effects.
Source: DANE, calculations and projections by *Banco de la República*.

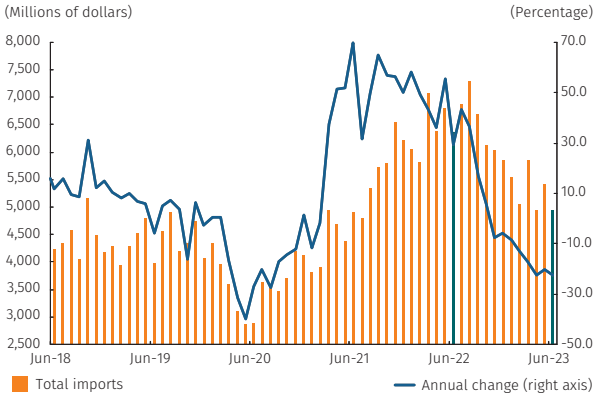
17 Inflation expectations net of premiums are calculated as the difference between nominal and real rates excluding risk based on public debt markets at multiple terms (Abrahams et al., 2015; Espinosa et al., 2015). Consequently, the so-called inflationary risk premium is derived by subtracting the premium by term on the TES in UVR from the premium on the TES curve in pesos. The differences between these term premiums can reflect uncertainty over future inflation, however, it can also be influenced by friction in particular markets, such as the preference of some agents to invest in certain types of bonds. Meanwhile, the liquidity component is calculated as the difference between the liquidity premium from the TES curve in pesos and the premium from the TES curve in UVR. As a result, total BEI calculated with this methodology can be disaggregated by expected inflation, the inflationary risk premium, and a liquidity component.

18 These figures correspond to the calculation made in July for April and July rates.

19 Annualized quarterly growth would be -5.2%.

the second quarter would have witnessed a contraction in annual terms across total consumption. This reduction translated into a negative contribution to the annual GDP growth. This behavior can be mostly attributed to a marked deceleration in private consumption and a concurrent decline in public consumption. The underlying factors responsible for the decline in private consumption are multifaceted, encompassing both the consumption of goods and services. This downward trend, consistent over past quarters, can be attributed to a combination of tighter monetary and financial conditions, in tandem with relatively subdued levels of consumer confidence. As for public consumption, it is anticipated to remain at levels similar to those observed in the first quarter, which in turn implies a decline on an annual basis due to a high base of comparison with the corresponding quarter of the previous year. Notably, during the second quarter, public consumption is expected to incorporate the portion of the retroactive salary increase for civil servants that was disbursed in June.

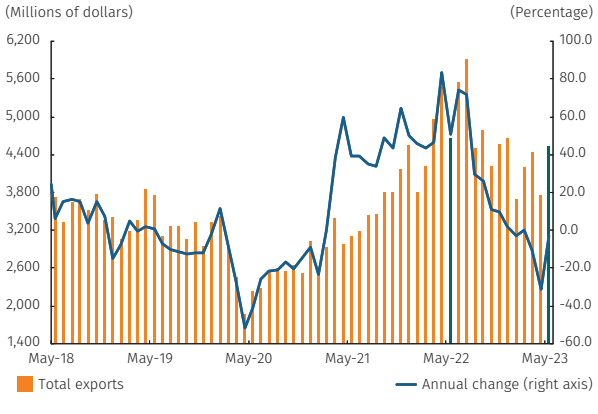
Graph 2.17
Total goods imports (CIF)
(monthly)



Source: DANE and DIAN (preliminary foreign trade data); calculations by *Banco de la República*.

Investment is estimated to have experienced a renewed decline in annual terms during the second quarter. Among the prominent elements of investment, the most substantial drop in both annual and quarterly terms occurred within machinery and equipment investment, notably transportation equipment. The behavior of this item, which reached historically elevated levels in 2022, is inferred from preliminary data drawn from capital goods imports as of June. Construction investment is also expected to register a contraction, albeit of a relatively smaller magnitude. The available information indicates that the lackluster performance in civil works construction, observed since the beginning of the year, has continued unabated. Conversely, only housing investment is projected to demonstrate positive annual growth, but without substantial gains in quarterly terms.

Graph 2.18
Total goods exports (FOB)
(monthly)

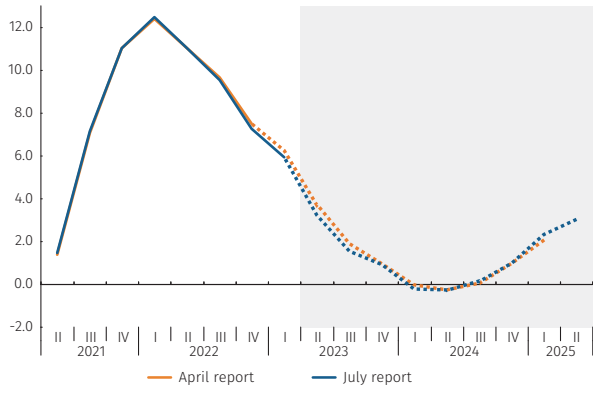


Source: DANE, calculations by *Banco de la República*.

As domestic demand continues to weaken, a further reduction in imports is expected for the second quarter. Coupled with sustained relatively high levels of exports, this dynamic would facilitate the rectification of the external deficit in terms of constant pesos. Preliminary data from the National Tax and Customs Authority (DIAN) as of June (Graph 2.17) indicates a notable decrease in imports, primarily attributed to diminished acquisitions of capital goods, with a particular emphasis on transportation equipment. This decline in import levels is likely to mirror an annual drop in the second quarter comparable to that of the first quarter. This trend aligns with the expected moderation in domestic demand, particularly regarding private consumption and investment in machinery and equipment. Exports in constant pesos are expected to grow both on an annual and quarterly basis. This development is predominantly attributed to the expansion of service exports, notably those associated with tourism by non-residents. Additionally, an increase in exports of goods in constant pesos is also expected, driven primarily by manufacturing exports (Graph 2.18). Given these dynamics, the trade deficit in terms of constant pesos is expected to have narrowed in comparison to the first quarter.

Graph 2.19
GDP, four-quarter cumulative[a/]
(annual change)

(Percentage)



a/ Seasonally adjusted and corrected for calendar effects.
Source: DANE, calculations and projections by *Banco de la República*.

In this Report, the GDP growth projection for 2023 has been slightly revised downward. A notably reduced growth rate persists year-on-year, within a landscape characterized by decelerating external and domestic demand, a decline in terms of trade, the influence of a restrictive monetary policy, and partial adjustments to the fiscal imbalance. Looking ahead, the economy is expected to stabilize at elevated levels similar to those achieved in 2022 and early this year. Consequently, this scenario would entail subdued annual and quarterly growth rates, fostering a gradual dissipation of excess demand and facilitating the convergence of inflation towards its target. The prevailing economic deceleration aligns with the expected marginal expansion in total consumption over the year, primarily stemming from an anticipated augmentation in public consumption, congruent with estimates outlined in the Medium-Term Fiscal Framework (MFMP-23). Nonetheless, private consumption is expected to remain at levels akin to those observed in the previous year. Investment is expected to remain low for the remainder of this year. Specifically, investment in machinery and equipment is not expected to replicate the robust levels witnessed in 2022. Furthermore, the momentum in civil works construction is expected to remain sluggish, and the recovery of housing investment would be curtailed by the elevated costs of inputs and financing for both households and businesses.

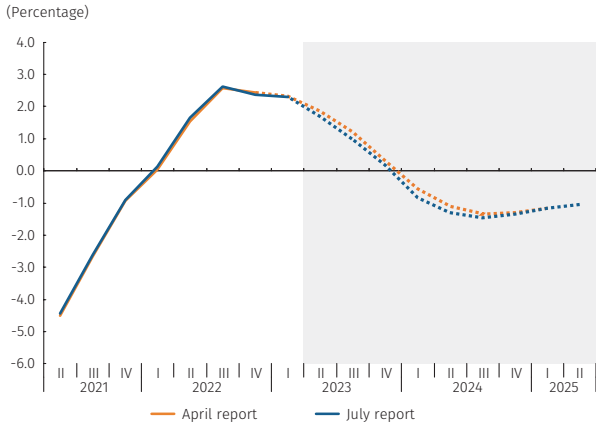
On the external front, the outlook for 2023 entails a marginal increase in exports when measured in constant pesos. This projection is driven in part by the expected slowdown in trading partner growth rates. Concurrently, imports are forecasted to undergo a downward adjustment from the elevated levels witnessed in preceding years, thus contributing to a reduction in the external imbalance. Furthermore, alongside the weakening of both domestic and external demand, a decrease in the terms of trade is set to erode national income. Given the aforementioned considerations, this Report projects a 0.9% annual GDP growth for the entirety of 2023. This figure is slightly below the growth forecast published in the April Report (1.0%) (Graph 2.19).

In 2024, the economy is expected to continue on a well-ordered adjustment trajectory, facilitating the gradual convergence of inflation toward its designated target for the forecast horizon. In the upcoming year, the ongoing process of expenditure realignment is projected to continue, yielding an annual GDP growth rate akin to that forecasted for the entirety of 2023. The contractionary monetary policy, complemented by terms of trade projections similar to those foreseen for the entire year of 2023, and lower than those observed in 2022, underpin expectations of measured growth in private consumption, in addition to a further round of adjustments in investment. These conditions are expected to align with an incremental narrowing of the external deficit. Despite these dynamics, as the year unfolds, the economy is expected to progressively regain its vitality within an environment marked by the gradual recovery of global economic activity and inflation rates that draw closer to the targeted ranges set by central banks in major economies. This trajectory is also expected

to pave the way for a relaxation of external interest rates and a reduction in external financing costs. The Colombian economy is projected to reach a 1.0% growth for the entirety of 2024, mirroring the figure published in the April Report, and is forecasted to remain below the levels characteristic of potential GDP. However, it is important to acknowledge that this projection is subject to considerable uncertainty, stemming from both domestic and international factors, which are considered in the risk assessment detailed in the macroeconomic forecast as presented in section 2.3.

Based on recent labor market dynamics and economic activity projections, the unemployment rate (UR) for 2023 is expected to average 10.8%, falling within a range between 10.0% and 11.6%. Information provided as of May from the Integrated Household Survey (GEIH) shows some growth in the employment market, attributed to the non-salaried segment, while the salaried segment shows indications of stagnation. The global labor force participation rate (GPR) has continued its recovery, reaching 64.3% and approaching pre-pandemic levels. Nevertheless, the national UR for the rolling quarter ending in May remained comparatively low[20] in relation to recent years, partially due to improved trends in rural employment. In consideration of these labor market trends and the economic activity forecasts outlined in this Report, it is suggested that the national UR is likely to remain relatively stable throughout 2023, with an annual mean of 10.8% and confined to a range between 10.0% and 11.6%. In urban areas, the projected annual average unemployment rate would fluctuate between 10.6% and 12.2%, with 11.4% being the most likely estimate. These projections lead to the conclusion that the labor market's alignment with inflation-consistent unemployment (Nairu)[21] suggests a tight labor market, which is anticipated to gradually self-correct throughout the year. As a consequence, inflationary pressures stemming from wage-related costs associated with labor market dynamics are expected to subside, although regulatory-driven pressures, particularly those emanating from adjustments to the minimum wage, are expected to continue.

Graph 2.20
Output gap[a/]
(four-quarter cumulative)



a/ The historical estimate of the output gap is calculated as the difference between observed GDP (four-quarter cumulative) and potential GDP (trend; four-quarter cumulative) from the 4GM model; for the forecast, it is calculated as the difference between the technical staff's GDP estimate (four-quarter cumulative) and potential GDP (trend; four-quarter cumulative) from the 4GM model.
Source: DANE, calculations and projections by *Banco de la República*.

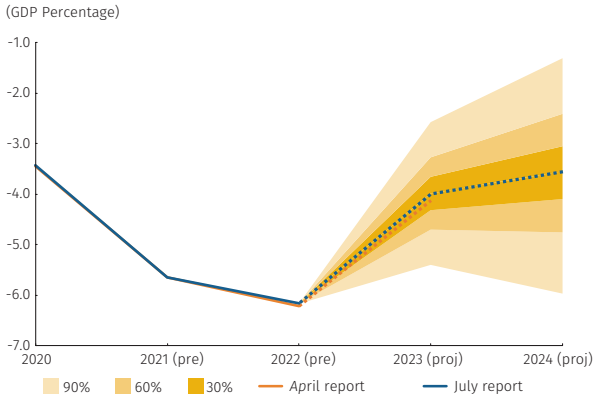
An appreciable alleviation of excess demand is anticipated for the second quarter of 2023, aligned with the observed economic slowdown. This trend, which is expected to endure through the remainder of the year, is poised to yield the eventual closing of the annual output gap by yearend 2023, thereby contributing to the gradual alignment of inflation with the established goal (Graph 2.20). In the second quarter of the year, the narrowing of the annual output gap[22] is believed to have intensified, although it remains in positive territory. This inference is drawn from newly available data on economic activity and core inflation, which show figures slightly below those previously projected in the April Report.

20 See Chapter 3 of this Report for additional information.

21 See July 2023 Labor Market Report available in Spanish.

22 Corresponds to the twelve-month gap.

Graph 2.21
Annual current account[a/, b/]
(four-quarter cumulative)



(pre): preliminary, (proj): projected.
a/ The graph displays the probability distribution and its most likely path for 2023 and 2024. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode), using primarily as reference the densities from the Patacon model.
b/ The probability distribution is derived from the forecasting exercise of the July report.
Source: *Banco de la República.*

This occurs within a context characterized by a tight labor market, yet exhibiting indications of mitigated price pressures (see Chapter 3). Specifically, in the second quarter, the annual output gap is estimated at 1.7% (previously 1.9%), in contrast to the 2.3% recorded in the year's first quarter. Potential output is calculated to increase at an annual rate of 3.2% during this quarter. Moving forward, it is probable that the dissipation of excess demand will occur gradually, a reflection of tight domestic and external financial conditions. Consequently, the central forecast scenario of this Report envisions an annual output gap that would approach zero (0.2%) by yearend 2023, subsequently transitioning into negative territory by the close of 2024 (-1.3%). These projections align with the assumption of potential output growth rates of 3.1% in 2023 and 2.6% in 2024. It is worth noting that these forecasts are underpinned by substantial uncertainty, stemming from the internal and external risks delineated in other sections of this Report.

2.2.3 Balance of Payments

By 2023, the current account deficit is expected to narrow to 4.0% of GDP, as compared to the 6.2% of GDP registered in 2022 (Graph 2.21).[23] The lower external disparity primarily stems from the rectification of the trade balance deficit. Specifically, the deceleration in economic activity and moderation of domestic demand are anticipated to be mirrored in a reduction of imports. Additionally, the normalization of global supply chains is expected to contribute to lower import freight costs, alongside reduced international prices of overseas raw materials. Meanwhile, the vitality of tourism service exports is expected to persist, surpassing pre-pandemic levels. Nevertheless, the decrease in international commodity prices and the continuation of relatively modest production levels are likely to impact the value of exports of the principal traditional goods.[24] This, coupled with the slowdown in the growth of trade partners, is expected to limit an extensive correction of the trade deficit. Conversely, the reduction of imbalances in the net factor income would also play a role in the annual recalibration of the current deficit. This is the result of lower outflows associated with foreign capital company profits and incremental income from yields on international reserves. These factors are poised to outweigh increased interest payments on foreign debt. As for current transfers, a robust surplus is foreseen, fueled by the favorable trajectory of worker

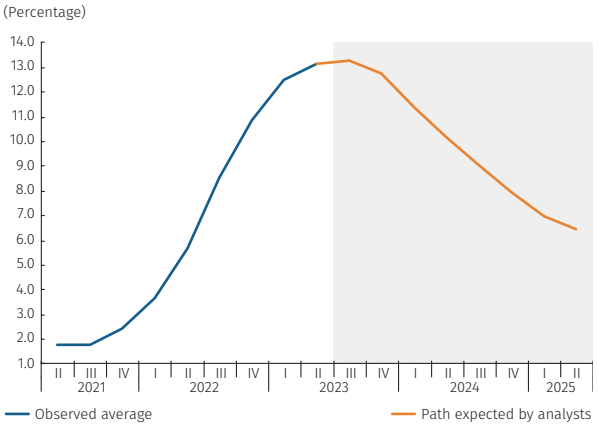
23 A current account deficit of close to 4.0% of GDP is expected for the second quarter of 2023, lower than the 5.4% observed in the same period of 2022. The adjustment of the trade imbalance in goods and services, as well as the lower deficit forecast for primary income, contribute to this dynamic.

24 A reduction in the dollar value of exports of products such as oil and derivatives, coal and coffee is expected for 2023. In the case of oil and derivatives, the effect of lower international prices will be partially offset by the recovery of production compared to 2022 levels. In the case of coal and coffee, the reduction is expected to be due to both lower international prices and lower production.

remittances.[25] For 2024, the current account deficit is expected to stand at 3.6% of GDP within an environment marked by below-potential economic growth. This projection is bolstered by the promising dynamics of tourism service exports, coupled with lower profits of select companies with direct investments and high worker remittances. Regarding savings and investment aggregates, the current deficit's rectification across the forecast horizon corresponds with the reduction in the general government imbalance as stated in the MFMP-2023. Furthermore, the expected adjustments in consumption and private sector investment align with this trajectory. Lastly, it is imperative to underscore the significant level of uncertainty associated with the forecasts for the current account.

Expectations point to lower net external financing requirements in 2023 and 2024, attributed to the contraction of the current account deficit amid a backdrop of relatively constrained global financial conditions. Over the specified period, the nation is set to continue to receive capital inflows from diverse origins. Notably, Foreign Direct Investment (FDI) is poised to remain the primary wellspring of external financing. While the public sector's contribution to funding would continue, its magnitude is expected to be relatively lower compared to prior years. This adjustment aligns with the reduction of the fiscal disparity as contrasted with the observed figures in 2021 and 2022. It is significant to recognize that these capital inflows into the Colombian economy across the projected span are expected to occur amid continued high interest rates in the United States, coupled with Colombia's risk premium which remains persistently above historical norms.

Graph 2.22
Monetary policy interest rate: average observed quarterly, and rate expected by analysts[a/]



a/ These projections are calculated considering the quarterly average of the current rate according to the median response of the *Monthly survey of economic analyst expectations* conducted by *Banco de la República* for July 2023.
Source: *Banco de la República.*

2.2.4 Monetary Policy and Interest Rates Expected by Analysts

The median analyst expectations for the third-quarter policy rate is 13.25%, decreasing to 12.7% by the fourth quarter (Graph 2.22). The median response to *Banco de la República*'s monthly survey of analyst expectations carried out at the beginning of July suggests that the policy interest rate during the second quarter of 2023 would stand at 13.25% and begin to decline during the fourth quarter of the year, reaching an average of 12.75% for that quarter, and 11.75% by the time the December meeting is held. In the ensuing two-year span, analysts foresee substantial declines in the trajectory of the policy rate, with projections indicating a decline to 7.9% in the fourth quarter of 2024, followed by a reduction to 6.5% in the second quarter of 2025. Conversely, the policy rate path outlined in this Report is consistent with the gradual alignment of inflation towards its 3.0% target by year-end 2024. This trajectory, spanning an eight-quarter outlook, on average holds a higher position than that predicted by the market's expectations as per the July 2023 survey. It is important to underline that by the end of 2024, analysts anticipate elevated inflation and growth rates relative to the figures projected by the technical staff. Multiple assessments included in the recent

25 Workers' remittances are expected to increase in 2023, in line with the migration of Colombians abroad observed in 2022, and the tight labor market in several countries where Colombian migrants reside.

Financial Stability Report[26] underscore the substantial resilience of the financial system in absorbing the impacts of elevated real interest rates, akin to those currently observed, without jeopardizing its stability. The forecast horizon remains punctuated by significant uncertainty given the global backdrop, external financial dynamics, geopolitical strains, exchange rate fluctuations, the rate at which the inflation-related shocks dissipate, and the pace of deceleration in the Colombian economy. These factors will be carefully assessed at each juncture in light of the available information.

2.3 Balance of Macroeconomic Risks

The current assessment of risk balance mirrors the levels of uncertainty outlined in the previous report. The predictive densities (PD)[27] exercise carried out in this Report, designed to assess risk balance across diverse variables within the macroeconomic forecast, continues to reflect a heightened state of uncertainty concerning the various elements influencing economic behavior and shaping the macroeconomic outlook. Notably, in the external context, this Report continues to outline elevated levels of uncertainty surrounding factors such as oil prices, external financial dynamics, international geopolitical tensions, the trajectory of economic activity among trading partners, and global commodity prices. On the domestic front, uncertainties persist regarding the pace at which domestic demand adjusts, the rate of dissipation of past supply shocks, and the trajectory of select regulated prices. These aspects collectively translate into a pronounced expansion of both inflation and GDP growth predictive density bands.

Regarding the external outlook, the risk balance encompasses a mixture of biases across various external factors impacting the Colombian economy. Notably, the Fed's projection for interest rates is characterized by a neutral risk balance in its predictive density (PD). Additionally, an upward bias is included in the forecast for external food prices, reflecting the high likelihood of the *El Niño* phenomenon's occurrence and ongoing geopolitical tensions affecting agricultural commodities. Concerning the risk premium associated with the five-year credit default swap (CDS), the early phase of the forecast horizon introduces a downward bias attributed to the recent improvement in the international market's perception of the country's risk. However, this inclination wanes as the forecast horizon progresses. Within this framework, the predictive density exercise further integrates a downward bias on inflationary pressures stemming from the exchange rate.

The inflation trajectory displays an upward bias for 2023 and 2024, arising from the potential emergence of adverse shocks within the forecast horizon. Despite this Report's inclusion of decreased inflationary pressures attributed to the exchange rate, the predictive density (PD) analysis underscores a range of upward risks affecting various price baskets. These risks collectively exert a bias that tends to slightly elevate core inflation and, more notably, headline inflation. In specific terms, our assessment incorporates upward biases associated with the increased likelihood of a strong *El Niño* phenomenon, which could exert inflationary pressure on categories such as food, regulated items, and services (particularly food outside the home). Moreover, the services basket is subjected to an additional upward bias, driven by the potential for a more pronounced deceleration in housing supply and its subsequent implications for rental prices. Lastly, an additional upward bias is observed within the regulated items basket, arising from the conceivable prospect

26 See the Financial Stability Report for May 2023: https://repositorio.banrep.gov.co/bitstream/handle/20.500.12134/10638/ repor-te-estabilidad-financiera-primer-semestre-2023.pdf

27 Technical details on the construction of the risk balance through the predictive density exercise can be found in the paper "Caracterización y comunicación del balance de riesgos de los pronósticos macroeconómicos: un enfoque de densidad predictiva para Colombia" (Méndez-Vizcaíno et al., 2021) and in Box 1 of the July 2021 Monetary Policy Report.

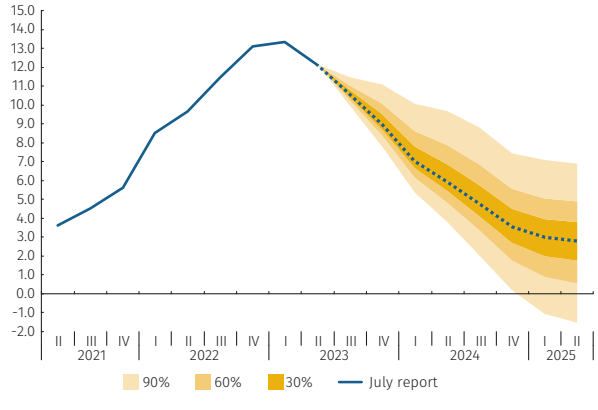
of supplementary energy price hikes, prompted by the potential elimination of the rate option mechanism,[28] alongside plausible escalations in toll fees and urban and inter-municipal public transportation fares.

The projection of economic activity is influenced by a blend of risks over the forecast horizon, characterized by a downward bias in 2023 and an upward bias in 2024. Within the predictive density (PD) analysis, a downward-leaning bias is integrated into the economic activity projection for 2023. This is attributed to a lower level of public execution, particularly by the national government, which typically aligns with the inaugural year of new administrations. The resultant impact is felt in reduced consumption and diminished public investment. Furthermore, this downward bias is sustained by the trajectory of housing investment. For 2024, a slight upward bias is factored into the GDP growth outlook, as a result of higher consumption dynamics surpassing those posited in the central scenario. This elevated consumption is attributed to the private sector and stems from increased disposable income, partially attributable to amplified transfer programs, as well as the corresponding contributions from the public sector.

In summary, the balance of risks underscores substantial levels of uncertainty regarding both inflation and economic growth, marked by an upward bias in inflation and mixed biases for growth (Graphs 2.23, 2.24, 2.25, and 2.26).

Graph 2.23
Consumer price index, predictive density[a/, b/]
(annual change, end-of-period)

(Percentage)

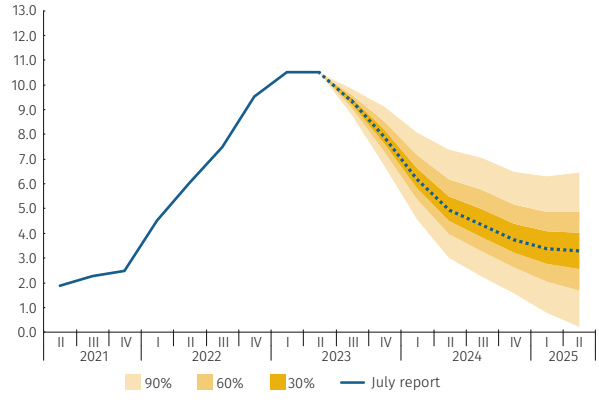


	3Q 2023	4Q 2023	4Q 2024
Mode	10.6	9.0	3.5
> Mode	39%	33%	46%
	Intervals		
<2	0.0%	0.0%	21.3%
2 to 4	0.0%	0.0%	32.6%
>4	100.0%	100.0%	46.1%

a/ The graph displays the probability distribution and its most likely path on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode), using a combination of densities from the Patacon and 4GM models.
b/ The probability distribution is derived from the forecasting exercise of the July report.
Source: DANE; calculations and projections by *Banco de la República*.

Graph 2.24
CPI excluding food and regulated items, predictive density[a/, b/]
(annual change, end-of-period)

(Percentage)



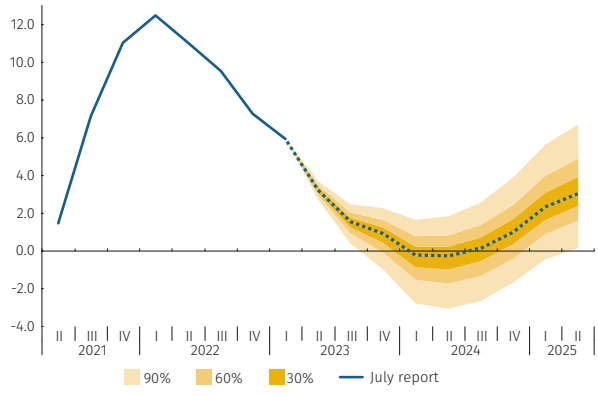
	3Q 2023	4Q 2023	4Q 2024
Mode	9.3	7.9	3.7
> Mode	54%	50%	44%
	Intervals		
<2	0.0%	0.0%	8.9%
2 to 4	0.0%	0.0%	41.7%
>4	100.0%	100.0%	49.4%

a/ The graph displays the probability distribution and its most likely path on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode), using a combination of densities from the Patacon and 4GM models.
b/ The probability distribution is derived from the forecasting exercise of the July report.
Source: DANE; calculations and projections by *Banco de la República*.

28 This mechanism entailed relief on electricity tariffs, especially during the pandemic.

Graph 2.25
GDP, four-quarter cumulative, predictive density[a/, b/]
(annual change)

(Percentage)

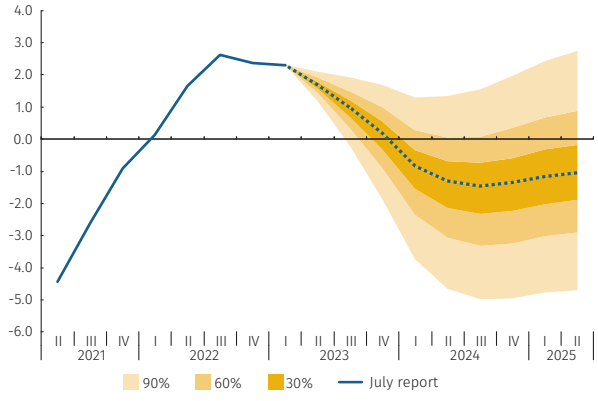


	2Q 2023	4Q 2023	4Q 2024
Mode	3.2	0.9	1.0
> Mode	52%	59%	49%
	Intervals		
<0	0.0%	25.2%	27.5%
0 to 2	0.0%	65.8%	44.2%
2 to 5	99.9%	8.6%	28.1%
>5	0.1%	0.4%	0.2%

a/ The graph displays the probability distribution and its most likely path on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode), using a combination of densities from the Patacon and 4GM models.
b/ The probability distribution is derived from the forecasting exercise of the July report.
Source: DANE, calculations and projections by *Banco de la República*.

Graph 2.26
Output gap, predictive density[a/, b/]
(four-quarter cumulative)

(Percentage)



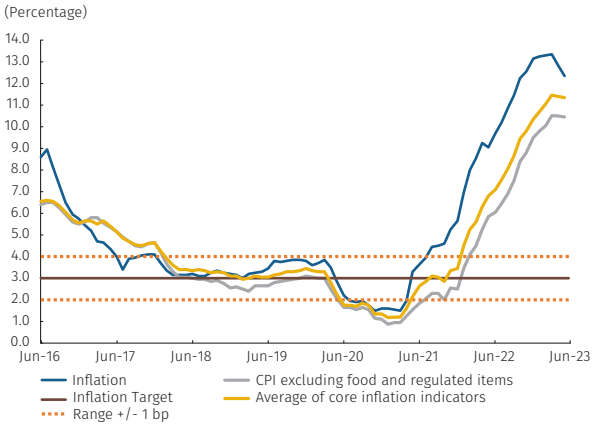
	2Q 2023	4Q2023	4Q 2024
Mode	1.68	0.19	-1.34
> Mode	53%	59%	54%
	Intervals		
< -2	0.0%	3.7%	40.4%
2 to 0	0.0%	49.2%	34.9%
0 to 2	88.2%	45.4%	18.3%
>2	11.8%	1.7%	6.4%

a/ The graph displays the probability distribution and its most likely path on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode), using a combination of densities from the Patacon and 4GM models.
b/ The probability distribution is derived from the forecasting exercise of the July report.
Source: DANE, calculations and projections by *Banco de la República*.

In this context, with a 90% level of confidence headline inflation would fall between 7.8% and 11.1% by yearend 2023, and between 0.2% and 7.5% by yearend 2024. Simultaneously, core inflation, within the same degree of certainty, is anticipated to fall between 6.7% and 9.1% by yearend 2023, and between 1.6% and 6.5% by the fourth quarter of 2024. The likelihood of both headline and core inflation dipping below 4.0% during the fourth quarter of 2024 stands at 54% and 51% respectively. Regarding economic activity, with a 90% probability, annual GDP growth is expected to stand in a range from -1.0% to 2.3% for 2023, and from -1.7% to 3.9% for 2024.

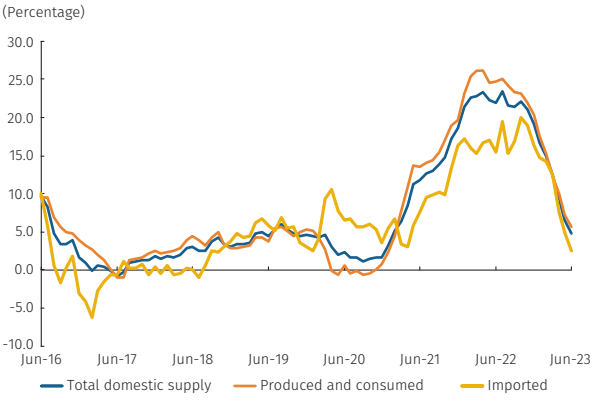
3. Current economic situation

Graph 3.1
CPI and core inflation indicators
(annual change)



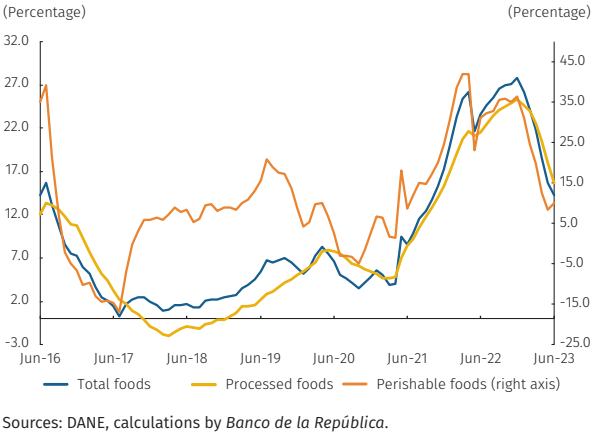
Sources: DANE and *Banco de la República.*

Graph 3.2
PPI by origin
(annual change)



Sources: DANE, calculations by *Banco de la República.*

Graph 3.3
CPI for foods and its components
(annual change)



Sources: DANE, calculations by *Banco de la República.*

3.1 Inflation and price behavior

Annual consumer inflation began to ease during the second quarter of 2023, supported by the dissipation of supply shocks and the cumulative effects of monetary policy. Annual inflation began to decline from its most recent peak in March (13.3%) and closed in June at 12.1% (Graph 3.1). Core inflation (CPI excluding food and regulated items), which was on an upward path until March, broadly stabilized throughout the second quarter at around 10.5%. The downward trend in annual inflation and the stabilization of core inflation during the second quarter are largely the result of lower international costs and prices, which have alleviated cost pressures in the country, especially on food, as suggested by the marked deceleration of the producer price index (PPI)[29] and its components (Graph 3.2).[30] Furthermore, the growth of aggregate demand has tempered, assisted by a contractionary monetary policy and an amelioration of exchange rate pressures during the period. Recovery is also noted in the supply of some perishable foods, which has reinforced the slowdown in food inflation and food away from home in the services basket. Despite the above, annual inflation and core inflation in Colombia continue to register high levels above the 3.0% target, as a result of a prevalence of excess domestic demand, official measures to close the gap between domestic and international fuel prices, indexation to high inflation rates, and the effect of elevated wage growth.

The main driver of the downward pressure on inflation in the second quarter was food prices. The annual adjustment in food prices, which had begun to decline since the start of the year, continued to decrease in the second quarter and stood at 14.3% in June 2023 (Graph 3.3). While the lower rate of adjustment of food prices has been widespread, it has been more noticeable in perishable foods, whose annual rate of change fell from 19.7% in March to 10.1% in June,[31] while processed foods experienced an annual change drop from 22.5% in March to 15.6% in June. These decreases would mainly be associated with a recovery in the supply of certain crops, after surmounting the adverse effect generated by the winter wave of the *La Niña* phenomenon. In the case of processed foods,

29 See Box 1 of this Report for more information on the relationship between the PPI and the CPI in Colombia.

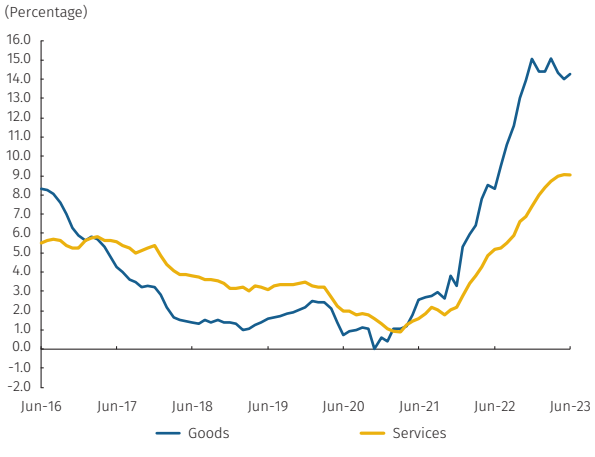
30 The annual producer inflation figure from DANE for June is provisional.

31 It should be recalled that food inflation was the main upward driver of inflation in 2022, both in processed and perishable goods. Within of the latter, one of the products that motivated the largest increases was beef. Box 2 of this report presents an analysis of the factors underlying the higher prices of this segment.

the recent appreciation of the peso would favor a downward price adjustment, along with a global environment that has contributed to an easing in the international prices of food and agricultural raw materials and inputs. In addition, there has been a normalization of logistics and transport costs, despite some continued disruptions like those caused by Russia's war in Ukraine.

The CPI's goods sub-basket was a factor that exerted downward pressure on core inflation during the second quarter. The annual change in the CPI for goods fell between March (15.1%) and June (14.3%) (Graph 3.4), partly due to the decrease in international costs and prices, buttressed by the appreciation of the peso in recent weeks and less dynamic domestic demand. However, the pace of adjustment of these prices remains high, which is related to an output gap that has continued in positive territory so far this year despite the recent decrease in demand surpluses. Likewise, the upside bias resulting from the reinstatement of indirect taxes on toiletries, hygiene, and some medical products, which began in the middle of last year, has lingered over the past months.

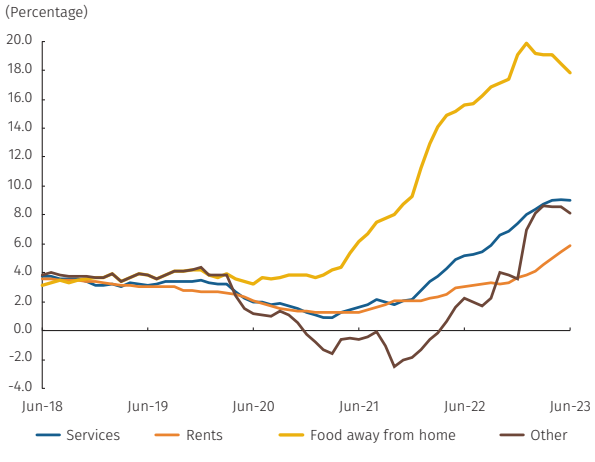
Graph 3.4
CPI for goods and services, excluding food and regulated items
(annual change)



Sources: DANE, calculations by *Banco de la República*.

In the second quarter of 2023, the CPI services sub-basket continued to exert upward pressures on core and headline inflation. The annual change in the CPI for services continued to increase during this period and stood at 9.0% in June. However, the movements within the components of the services sub-baskets varied. On the one hand, rents generated the greatest upward pressure, escalating from 3.6% at the end of 2022 to 4.5% in March and 5.9% in June 2023 (Graph 3.5). The increase in rents is mostly explained by the high level of rent contract indexation to the CPI of the immediately preceding year. On the other hand, there was a drop in the annual change of the CPI for food away the home (from 19.1% in March to 17.8% in June), which could be mainly attributed to the marked reduction in food inflation during the year to date. There were also decreases in the annual price adjustment rate of other services, such as transportation (mainly airline tickets), hotels and tourism, which would be related to a contraction in the growth of demand (see the others sub-basket in Graph 3.5).

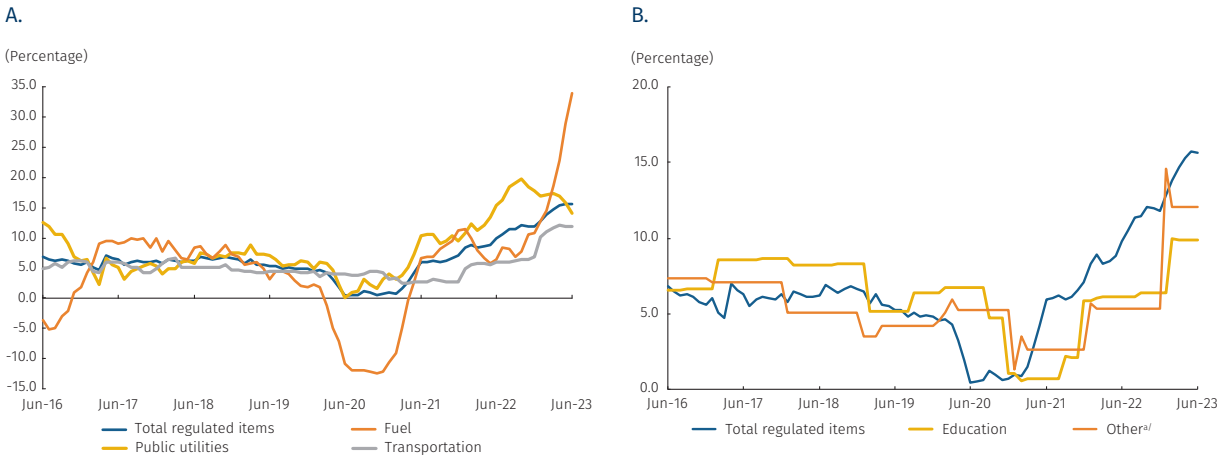
Graph 3.5
CPI for services, excluding food and regulated items and its componentss
(annual change)



Sources: DANE, calculations by *Banco de la República*.

During the second quarter, upward inflationary pressures in the regulated sector continued to be mainly explained by the adjustment in domestic fuel prices. The annual change in the CPI for regulated items increased between March (14.7%) and June (15.6%). The need to bring domestic gasoline prices closer to international prices explains a significant part of this rise (Graph 3.6, panel A). These fuel price increases, implemented since October of last year, have resulted in a 23% price hike in regular gasoline so far this year and 34% over the last twelve months (18.7% in March). Higher fuel costs, together with the indexation of this sub-basket to higher inflation and wage rates, continued to pressure regulated

Graph 3.6
CPI for regulated items and its components
(annual change)



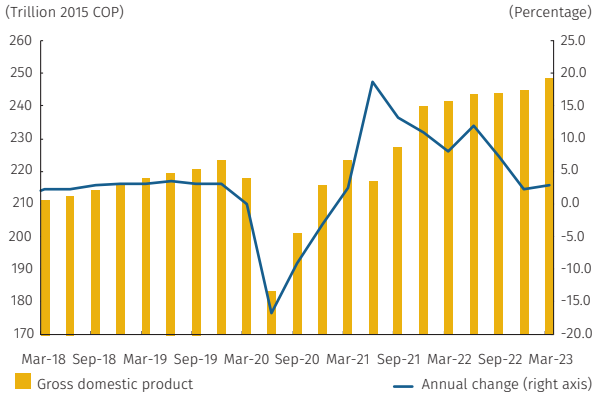
a/ Includes EPS affiliate contributions, administrative certificates and documents, copays and charges.
Sources: DANE, calculations by *Banco de la República*.

transportation rates, which exhibited a high annual change to June (11.8%). In contrast, the annual change in utility rates tended to fall between March (17.3%) and June (14.1%), due to a statistical effect.

3.2 Growth and Domestic Demand

In the first quarter of 2023, the GDP expansion pace continued but at a slower speed, with an annual growth rate lower than that observed, on average, during 2022. In this period, the Colombian economy registered an annual growth of 3.0% (similar to that forecast in the April Report), with annualized quarterly growth of 5.9% according to seasonally adjusted data. This result implied record high economic activity levels, 11.4% higher than those observed in yearend 2019 (Graph 3.7). This moderation in the economy's growth coincided with a fall in domestic demand in annual terms, which occurred against a backdrop of restrictive domestic and external financial conditions, relatively low consumer and business confidence indicators, and persistently high consumer inflation. On the supply side, the tertiary sectors were the most dynamic, owing to positive performance in financial and insurance services and art and entertainment activities. Conversely, secondary sectors continued to register quarterly declines due to the low activity level recorded in the construction sector.

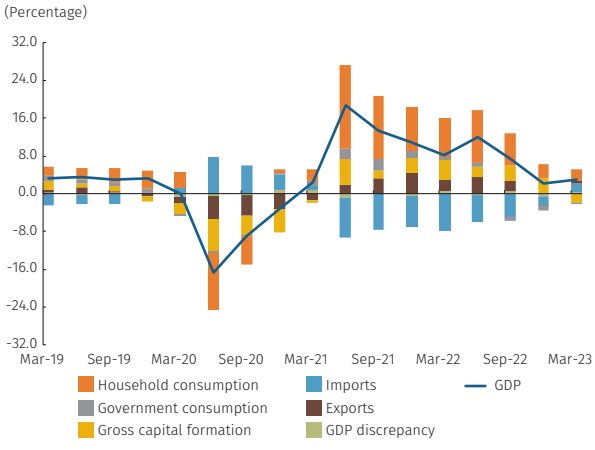
Graph 3.7
Gross domestic product a/
(quarterly and annual change)



a/ Seasonally adjusted and corrected for calendar effects.
Sources: DANE, calculations by *Banco de la República*.

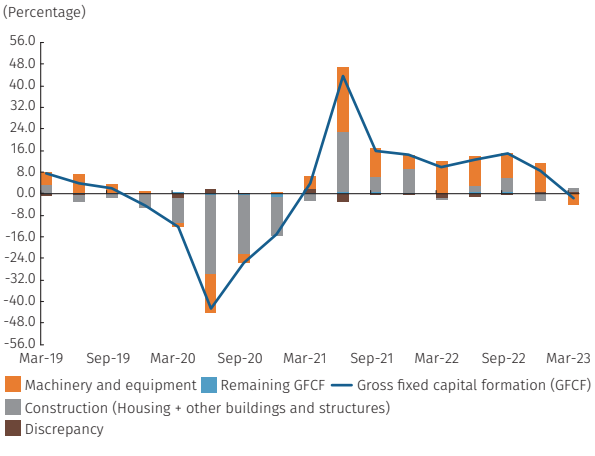
During the first quarter, domestic demand weakened, mainly as a result of the sluggish behavior of investment. For the first time since the fourth quarter of 2020, absorption registered a negative annual variation (-0.2%) and a decrease in its levels. As a result, its contribution to annual GDP growth in the first quarter was slightly negative (Graph 3.8). This adjustment is primarily explained by the significant drop

Graph 3.8
Contributions to annual changes to quarterly GDP[a/]
(annual change, contribution)



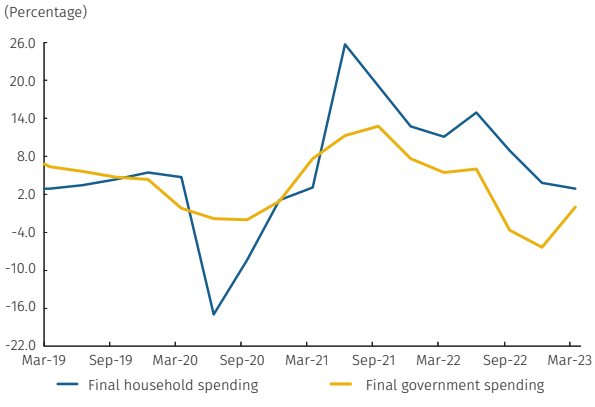
a/ Seasonally adjusted and corrected for calendar effects.
Sources: DANE, calculations by *Banco de la República*.

Graph 3.9
Quarterly gross fixed capital formation[a/]
(annual change, contributions)



a/ Seasonally adjusted and corrected for calendar effects.
Sources: DANE, Calculations by *Banco de la República*.

Graph 3.10
Final household and General Government spending[a/]
(annual change)



a/ Seasonally adjusted and corrected for calendar effects.
Sources: DANE; calculations by *Banco de la República*.

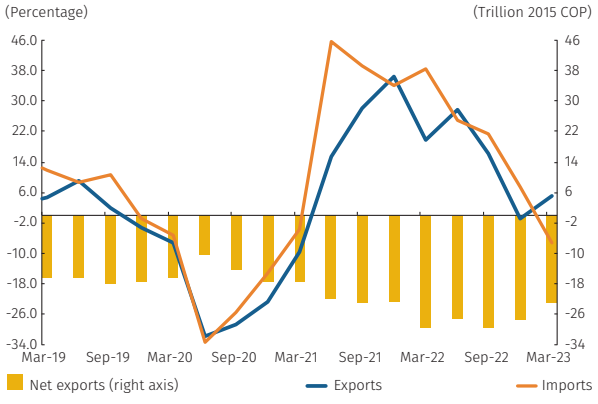
seen in gross capital formation in both annual (-9.6%) and quarterly (-9.2%) terms. Unbundled by component, the main contributor to the decline of this aggregate were investments in machinery and equipment (Graph 3.9) which, after reaching historic high levels in 2022, presented a substantial drop, mostly in transportation equipment. Investment in construction also lagged, while the housing and other buildings and structures components logged modest quarterly increases. However, the former recorded significant annual growth levels (11.4%), albeit from a low base of comparison from previous periods. As for the latter, annual decreases continued (-2.4%), mainly due to sluggish activity in civil works that persisted at the start of this year.

Annual consumption growth moderated during the first quarter, although it continued to increase, particularly its public component. In this period, total consumption expanded at an annual rate of 2.4%, a somewhat higher level than that observed in yearend 2022. Public consumption contributed most to this increase, recording a significant quarterly increase (7.4%). However, annual growth levels were not affected given the high basis of comparison from 2022 (Graph 3.10). According to the DANE, the main driver affecting this component would have come from collective consumption expenditure (payments of bonuses and hiring of public sector personnel). Alternatively, annual growth in private consumption (3.0%) continued to curb. Consumption in non-durable goods and services segments maintained high levels, close to those of the fourth quarter of 2022, while durable and semi-durable goods consumption grew marginally despite presenting negative annual variations. The slowdown in private consumption in the first quarter occurred in a context of a more restrictive monetary policy, low levels of consumer confidence and uncertainty, and a slowdown in household credit.

In the first quarter, a significant drop in imports was once again recorded which, together with an increase in exports, reduced the trade deficit in real pesos. The adjustment of domestic demand resulting from the decline in investment and a lessening of private consumption resulted in a significant quarterly (-3.9%) and annual (-7.4%) fall in imports. This phenomenon was mainly the result of lower purchases of capital goods. In contrast, exports increased versus yearend 2022 and continued to be driven mostly by external sales of manufactured goods and services. This growth was offset by a less favorable performance of basic goods exports, predominantly some agricultural goods and coal. In view of the foregoing, the first quarter recorded a significantly lower trade deficit in constant pesos than that recorded in the fourth quarter of 2022 (Graph 3.11).

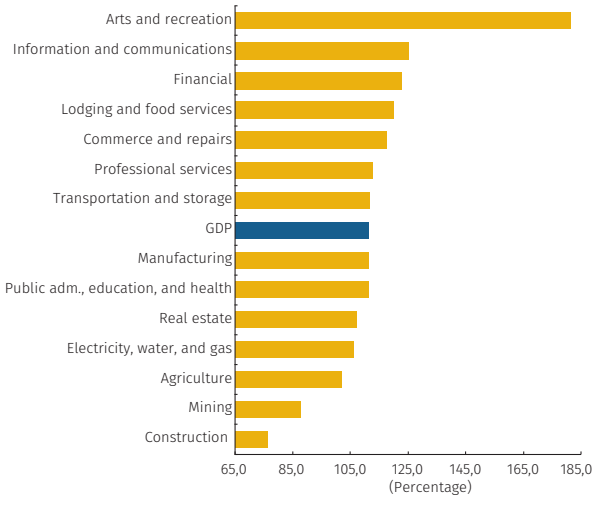
On the supply side, all GDP sectors presented positive annual growth rates, except for construction. In the first quarter of 2023, the 3.0% annual GDP growth was mainly explained by

Graph 3.11
Exports, imports, and trade balance[a/]
(annual change and trillion 2015 COP)



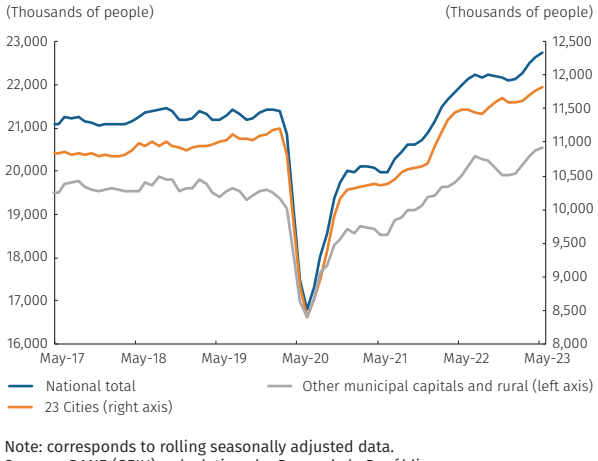
a/ Seasonally adjusted and corrected for calendar effects.
Sources: DANE, calculations by *Banco de la República*.

Graph 3.12
Sectoral value added in 1Q 2023 relative to 4Q 2019[a/]
(4Q 2019 = 100%))



a/ Seasonally adjusted and corrected for calendar effects.
Sources: DANE, calculations by *Banco de la República*.

Graph 3.13
Employed population by location



Note: corresponds to rolling seasonally adjusted data.
Sources: DANE (GEIH), calculations by *Banco de la República*.

the tertiary sector, which registered an annual expansion of 3.9%. This performance was chiefly driven by the positive performance of the financial and insurance sector (22.6%), characterized by premiums collected by the insurance sector, and of arts and entertainment activities (18.5%), which continue to be driven by the popularity of online gaming and sports betting. The primary sectors grew 1.7% annually, recovering from the very low level observed in the fourth quarter of last year. During the current period, agricultural production activities improved boosted by coffee cultivation and oil extraction, although they continue to register much lower levels compared to pre-pandemic periods (Graph 3.12). In contrast, the secondary sectors registered a slight decline (-0.3% annually), given the very sluggish performance of construction activities associated with civil works and the deceleration of the manufacturing industry.

3.3 Labor Market [32, 33]

As of May, the labor market registered an increase in employment levels relative to that observed in the second half of 2022. In the rolling quarter ending in May, the results of the DANE's Integrated Household Survey (GEIH) showed that the annual employment rate grew by 3.4%, which corresponds to the creation of 757,000 new jobs.[34] By geography, between April and May the average employment change in urban and rural areas was 0.5% and 0.4%, respectively (Graph 3.13). By sector, annual employment growth for the rolling quarter ending in May was driven, to a greater extent, by a positive performance in the commerce, lodging, manufacturing, and professional activities sectors, which together contributed 2.4 pts to the total annual change in employment. Conversely, mining and electricity, gas, and water supply showed annual contractions, while recreation and other services remained steady.

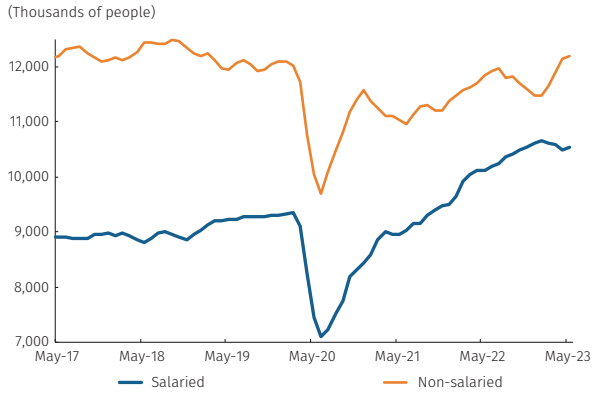
So far this year, job creation has been driven mainly by the non-salaried segment, while salaried employment shows signs of stagnation. To May, rolling quarterly data indicates the national aggregate growth in employment was led by the non-salaried segment. In contrast, the monthly changes in the salaried employment segment have been close to zero or even negative in recent months, showing signs of possible stagnation (Graph 3.14). Other sources of information on salaried and formal employment, such as pension contributions

32 For a more detailed analysis of the labor market, we invite you to consult *Banco de la República's* Labor Market Report, available in Spanish at https://www.banrep.gov.co/es/reporte-mercado-laboral

33 See the July 2023 Labor Market Report (only available in Spanish).

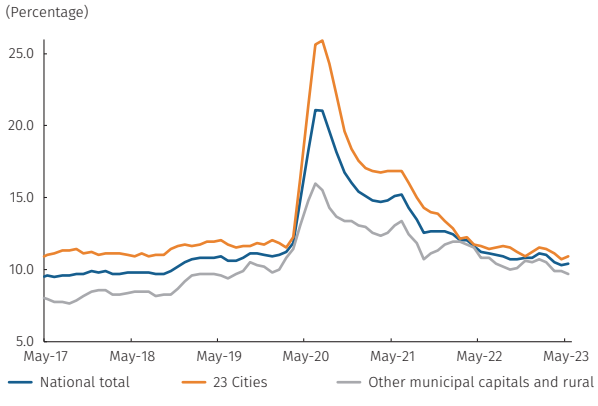
34 In line with employment behavior, average total national employment has increase (57.7%); with higher increases noted in rural areas (total 56.9% vs.55.4% reported in the April Report), than in urban areas (58.4% vs. 57.6%).

Graph 3.14
Jobs by type of employment: national total



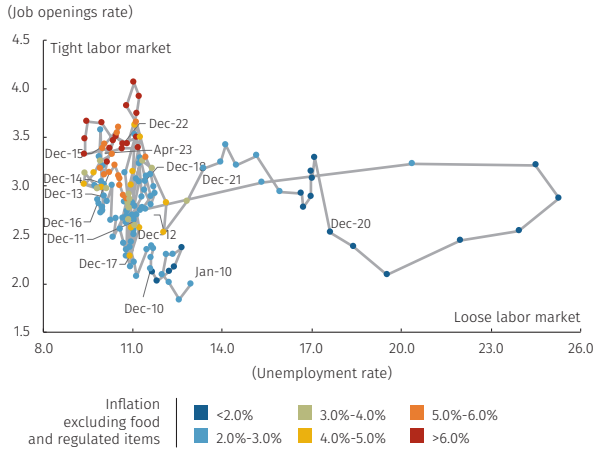
Note: corresponds to rolling seasonally adjusted data.
Sources: DANE (GEIH), calculations by *Banco de la República*.

Graph 3.15
Unemployment rate by location



Note: corresponds to rolling seasonally adjusted data.
Sources: DANE (GEIH), calculations by *Banco de la República*.

Graph 3.16
Beveridge curve for the seven largest cities



Notes: Seasonally adjusted series, rolling quarter. GEIH Vacancy rate estimated based on hires according to Morales, Hermida and Dávalos methodology (2019).
Sources: DANE (GEIH), calculations by Banco de la República.

in the Comprehensive Contribution Settlement System (PILA) and the records of affiliates to family compensation funds (CCF), confirm the lack of activity in the salaried employment segment. The growth of non-salaried and informal employment, exceeding that of the formal segment, has led to a notable increase in the informal employment rate during the first quarter, which has partly self-corrected. In the rolling quarter ending in May, this indicator stood at 57.3% for the national aggregate.

In May, the national aggregate unemployment rate was below its historical average and registered a slight month-on-month increase. In May, the national unemployment rate in a rolling quarter remained stable at 10.4%. By geography, this same month noted a significant drop in rural unemployment, which stood at 9.7% (Graph 3.15). Urban unemployment, however, saw a moderate increase to 11.0%, but with significant differences among the main cities. Those that recorded the largest increases in annual unemployment rates were Quibdó (4.4 pts), Ibagué (2.6 pts), and Neiva (1.6 pts); in contrast, greater decreases were recorded in Tunja (-3.3 pts), Santa Marta (-3.2 pts) and Popayán (-2.4 pts). As for unemployment by gender, the positive performance of labor force participation rates for women has allowed the labor gender gap to narrow, situated at 4.8 pts in May.

Formal labor demand indicators show mixed signals and, alongside the behavior of unemployment, suggest a labor market that - although still tight - shows signs of marginal weakening. The job vacancy indexes to April obtained from classified ads continued to decrease, while implicit GEIH hiring figures remained stable. Nevertheless, the job vacancy index computed from Public Employment Service (PES), available to May, showed a partial recovery after the decline observed in the second half of 2022. The mixed behavior of the job vacancy indexes, together with lower hiring expectations conveyed in *Banco de la República's* monthly Survey of Economic Expectations (EMEE) suggest a less dynamic behavior of formal employment in the near future. From the first quarter of 2023, the EMEE showed a 1 pt. decrease versus the previous quarter, on balance, between those planning to increase and those planning to decrease their workforce in the short term. The behavior of urban unemployment rates and relatively high levels of job vacancy rates show, in light of the Beveridge curve[35] (Graph 3.16), a labor market that continues tight and therefore continues exerting inflationary pressures. However, lower hiring expectations would indicate that this tightness could begin to ease in the second semester of 2023. Finally, to April, the labor income information from the household survey shows that nominal income indexes continue their upwards annual adjustment; nonetheless, in

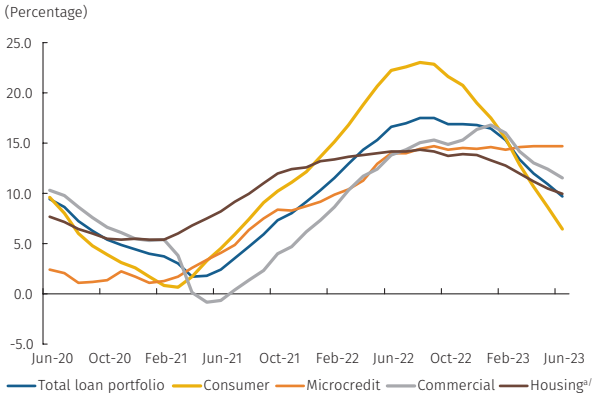
35 The Beveridge curve is a graphical representation of the relationship between unemployment and the job vacancy rate.

Table 3.1
Average monthly interest rates
(percentage)

	Sep-21	Dec 21	Dec 22	Jun-23
Interbank				
TPM	1.75	2.70	11.48	13.25
Interbank overnight	1.79	2.73	11.47	13.29
IBR overnight	1.77	2.72	11.46	13.28
IBR 1-month	1.93	2.96	11.81	13.25
IBR 3-months	2.27	3.36	12.11	13.25
IBR 6-months	2.76	3.97	12.33	13.03
IBR 12-months			12.20	11.99
Deposits				
Savings	0.97	1.19	5.72	6.23
FTD 90-days	2.05	3.08	13.42	13.02
CDT* 180-days	2.45	3.71	15.58	13.30
CDT 360-days	3.16	5.10	17.08	14.17
CDT > 360-days	3.68	7.14	19.15	14.44
Credit				
Preferential	4.98	6.00	18.57	17.65
Ordinary	7.34	8.18	19.27	19.20
Non-public housing purchases	9.06	9.40	17.22	17.97
Public housing purchases	10.98	11.55	17.00	16.41
Personal loan consumption	17.09	17.51	31.23	31.65
Payroll loan consumption	11.23	11.65	19.45	19.82
Credit card	23.49	24.47	39.01	39.58

*CDT (term deposit certificates).
Sources: Office of the Financial Superintendent of Colombia, calculations by *Banco de la República.*

Graph 3.17
Gross portfolio in national currency
(annual change, average monthly data)



a/ Adjusted housing: banking loan portfolio plus securitizations.
Sources: Office of the Financial Superintendent of Colombia, calculations by *Banco de la República.*

the salaried segment, characterized by greater nominal rigidity, these adjustments would occur at a slower pace than the observed inflation. Thus, the median real income of salaried workers fell annually by 3.6%, in contrast to that of non-salaried workers, which increased in annual terms by 6.4%.

3.4 Financial and Monetary Markets

Credit continues to ease, while interest rates on deposits and loans fell amid still tight financial conditions (Table 3.1). This behavior transpired in an environment of slower economic activity, expectations that the monetary policy interest rate hike cycle would end, increases in loan portfolio delinquency, more stringent loan requirements in Colombia by financial entities, and somewhat tighter financial conditions.

Lower credit activity was noted in the second quarter, mainly in consumer loans (Graph 3.17). During this period, credit growth continued to moderate in most modalities. In June, the loan portfolio recorded an annual increase in local currency of 9.7% (-1.8% in real terms[36]), 7.1 pts below that observed in December 2022. The lower annual growth has been seen in all loan portfolio modalities and has been more noticeable in consumer credit, whose growth contracted from 19.0% in December to 6.4% in June 2023. For these same periods, the housing loan portfolio decelerated from 13.9% to 10.0%, respectively. In this segment, the non-social interest housing segments (non-VIS) loan portfolio is the one that has lost the largest share. Since April, the household loan portfolio (consumer and housing) has exhibited negative real annual growth (-3.7%). Conversely, the commercial loan portfolio increased by 11.6% in June (-0.2% in real terms), 4.9 pts lower than the value observed in December 2022. Commercial credit in US dollars decreased again during the second quarter, after the slight recovery seen at the beginning of the year. Finally, the microcredit segment was the only one to show a slight increase (0.3 pts), with a growth of 14.7% (2.8% in real terms) to June 2023.

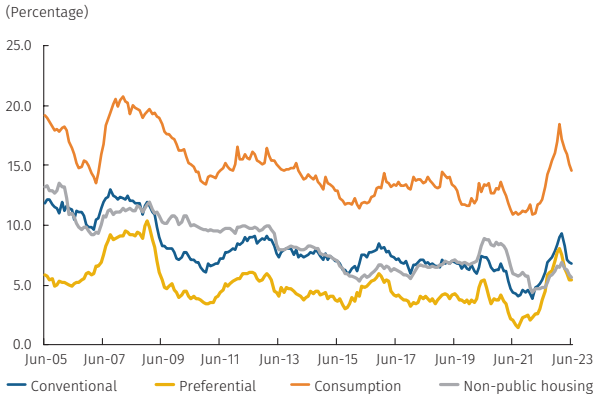
Lending and term deposit interest rates fell during the second quarter, although higher in real terms than their historical average (Table 3.1). In April, the BDBR increased the monetary policy interest rate (MPR) by 25 bps to 13.25%, a figure that remained unchanged at the June meeting. In the money market, interest rates for terms of less than six months followed the behavior of the MPR.[37] For the remaining terms, the difference between the IBR and the TIB has progressively closed, and between the six- and twelve-month rates, this difference suggests market expectations of a lower monetary policy interest rate towards the end of the year

36 Deflated by CPI excluding food.

37 The interbank rate (TIB) and bank benchmark index (IBR).

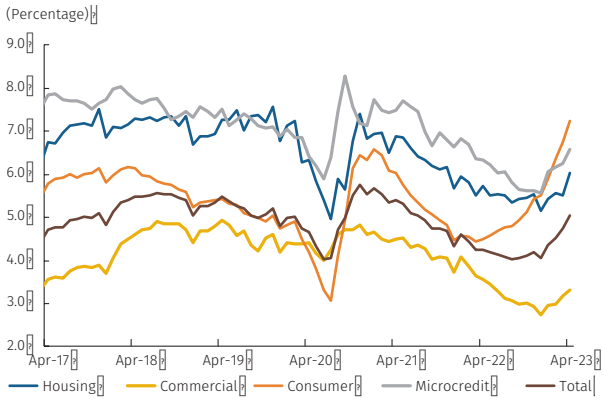
This occurs against a backdrop of lower funding needs by financial institutions, consistent with a less dynamic behavior of the loan portfolio. Interest rates on term deposit certificates (CDTs), which significantly decrease in the first quarter, continued their downward trend to a level of 13.7% in June. Interest rates for deposits were 6.2% in June, below those observed in December 2022, while interest rates for the different types of loans fell during the second quarter. Interest rates for conventional and preferential commercial loans were below those seen in December 2022. In consumer loans, the interest rates for credit cards and personal loans showed marginal reductions in the second quarter of 2023 versus the increase experienced in the previous quarter of the year. In real terms, all rates remain above the average computed since 2003 (Graph 3.18).

Graph 3.18
Real commercial credit interest rates
(Average monthly data deflated with CPI excluding foods)



Sources: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

Graph 3.19
NPL Indicator
(Past due loan portfolio/ Total loan portfolio)



Sources: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

Credit institutions continue to see an increase in the nonperforming loans indicator, primarily in the case of consumer loans. So far in 2023, there has been an increase in the nonperforming loans indicator (NPL) for all types of credit. The consumer NPL indicator continued its upward trend, while that for commercial, housing and microcredit began to decline, although at levels below their historic averages (Graph 3.19). This behavior was observed after recording robust credit growth in 2022, in a current environment of high household financial burden. Solvency indicators remain at high and stable levels. To April 2023, the basic and risk solvency indicators were 14.1% and 17.8%, respectively, maintaining a significant margin with respect to the required minimums of 4.5% and 9.0%.

The Colombian financial system evidences solid solvency and liquidity indicators, which would allow it to face the materialization of several risks. During March 2023, the financial system faced a period of international stress that affected several banks in the United States, among them First Republic Bank and Silicon Valley Bank. This episode was associated with high exposure to treasury securities, which were accounted for on the balance sheet at maturity, a position that was mainly funded through demand deposits from its client base highly concentrated in technology companies.[38] When analyzing the exposure of the Colombian financial sector to a similar situation as that observed in the United States, it was found that the balance sheet structure of the domestic financial system is characterized by having more stable funding, higher levels of liquidity and solvency, in addition to a limited exposure when security investments mature. This structure is in line with the international regulation suggested in Basel III.

38 For more information on this episode of banking stress, see Box 3 of the Financial Stability Report for the first half of 2023, available in Spanish at: https://www.banrep.gov.co/es/publicaciones-investigaciones/reporte-estabilidad-financiera/primer-semestre-2023

The presence of high liquidity and solvency indicators allows the financial system to adequately face extreme adverse scenarios. Specifically, the results of the financial stress exercises that simulate extreme deteriorations in the macroeconomic environment continue to indicate that the institutions' equity would assimilate the shocks, meeting the solvency required to continue operating. Likewise, additional exercises to evaluate the resilience of credit institutions in Colombia reveal that, in the event of a similar scenario to that observed in the United States, they would have the necessary resources to meet their client's requests.[39]

39 For more information on these calculations, see Box 1 of the July 2023 Report to Congress.

Box 1
Understanding the lead-lag relationship between the PPI and the CPI in Colombia

Edgar Caicedo García
Wilmer Osvaldo Martínez Rivera
Juan David Bonilla Pérez*

An analysis of national and international literature finds multiple linkages (bidirectional, coincidental, or forward-looking) between the producer price index (PPI) and the consumer price index (CPI). However, few studies eliminate the differences between the methodologies of the two baskets by homogenizing items and weights in order to find such associations. This paper studies the relationship between the PPI and CPI baskets, identifying the number of months in which annual producer inflation anticipates a change in annual consumer inflation. The results are valuable to inform and improve the forecasting process within the framework of monetary policy decision-making.

1. What does the literature conclude about the lead-lag relationship between the PPI and the CPI?

Research findings on the type of relationship between the IPP and the CPI have been divergent, ranging from identifying the CPI as leading the PPI, bidirectional linkages, coincident price indexes, or the PPI leading the CPI.[1] This discrepancy in results has been explained by different incidences of price controls, supply and demand factors, price rigidities, sales margins, and inconsistencies in the transmission of exchange rate movements, among others. Methodological differences, which are not usually corrected in the literature consulted, and the lag with which one indicator operates with respect to the other, are also recognized as factors that complicate the causality analysis. This has led to unexpected results, such as the conclusion that the CPI is the leading indicator of the PPI.[2]

This Box updates and identifies the lead-lag relationship between these two price baskets. The approach taken consists of minimizing the differences between the methodologies used to compute the PPI and the CPI, isolating all non-price factors, and discovering the resulting relationship between the two baskets by correlating the breakpoints among both indexes. This will allow us to determine the causal or leadership relationship between the PPI and the CPI, which characterizes the price dynamics in Colombia.

---

* The authors are members of *Banco de la República*'s the Monetary Policy and Economic Information Subdepartment. The views and opinions expressed herein do not necessarily reflect those of the bank or its Board of Directors.

1 The possible multi-directional links between the IPP and CPI can be found at: Osvaldo, Martinez Rivera, Wilmer O. Martinez R., Edgar Caicedo G., and Evelyn J. Tique C. "Exploring the Relationship between the CPI and the PPI: The Colombian Case." *International Journal of Business and Management* 8, no. 17 (2013). https://doi.org/10.5539/ijbm.v8n17p142. In addition, recent research continues to offer results that the PPI does not lead the CPI, bidirectional relationships or, even, that the CPI leads the PPI. At the local level, the lag of the PPI towards the CPI is found by Cerquera Losada, Oscar Hernán, Juan Pablo Murcia Arias, and Jonas Conde Guzmán. "Relationship between the Consumer Price Index and the Producer Price Index for Six South American Countries." *Apuntes del Cenes* 37, no. 66 (2018): 39–74. https://doi.org/10.19053/01203053.v37.n66.2019.6601. Bidirectional links or from the CPI to the PPI can be found recently in the international literature in: Sun, Jing, Jinhui Xu, Xin Cheng, Jichao Miao, and Hairong Mu. "Dynamic Causality between PPI and CPI in China: A Rolling Window Bootstrap Approach." *International Journal of Finance & Economics* 28, no. 2 (2021): 1279–89. https://doi.org/10.1002/ijfe.2476.

2 See, for example, Meyer, Daniel Francois, and Thomas Habanabakize. "Analysis of Relationships and Causality between Consumer Price Index (CPI), the Producer Price Index (PPI) and Purchasing Manager's Index (PMI) in South Africa." *Journal of Economics and Behavioral Studies* 10, no. 6 (2018): 25. https://doi.org/10.22610/jebs.v10i6.2590.

2. Methodological differences between the PPI and the CPI

The CPI measures the evolution of prices of a representative basket of goods and services consumed by households in the national territory. For this purpose, the National Administrative Department of Statistics (DANE) periodically conducts household surveys to identify their consumption patterns, including the frequency and place of their purchases.[3] The selection of the items that comprise the consumer basket and the structure of their weights, as well as the current CPI calculation methodology (December 2018 is the index reference period = 100), are based on the information obtained from the National Household Budget Survey during 2016 and 2017. The CPI basket only includes final consumption goods and services purchased in the last market transaction.[4] Additionally, geographically the CPI sampling covers 38 municipalities (32 departmental capitals and six prioritized municipalities) and four income levels: poor, vulnerable, middle-class, and high-income households.

For the PPI, the DANE captures the average change in prices of goods produced in the country for internal consumption and exports, including the primary distribution and secondary sale channels.[5] The annual official PPI inflation rates reported by the DANE[6] corresponds with the classification of national production (December 2014 is the index reference period = 100) that results in the PPI value of the basket of goods produced and consumed domestically plus those exported. In particular, the PPI's inputs include the results of the DANE's Annual Manufacturing Survey (EAM), the National Accounts System and foreign trade information, and research data for the various sectors of the economy, including industrial, agriculture, fishing, forestry, and mining. Unlike the CPI, the PPI does not include or follow the prices of the services sector. This is the main difference between the two baskets, which is more relevant given that this component accounts for close to 50% of the weighting in CPI. Further significant differences include, among others, the national geographical coverage of the PPI, without disaggregating by cities or geographical areas, and, unlike the consumer basket, the PPI does not have information by income level.

Moreover, some goods are included in one basket but not in the other, such as those used for intermediate consumption (e.g., raw materials used in mining or industry) or capital goods (e.g., industrial machinery), which are part of the IPP but not the CPI. Another variance is that the PPI tracks prices at the first sale stage, namely the manufacturer's selling price without taxes, while the CPI is calculated using the purchase price including taxes at the last stage of the sales chain.[7] The products included in the PPI must have a significant share in domestic production or foreign trade, so they are derived from a Laspeyres index,[8] which is a fixed-weight basket of goods. In this sense, the PPI includes internationally tradable goods, where a significant part of the prices is captured in foreign currency and converted into pesos, and therefore this basket is very sensitive to the behavior of the exchange rate. Conversely, the CPI uses local market prices in pesos, and therefore the exchange rate has a lower pass-through and greater lag on this basket.

---

3 Until 2006-2007, the Survey of Income and Expenditures (EIG) was applied; it was replaced in 2016-2017 by the National Household Budget Survey (ENPH)

4 Further details on the CPI methodology are available in the DANE document detailing the 2019 methodological update, available at: https://www.dane.gov.co/files/investigaciones/fichas/precios-y-costos/Methodological-datasheet-CPI-2019.pdf

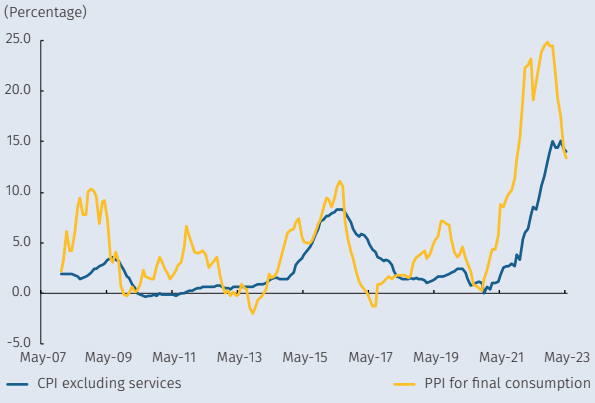
5 Initially, the PPI was established in 1948 as a wholesale price index (WPI) and, as of January 1991, it began to be published as a producer price index (PPI). Until November 2006, it was published by *Banco de la República*, but as of that date the National Administrative Department of Statistics (DANE) assumed its monthly preparation and publishing.

6 Further details on the DANE's PPI methodology are available at: https://www.dane.gov.co/files/investigaciones/boletines/ipp/methodology_producer_price_index_IPP.pdf

7 However, it is important to clarify that data on agricultural products is mainly collected in the country's central supply centers, so for this segment it corresponds to a wholesale price index.

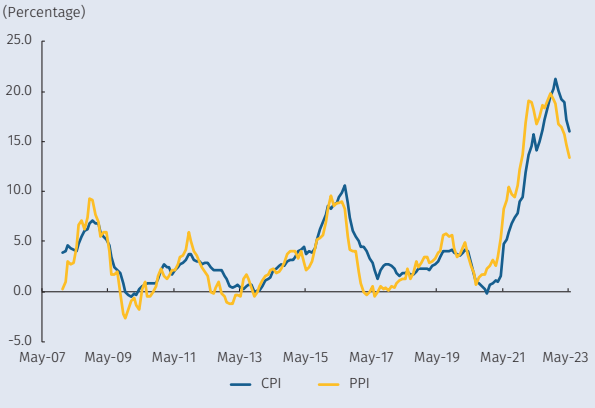
8 It is important to note that the CPI is a Laspeyres index for the higher-level aggregation - from subclasses to total - while a geometric mean formula is used for the lower-level aggregation. In the two homogenized baskets, the Laspeyres index is adopted to aggregate from the subclasses level and thus calculate the different aggregations for each basket.

Graph B1.1
CPI excluding services and PPI for final consumption
(Annual change)



Note: the CPI excluding services was calculated by the authors, while the PPI for final consumption is part of the official DANE classification by economic use and purpose (CUODE).
Sources: DANE and calculations by the authors.

Graph B1.2
Homogenized CPI and PPI baskets (annual change)



Note: the homogenized baskets are a regrouping of the CPI and PPI so that both baskets have identical descriptions and number of items, with the same statistical base (December 2018 is the index reference period = 100) and weighting structure, as those of the CPI.
Sources: DANE and calculations by the authors.

3. Basket homogenization

From the above analysis, we conclude that the CPI and the PPI baskets differ in terms of size, coverage, weighting, tradability, and sectors included. These methodological differences do not allow for a simple comparison between the two baskets.

In order to overcome the differences in the methods employed between the two indices, two homogenization exercises were carried out to facilitate a comparison between the consumer and producer baskets. First, services were excluded from the CPI basket to draw it conceptually closer to the PPI grouping by final consumption,[9] since the consumption of intermediate and capital goods is not found in the CPI (Graph R1.1). A second exercise consisted of reducing to the greatest extent possible the methodological differences between the two indices. For this, each of the CPI items was assigned a subclass of the PPI. Subsequently, two baskets with identical descriptions and number of subclasses were given a weighting structure equivalent to the CPI basket (Graph R1.2). The total number of matching items (subclasses) between the two baskets was 116, tantamount to about 40 % of the CPI. Additionally, the homogenous items were classified as either goods or food, so as to identify the type of linkage between these breakdowns.

The two basket homogeneity exercises confirm that, the greater the methodological differences between the CPI and the PPI, the more pronounced the variances between the corresponding inflation dynamics (Graphs R1.1 and R1.2). The comparison of annual CPI inflation without services versus the PPI inflation by final consumption shows very little correlation, even though in some periods they follow similar paths. In contrast, when minimizing the methodological differences between the two indicators, the result is that both the annual inflation of the homogenous CPI and its corresponding PPI tend to behave very alike, with a high statistical correlation therebetween.

4. Lead-lag methodology employed for comparison between baskets and results

To identify the leading or causal relationship between the CPI and the PPI, the coincident profiles methodology proposed by Martinez (Martínez et al., 2013)[10] was used, which employs an algorithm to determine the breakpoints of the annualized series and then identifies the number of months by which one series leads the other. This is the technique adopted to verify whether the PPI is a leading indicator of the CPI, namely whether the annual adjustment of producer prices anticipates the inflection or breakpoints of the annual changes in consumer prices. The results of applying this coincident profile methodology are summarized in a bar graph, whose dotted blue line expresses the threshold beyond which there is statistical significance for each of the lags with which the leading variable anticipates the other. The study period covers the interval from December 2007 to May 2023, examining the annual variations of the transformed series of the previous section.[11]

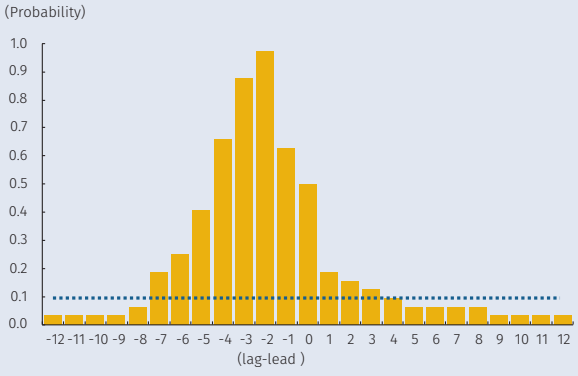
9 Classifying the PPI for final consumption is part of the classification by economic use and purpose (CUODE), which includes goods for capital formation, intermediate consumption and construction materials.

10 Further information on this methodology is available at: Osvaldo, Martinez Rivera, Wilmer O. Martinez R., Edgar Caicedo G., and Evelyn J. Tique C. "Exploring the Relationship between the CPI and the PPI: The Colombian Case." *International Journal of Business and Management* 8, no. 17 (2013). https://doi.org/10.5539/ijbm.v8n17p142.

11 The study period involved merging three CPI methodologies (1998, 2008 and 2018) and two PPI methodologies (2006 and 2014).

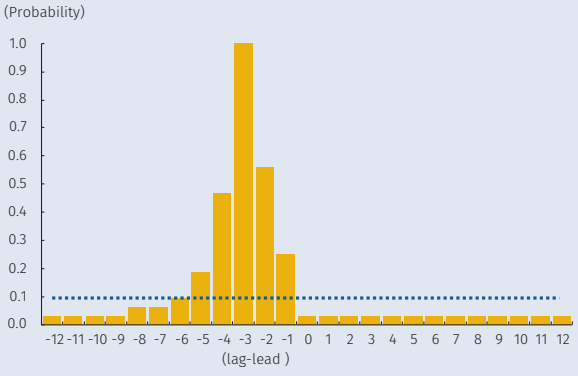
When comparing the PPI for final consumption with the CPI without services (Graph R1.3), we find statistically significant evidence of both leading and lagging of the PPI for final consumption to the CPI without services. In contrast, when the methodological differences between the two baskets are eliminated to the maximum extent possible, we find that the homogenized PPI is a leading indicator of the homogenized CPI with a higher probability for lags 2 and 3 (Graph R1.4).

Graph B1.3
Coincident profiles of the CPI without services and PPI for final consumption (annual change)



Note: the dotted blue line represents the statistical significance threshold beyond 0.1.
Sources: DANE and calculations by the authors.

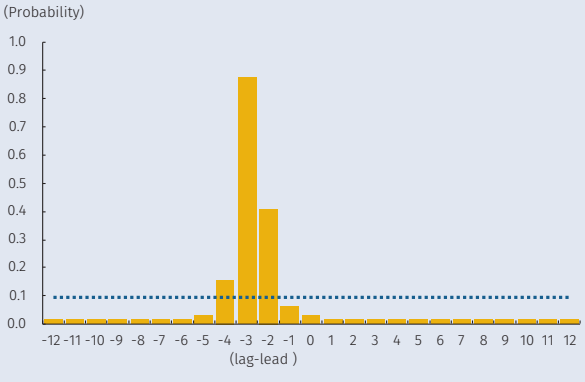
Graph B1.4
Coincident profiles of homogenized CPI and PPI baskets (annual change)



Note: the dotted blue line represents the statistical significance threshold beyond 0.1.
Sources: DANE and calculations by the authors.

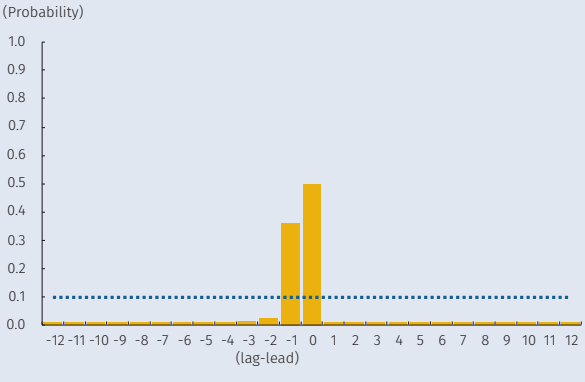
Additionally, the coincident profile test was performed for the homogenized sub-basket of goods (Graph R1.5) and food (Graph R1.6). In the case of goods, in the two and four-month-forward periods, the PPI leads the CPI with a high degree of statistical significance, with the highest degree of probability seen in the 3-month forward lag. In the case of food, the PPI would be leading the CPI for food with a zero and one-month lag, but with a higher degree of coincidence probability in the zero-month lag. This last result is expected because a key food sub-group component (perishable foods) experiences a high turnover due to its highly fragile nature, which generates coincident profiles (zero-month lag) for the price adjustments of the compared food baskets.

Graph B1.5
Coincident profiles of homogenized CPI and PPI baskets for goods (annual change)



Note: the dotted blue line represents the statistical significance threshold beyond 0.1.
Sources: DANE and calculations by the authors.

Graph B1.6
Coincident profiles of homogenized CPI and PPI baskets for food (annual change)



Note: the dotted blue line represents the statistical significance threshold beyond 0.1.
Sources: DANE and calculations by the authors.

In summary, a direct comparison of the total PPI of domestic supply versus the total CPI is imprecise, given that they are very different baskets in terms of size, coverage, weights, descriptions, sales chains, tradability, and sectors included. Even when these two baskets are conceptually homogenized and the CPI without services is compared to the PPI for final consumption, the results of the coincident profiles test do not allow us to identify the type

of lead-lag relationship that exists. Finally, when we eliminate methodological differences between the two baskets, it is found that the homogenized PPI leads by two to three months (as the most likely lags) the homogenized CPI. Likewise, for the homogenized goods and food aggregates, the results endorse this finding. The goods of the PPI lead by three months those of the CPI, seeing that this lag has the greatest statistical significance while food exhibits the most likely coincidence between the two price indicators.

Box 2
Analysis of the recent meat price performance

Margarita María Gáfaro-González
Alejandra Ximena González-Ramírez
Juan Sebastián Vélez-Velásquez*

This Box explores how multiple factors may contribute to the increase in beef prices experienced in Colombia during 2021 and 2022 when they reached an average annual escalation of 24%. The effect of certain supply and demand factors on the price of beef in the country's central supply centers is quantified by employing an econometric model. The results suggest that demand pressures associated with the increase in chicken and pork prices and with the recovery of employment, and supply pressures stemming from the excess rainfall experienced between 2021 and 2022 explain approximately 42% of the average annual change in beef prices during this period. Other shocks, such as changes in fuel prices, among others, that occurred during this time and affected all regions of the country across the board account for most of the remaining increase.

The factors considered as possible causes of the recent rise in beef prices are described below, followed by an economic exercise to measure the contribution of these factors to the observed price growth and the conclusions thereof.

1. Possible causes

Live cattle and beef exports: In February 2020, Colombia recovered the "foot-and-mouth disease (FMD) free zone" status it had lost in October 2018.[1] This, together with the increase in international beef prices, boosted the recovery of live cattle and beef exports. While cattle livestock slaughtered for domestic consumption between 2021 and 2022 fell on average by 6.0%, over the same period annual volumes of live cattle and beef exports grew by an average of 53% and 25%, respectively. These figures reflect a limited supply response to external demand pressures in the short term, which may have generated upward pressure on domestic prices.

Price of substitute goods: The first half of 2021 experienced the beginning of a period of accelerated growth in the international prices of corn and soybeans, essential raw materials in pork and chicken production.[2] Between 2021 and 2022, the average annual growth of the international prices (in USD) of these products reached 35% for corn and 26% for soybeans. Concurrently, domestic conditions associated with road blockades during the national strike in mid-2021 limited domestic pork and chicken production. In this context, the prices for these meats at the central supply centers showed an average annual growth rate of 20% and 25%, respectively. The increases in the prices of these goods, which act in the market as substitutes for beef, could have generated demand pressures, which, together with an inelastic short-term supply, could have resulted in beef price increases.

---

[*] The authors are members of *Banco de la República's* Cali branch. The views and opinions expressed herein do not necessarily reflect those of the bank or its Board of Directors.

1 Colombia´s FMD-free status, granted by the World Organization for Animal Health (formerly OIE), is a relevant factor for allowing international trade in beef and cattle and was recovered on February 5, 2020.

2 Egg, a protein of animal origin, could also be considered a beef substitute. The data shows a positive correlation between egg and beef prices, but of a lesser magnitude than that observed between chicken and pork. In the econometric exercise presented below, we focus on the prices of chicken and pork as primary substitutes. Alternative exercises wherein we also included egg prices had similar results.

Excessive rainfall: Between 2021 and 2022, the departments that supply meat to the country's central supply centers experienced excessive rainfall levels.[3] This excess affected, on average, 27% of their municipalities. Excessive rainfall can reduce the supply of beef by affecting the quantity and quality of pastures, the main feed source for Colombian cattle, as well as deteriorating the animals' health and affecting transport from production to consumption sites. These curtailments in supply could also have generated upward pressure on beef prices.

2. Econometric modeling

The following econometric model was used to quantify the effect of the different factors that can influence the increase in beef prices:

$$y_{it} = \beta expo_{it} + \theta S_{it} + \boldsymbol{\varphi R}_{it} + \boldsymbol{\alpha X_{it}} + \mu_i + \gamma_t + \epsilon_{it} \quad (1)$$

Where y_{it} is the dependent variable and is defined as the logarithm of the average price of beef in the central supply centers of department *i* in month *t*. The explanatory variables include a measure of the monthly price of beef and live cattle exports ($expo_{it}$) and of rainfall excesses and shortages ($\boldsymbol{R}_{it}$) in the departments that supply beef to each central supply center located in the destination department *i*[4] between months *t* -12 and *t* -1; the logarithm of the average price of chicken and pork meat in the central supply centers of each department in each month (S_{it}) and other controls ($\boldsymbol{X_{it}}$) that include the unemployment rate in the main city of each destination department and the closure of abattoirs (slaughter and meat-packing facilities) in each department. The regression also includes fixed effects by destination department and time (μ_i and γ_t), which capture differences between central supply centers that do not vary over time and common shocks suffered by all regions in each month, respectively. The error term (ϵ_{it}) includes all other unobserved factors that explain the behavior of beef prices in each central supply center and each month.

Bearing in mind that both exports and prices of substitutes can be endogenous, an instrumental variables approach is used to identify their possible causal effect on beef prices. In the case of exports, the exogenous variation arising from the reinstatement of the country's FMD-free status is exploited, and consideration is also given to the fact that the supply centers where this status reinstatement could be most beneficial are those located closest to the sites where licensed livestock (live cattle) export companies operate.[5] Specifically, the instrument used is the interaction between a dichotomous variable that assumes the value of 1 after February 2020 - when Colombia recovers its FMD-free status - and the distance between the main city of the destination department and the city with the closest livestock export company.[6] In the case of the prices of substitutes, the exogenous variation in the international price of corn and soybean is used.[7] In particular, we use as instrumental variables the interaction between the international price in USD of corn and soybeans, and the share of each chicken and pork-producing department in the total volume of corn and soybean imports between 1995 and 2012. A more detailed description of how the explanatory variables and instruments employed were constructed is provided in the Appendix to this Box.

---

3 For the analysis presented in this Box, excess is defined as a monthly precipitation above the 80th percentile of the monthly historical distribution.

4 For exports and rainfall shocks, monthly data is available for the department of origin of the product to be delivered to each supply center. Therefore, the regressions include the weighted average of these variations in the department of the central supply centers, using as indicator the total supply provided by the department of origin to the supply center between 2013 and 2022. See the Appendix to this Box for further details on the construction of the variables included herein.

5 Bogotá, Medellín, Bucaramanga, Barranquilla and Cartagena.

6 A required condition to identify the causal effects here is that the elasticity of the beef supply does not vary according to its proximity to the port of export.

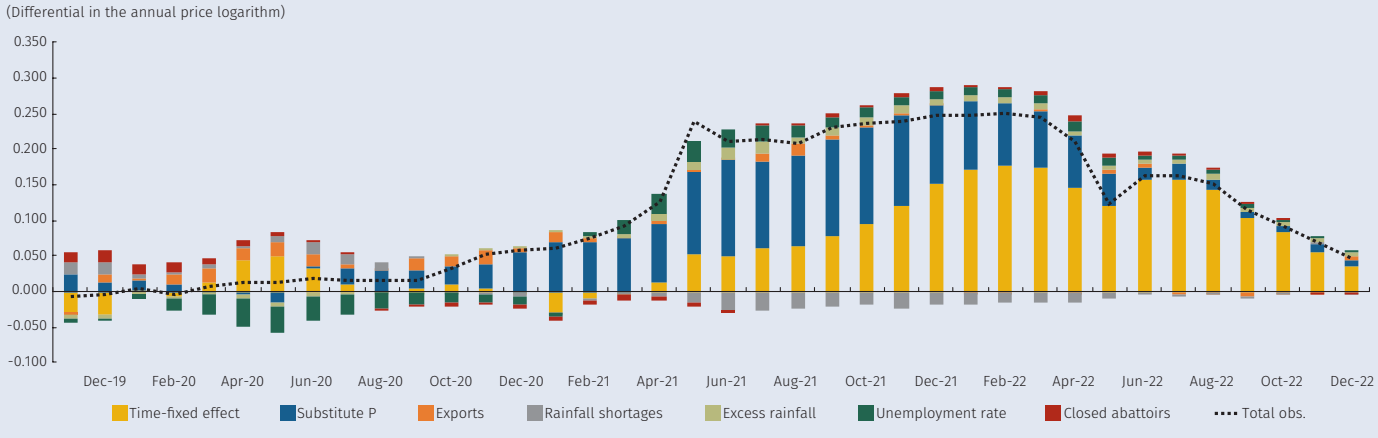
7 In this case, the assumption to identify causality requires that the price of corn and soybean does not directly affect the price of beef. This assumption is fulfilled to the extent that cattle in Colombia is primarily pasture fed, and therefore the price of corn and soybeans should not directly affect the production costs of beef.

The equation shown above is estimated using data from the DANE's price and supply information system of the agricultural and livestock sector (SIPSA), together with the DANE's foreign trade data and rainfall measurements from the meteorological stations of the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM). The grouping of the different datasets results in a final sample with monthly data from November 2018 to December 2022 for sixteen departments. The prices of beef, pork, and chicken are calculated as the simple monthly average prices for the different wholesale beef, pork, and chicken cuts reported in SIPSA in each department. For the departments with more than one central supply center, we aggregated the information to deliver a single observation per department. These prices were deflated with the national consumer price index (CPI) so that the measurements capture the relative prices using 2018 as the base year. In the case of the price of chicken and pork, the simple average of their relative prices is calculated to provide a single measure of the relative price of substitute proteins. The dotted line in Graph R2.1 shows that, even after discounting the generalized price increase, the relative price of beef grew on average 19% per year over the past two years.

2.1 Results

The results of the estimated equation are shown in Table R2.1. Prices of substitutes, exports, rainfall shocks, and the closure of active abattoirs have a positive and statistically significant estimated coefficient.[8] The unemployment rate, as a proxy variable for a negative demand shock, is negatively correlated with the price of beef. The estimated coefficients in this regression are robust to alternative specifications in which the average annual growth in slaughter was included as a measure of the cattle cycle.[9]

Graph B2.1
Contribution of each factor to the annual price increases



Note: the graph illustrates the annual difference observed in the logarithm average of the relative price of beef in the country's central supply centers (dotted line). The bars show the contribution of each factor to this variation according to the results of the estimation of equation 1. The difference between the sum of the bars in each period and the dotted line represents the estimated error.
Sources: DANE-SIPSA, DANE-DIAN, world climate databases, IDEAM, INVIMA, DANE, calculations by the authors.

The contribution of each factor to the annual change in the logarithm of the price of beef is derived from the estimated regression (Graph R2.1). The height of each bar represents to what extent the variation in the price of beef is explained by each regression component. Regional variations in pork and chicken prices, the unemployment rate, and excess rainfall explain 40% of the average price increase observed between 2021 and 2022.

The Graph also shows that the time-fixed effect explains 42% of the average increase in beef prices between 2021 and 2022. This fixed effect captures shocks to beef prices common in all regions.

8 The positive effect of the two types of shocks on the price implies that both positive and negative rainfall deviations result in higher prices than those observed when the rainfall levels remain between the 20th and 80th percentile of the historical distribution by municipality and month.

9 This measure is not included in the primary analysis due to the endogeneity resulting from the simultaneous determination of prices and quantities.

Part of these shocks may be related to aggregate variables that were not included in this analysis, such as the exchange rate, fuel prices, international meat and raw material prices, and national evolution of the livestock cycle, among others. Another part thereof may be related to the aggregate effects of the variables included in the analysis. In particular, the time-fixed effect captures the impact on beef prices relative to generalized increases in rainfall levels, meat demand, and chicken and pork prices throughout the country, if these

Table B2.1
Results of the instrumental variables estimation

Dependent Variable: Price of Beef Logarithm				
	Coefficient	Standard Error	t value	P>t
Prices of substitutes	0.552	0.1750	3.16	0.0020
Relevant exports	0.008	0.0050	1.66	0.0970
Relevant rainfall shortages	0.150	0.0370	4.07	0.0000
Relevant excess rainfall	0.092	0.0520	1.75	0.0810
Unemployment rate	-0.003	0.0010	-2.71	0.0070
Relevant abattoir closures	0.038	0.0210	1.84	0.0660

Note: The estimate includes 800 observations of monthly data for the period between November 2018 and December 2022 for the supply centers in the departments of Antioquia, Atlántico, Bogotá, Bolívar, Caldas, Cauca, Cesar, Córdoba, Huila, Meta, Norte de Santander, Risaralda, Santander, Sucre, Tolima, and Valle del Cauca.
Source: Authors' calculations.

aggregate effects are different from those of local variations in these factors. For example, if a fall in unemployment across the country has a larger effect on prices than a fall in local unemployment, as would be expected if there was arbitrage, the time-fixed effect captures part of the contribution of the unemployment rate (which we use as a proxy for aggregate demand) to the price increase.

3. Conclusions

The econometric model presented suggests that among the factors associated with the increase in beef prices are demand pressures resulting from increases in chicken and pork prices and a recovery in employment, as well as supply pressures associated with excess rainfall. In addition, a significant part of the increase in prices occurred in a generalized manner throughout all regions of the country and could be related to aggregate variables that are not included in the analysis and aggregate effects of our analysis variables.

Appendix

Description of the calculation of the explanatory variables included in the estimate

For each destination department, relevant measures are defined as those that denote factors in the places of origin of the supply received by the supply centers of each department. These measures are calculated as weighted averages of the values of the foodstuffs in the departments of origin, according to the total supply of each product. In the case of the relevant variables for beef, the total beef supply between 2013 and 2022 is used as a weight.

Substitute prices: logarithm of the simple average of the prices of chicken and pork in the central supply centers of each department, deflated with the base 2018 CPI.

Relevant exports: inverse hyperbolic sine (IHS) transformation of the Free on Board (FOB) value in constant pesos of beef and live cattle exports relevant to each central supply center, $\tilde{z} = \operatorname{arcsinh}(z) = \log\left(z + \sqrt{z^2 + 1}\right)$. The values are converted to pesos using the exchange rate at the end of the month.

Relevant abattoirs closures (animal processing plants): first, the number of abattoirs closed in each department is found, and then a weighted average is calculated for the departments where the beef is destined. This provides the relevant number of abattoirs in the departments where the supply centers are located. Then, a variable is calculated which takes the value of 1 if there were relevant abattoir closures for each destination department and, fina-

lly, the 12-month moving average of this variable is included in the regression; that is, the fraction of months in which relevant abattoirs were closed during the last year.

Relevant rainfall shortages: first, the share of municipalities in each department that had rainfall levels below the 20th percentile of historical rainfall is calculated. Then, a weighted average of this measure is obtained in the departments of origin for the supply centers in each destination department. The 12-month moving average of this variable is included in the regression.

Relevant excess rainfall: first, the share of municipalities in each department that had rainfall levels above the 80th percentile of historical rainfall is calculated. Then, a weighted average of this measure is obtained in the departments of origin for the supply centers in each destination department. The 12-month moving average of this variable is included in the regression.

Unemployment rate: the 3-month moving average of the unemployment rate for the city where the supply center is located and its metropolitan area.

Instrument for exports: interaction between a dichotomous variable that takes the value of 1 after February 2020 with the distance in seconds between the main city of each destination department and the city with the nearest livestock export companies. The cities considered are Bogota, Medellin, Bucaramanga, Barranquilla, and Cartagena which, according to the National Directorate of Taxes and Customs' (DIAN) export records, are the cities where cattle livestock export companies were located during 2018 and 2020.

Substitute price instrument: this is a relevant measure in the destination department to gauge the interaction between the international price in USD of corn and soybeans, and the share of each chicken and pork-producing department in the total volume of corn and soybean imports between 1995 and 2012.

Annex 1
Macroeconomic Forecasts by Local and Foreign Analysts [a/, b/]

	Units	Jul-23	Dec 23	Jul-24	Dec 24	Jul-25
Headline CPI	Monthly variation (average)	0.30	n. a.	n. a.	n. a.	n. a.
CPI excluding food	Monthly variation (average)	0.40	n. a.	n. a.	n. a.	n. a.
Headline CPI	Annual variation (average), end of period	11.57 [c/]	8.90	6.15	5.03	3.99
CPI excluding food	Annual variation (average), end of period	11.25 [c/]	9.34	6.07	4.86	3.64
Nominal exchange rate	COP per USD, end of period	4,127	4,180	4,207	4,200	4,200
Monetary policy rate	Percentage, end of period	13.25	11.75	8.88	7.00	5.63

	Unidades	II-2023	III-2023	IV 2023	2023	I-2024	II-2024	III-2024	IV-2024	2024	I-2025	II-2025
GDP	Annual change, original series	0.9	0.8	0.9	1.4	1.5	1.9	2.4	2.6	2.1	3.0	n. a.
Unemployment	Thirteen cities, quarterly average	11.1	11.2	11.1	n. a.	11.6	11.4	11.2	10.8	n. a.	11.3	n. a.
IBR (90 days)	Effective annual rate, end of period	n. r.	12.5	11.8	n. a.	10.5	9.3	8.0	7.3	n. a.	6.7	6.2
Fiscal Deficit (GNC) [d/]	Share of GDP	n. a.	n. a.	n. a.	4.3	n. a.	n. a.	n. a.	n. a.	4.5	n. a.	n. a.
Direct Account Deficit [d/]	Share of GDP	n. a.	n. a.	n. a.	4.1	n. a.	n. a.	n. a.	n. a.	4.0	n. a.	n. a.

n.a.: Not available.
n.r.: Not relevant, given that the data has already been observed.
a/ The survey excluded the question related to the DTF starting with the April 2023 *Banco de la República's* Monthly Survey of Economic Analyst Expectations. Expectations (EME for its Spanish acronym) conducted by *Banco de la República.*
b/ Is the response median to *Banco de la República's Monthly Survey of Economic Analyst Expectations*, except for the CPI and CPI excluding food, which are the response average.
c/ Data calculated based on the results of *Banco de la República's* Monthly Survey of Economic Analyst Expectations (EME).
d/ Positive values represent deficit and negative values represent surplus.
Sources: *Banco de la República Monthly Survey of Economic Analyst Expectations*, conducted in July 2023.

Annex 2
Main macroeconomic forecasting variables

		Years										
		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Exogenous variables												
External [a/]												
GDP of trading partners [b/]	Percentage, annual var., seasonally adjusted	2.7	2.1	1.6	2.7	2.5	1.4	-6.5	7.1	3.0	**1.8**	**1.8**
Oil price (Brent benchmark)	Dollars per barrel, average of the period	99	54	45	55	72	64	43	71	99	**79**	**80**
Federal funds effective rate (Fed)	Percentage, average for the period	0.09	0.13	0.39	1.00	1.83	2.16	0.36	0.08	1.68	**5.09**	**5.22**
5-year Credit Default Swap for Colombia	Basis points, average for the period	101	184	212	129	114	99	142	142	259	**266**	**246**
Internal												
Neutral real interest rate for Colombia	Percentage, average for the period	1.4	1.5	1.6	1.3	1.3	1.2	1.3	1.5	2.0	**2.2**	**2.3**
Potential GDP for Colombia (trend)	Percentage, annual change	3.9	3.3	2.7	2.4	2.3	2.5	0.1	4.1	3.9	**3.1**	**2.6**
Endogenous variables												
Prices												
Total CPI	Percentage, annual change, end of period	3.66	6.77	5.75	4.09	3.18	3.80	1.61	5.62	13.12	**8.96**	**3.53**
CPI excluding food [c/]	Percentage, annual change, end of period	3.28	5.25	5.51	5.03	3.51	3.45	1.03	3.44	9.99	.	.
CPI for goods (excluding food and regulated items)	Percentage, annual change, end of period	1.75	7.27	5.91	3.24	1.40	2.18	0.63	3.31	15.04	.	.
CPI for services (excluding food and regulated items)	Percentage, annual change, end of period	3.34	4.64	5.26	5.38	3.13	3.45	1.29	2.18	7.41	.	.
CPI for regulated items	Percentage, annual change, end of period	4.89	4.43	5.63	6.26	6.65	4.81	0.73	7.10	11.77	**18.05**	**5.21**
CPI for food [d/]	Percentage, annual change, end of period	5.24	13.08	6.65	0.48	1.87	5.80	4.80	17.23	27.81	**4.33**	**0.75**
CPI for perishable food	Percentage, annual change, end of period	16.74	26.03	-6.63	5.84	8.88	8.66	2.49	24.42	36.44	.	.
CPI for processed food	Percentage, annual change, end of period	2.54	9.62	10.74	-0.91	-0.08	5.04	5.43	15.32	25.33	.	.
Core inflation indicators [e/]												
CPI excluding food	Percentage, annual change, end of period	3.28	5.25	5.51	5.03	3.51	3.45	1.03	3.44	9.99	.	.
Core CPI 15	Percentage, annual change, end of period	3.19	5.59	5.98	4.21	3.22	3.78	1.88	4.42	11.55	.	.
CPI excluding food and regulated items	Percentage, annual change, end of period	2.82	5.50	5.48	4.67	2.57	3.10	1.11	2.49	9.51	**7.91**	**3.74**
Average of all core inflation indicators	Percentage, annual change, end of period	3.10	5.44	5.66	4.64	3.10	3.44	1.34	3.45	10.35	.	.
Representative market exchange rate (TMR)	Pesos per dollar, average for the period	2,001	2,746	3,053	2,951	2,957	3,282	3,691	3,747	4,257	.	.
Real exchange rate Inflationary gap	Percentage, average for the period	-0.3	9.5	2.5	-1.8	-0.8	3.6	6.0	2.5	6.5	**2.0**	**-2.1**
Economic activity												
Gross domestic product (sats)*	Percentage, annual change, sats	4.5	3.0	2.1	1.4	2.6	3.2	-7.3	11.0	7.3	**0.9**	**1.0**
Final consumption expense	Percentage, annual change, sats	4.3	3.4	1.6	2.3	4.0	4.3	-4.1	13.6	7.9	.	.
Household final consumption expenditure	Percentage, annual change, sats	4.2	3.1	1.6	2.1	3.2	4.1	-4.9	14.5	9.5	.	.
General government final consumption expenditure	Percentage, annual change, sats	4.7	4.9	1.8	3.6	7.4	5.3	-0.8	9.8	0.3	.	.
Gross capital formation	Percentage, annual change, sats	12.0	-1.2	-0.2	-3.2	1.5	3.0	-21.1	12.6	16.8	.	.
Gross fixed capital formation	Percentage, annual change, sats	9.2	2.8	-2.9	1.9	1.0	2.2	-24.0	17.3	11.4	.	.
Housing	Percentage, annual change, sats	10.4	9.5	-0.2	-1.9	-0.4	-8.9	-32.7	40.2	4.5	.	.
Other buildings and structures	Percentage, annual change, sats	9.6	10.2	0.0	4.6	-3.5	1.1	-31.6	1.0	0.4	.	.
Machinery and equipment	Percentage, annual change, sats	9.2	-9.3	-7.9	1.4	8.6	12.3	-13.3	24.2	24.5	.	.
Cultivated biological resources	Percentage, annual change, sats	-1.3	2.3	13.1	0.3	-3.1	7.9	-1.8	-0.9	-6.8	.	.
Intellectual property products	Percentage, annual change, sats	5.1	1.3	-12.0	1.2	1.5	-0.7	-10.8	6.4	12.4	.	.
Domestic demand	Percentage, annual change, sats	6.0	2.4	1.2	1.1	3.5	4.0	-7.5	13.4	9.4	.	.
Exports	Percentage, annual change, sats	-0.3	1.7	-0.2	2.6	0.6	3.1	-22.7	15.9	14.8	.	.
Imports	Percentage, annual change, sats	7.8	-1.1	-3.5	1.0	5.8	7.3	-19.9	26.7	22.3	.	.
Product gap [f/]	Porcentaje	1.3	1.0	0.4	-0.6	-0.4	0.3	-7.2	-0.9	2.4	**0.2**	**-1.3**
Short-term indicators												
Real production of manufacturing industry	Percentage, var. annual, seasonally adjusted	1.7	2.2	3.5	0.0	2.9	1.3	-8.1	16.2	10.5	.	.
Retail trade sales, excluding fuels or vehicles	Percentage, var. annual, seasonally adjusted	8.4	6.4	2.0	-0.2	5.5	8.1	-1.6	12.1	9.0	.	.
Coffee production	Percentage, var. annual, cum. for period	11.5	16.8	0.4	-0.3	-4.5	8.8	-5.8	-9.5	-11.9	.	.
Oil production	Percentage, annual var., period average	-1.8	1.5	-11.9	-3.6	1.3	2.4	-11.8	-5.8	2.4	.	.
Labor market [g/]												
Total national												
Unemployment rate	Percentage, annual var., period average	9.4	9.2	9.5	9.7	10.0	10.9	16.7	13.8	11.2	**10.8**	.
Occupancy Rate	Percentage, annual var., period average	61.1	61.3	60.5	60.0	59.1	57.7	50.4	53.1	56.5	.	.
Overall participation rate	Percentage, annual var., period average	67.4	67.5	66.9	66.4	65.7	64.8	60.4	61.5	63.6	.	.
Thirteen cities and metropolitan areas												
Unemployment rate	Percentage, annual var., period average	10.2	10.1	10.3	11.0	11.1	11.5	19.1	15.2	11.4	**11.4**	.
Occupancy Rate	Percentage, annual var., period average	62.8	62.6	61.7	60.5	59.6	58.8	50.8	53.8	58.1	.	.
Overall participation rate	Percentage, annual var., period average	69.9	69.6	68.8	67.9	67.1	66.4	62.7	63.5	65.5	.	.
Balance of payments [h/i/]												
Current account (A + B + C)	Millions of dollars	-19,819	-18,702	-12,587	-9,924	-14,041	-14,810	-9,267	-17,951	-21,252	**-14,738**	**-14,416**
Percentage of GDP	Percentage, nominal terms	-5.2	-6.3	-4.4	-3.2	-4.2	-4.6	-3.4	-5.6	-6.2	**-4.0**	**-3.6**
A. Goods and services	Millions of dollars	-12,332	-19,004	-13,451	-8,762	-10,556	-14,148	-13,105	-20,002	-16,309	**-11,920**	**-12,463**
B. Primary income (factor income)	Millions of dollars	-12,108	-5,450	-5,312	-8,046	-11,442	-9,717	-4,950	-8,723	-17,251	**-15,155**	**-14,334**
C. Secondary income (current transfers)	Millions of dollars	4,622	5,752	6,177	6,883	7,957	9,055	8,788	10,775	12,308	**12,337**	**12,381**
Financial account (A + B + C + D)	Millions of dollars	-19,292	-18,060	-12,339	-9,625	-12,954	-13,298	-8,113	-16,693	-20,630	.	.
Percentage of GDP	Percentage, nominal terms	-5.1	-6.1	-4.4	-3.1	-3.9	-4.1	-3.0	-5.3	-6.0	.	.
A. Foreign investment (ii - i)	Millions of dollars	-12,270	-7,403	-9,341	-10,011	-6,172	-10,836	-5,725	-6,381	-13,467	.	.
i. Foreign Investment in Colombia (FDI)	Millions of dollars	16,169	11,621	13,858	13,701	11,299	13,989	7,459	9,561	16,869	.	.
ii. Colombian abroad	Millions of dollars	3,899	4,218	4,517	3,690	5,126	3,153	1,733	3,181	3,402	.	.
B. Portfolio investment	Millions of dollars	-11.565	-9.091	-4.945	-1.800	862	24	-1.768	-4.595	411	.	.
C. Other investment (loans, other credits, and derivatives)	Millions of dollars	106	-1,981	1,781	1,641	-8,831	-5,820	-4,949	-6,371	-8,145	.	.
D. Reserve assets	Millions of dollars	4,437	415	165	545	1,187	3,333	4,328	654	571	.	.
Errors and omissions (E&O)	Millions of dollars	526	642	247	299	1,087	1,511	1,153	1,258	622	.	.
Interest rates												
Policy interest rate [j/]	Percentage, period average	3.88	4.67	7.10	6.10	4.35	4.25	2.87	1.91	7.20	.	.
Policy rate expected by analysts [k/]	Percentage, period average										**12.92**	**9.64**
IBR* overnight	Percentage, period average	3.8	4.7	7.1	6.1	4.3	4.3	2.9	1.9	7.2	.	.
Commercial interest rate [l/]	Percentage, period average	8.7	9.4	12.8	11.1	9.3	8.8	7.4	6.2	13.3	.	.
Consumer interest rate [m/]	Percentage, period average	17.3	17.2	19.2	19.4	17.9	16.5	15.0	14.3	21.1	.	.
Mortgage interest rate [n/]	Percentage, period average	11.1	11.0	12.4	11.6	10.6	10.4	10.1	9.1	12.9	.	.

Note: values in bold are forecasts or assumptions.
sats: seasonally adjusted time series, modified to eliminate the effect of seasonal and calendar influences.
a/ Quarterly data in bold are assumptions based on the annual forecast of each variable.
b/ Calculated with the main trading partners (excluding Venezuela) weighted by their share of trade.
c/ Calculations by *Banco de la República*; excluding the CPI item weight for food and non-alcoholic beverages. Consult González, E.; Hernández, R.; Caicedo, E.; Martínez-Cortés, N.; Grajales, A.; Romero, J. (2020). "Nueva clasificación del Banrep de la canasta del IPC y revisión de las medidas de inflación básica en Colombia", *Borradores de Economía*, No. 122, *Banco de la República*, available at: https://investiga.banrep.gov.co/es/be-1122.
d/ Calculations by *Banco de la República*; equal to the CPI item weight of Food and non-alcoholic beverages produced by DANE (does not include the subclasses corresponding to meals outside the home). See González, E.; Hernández, R. et al, Ibid.
e/ Calculations by *Banco de la República*. See González, E.; Hernández, R. et al, Ibid.
f/ The historical gap estimate is calculated based on the difference between observed GDP (cumulative 4 quarters) and potential GDP (trend; cumulative 4 quarters) resulting from the 4GM model; in the forecast it is calculated from the difference between the technical staff's estimate of GDP (cumulative 4 quarters) and potential GDP (trend; cumulative 4 quarters) resulting from the 4GM model.
g/ Rates are calculated based on seasonally adjusted annual populations.
h/ The results presented follow the recommendations of the sixth edition of the Balance of Payments and International Investment Position Manual (BPM6). See additional information and method changes at http://www.banrep.gov.co/ balance-payments.
i/ Results for 2021 and 2022 are preliminary.
j/ Corresponds to the average annual monetary policy interest rate calculated with the working days of the series.
k/ These projections are calculated as the average of the interest rate that would be in effect in each year according to the median of the monthly responses to the Monthly Survey of Economic Analyst Expectations (EME) conducted by *Banco de la República* in July 2023.
l/ Weighted average of interest rates on ordinary, treasury and preferential loans.
m/ Does not include loans granted through credit cards.
n/ Corresponds to the weighted average of interest rate of the disbursements in COP and UVR (real value unit for its Spanish acronym) for the acquisition of NON-VIS housing (housing that is not social interest housing).

Annex 2 (continuation)
Main macroeconomic forecasting variables

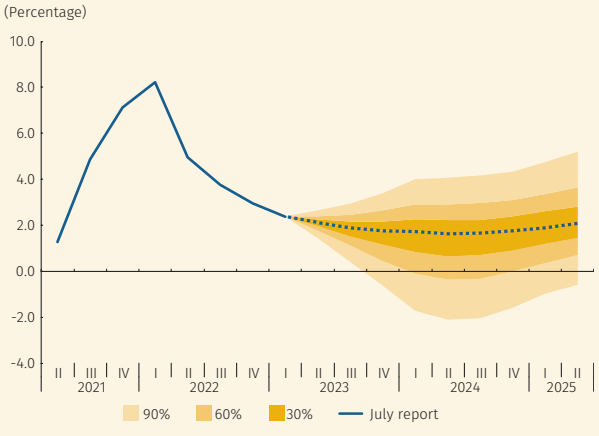
		2018				2019			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Exogenous variables									
External [a/]									
GDP of trading partners [b/]	Percentage, annual var., seasonally adjusted	2.1	3.4	1.1	1.0	0.7	3.3	1.5	-1.7
Oil price (Brent benchmark)	Dollars per barrel, average of the period	67	75	76	69	64	68	62	62
Federal funds effective rate (Fed)	Percentage, average for the period	1.45	1.74	1.92	2.22	2.40	2.40	2.20	1.65
5-year Credit Default Swap for Colombia	Basis points, average for the period	99	113	110	132	121	104	90	83
Internal									
Neutral real interest rate for Colombia	Percentage, average for the period								
Potential GDP for Colombia (trend)	Percentage, annual change								
Endogenous variables									
Prices									
Total CPI	Percentage, annual change, end of period	3.14	3.20	3.23	3.18	3.21	3.43	3.82	3.80
CPI excluding food [c/]	Percentage, annual change, end of period	3.97	3.73	3.67	3.51	3.27	3.22	3.37	3.45
CPI for goods (excluding food and regulated items)	Percentage, annual change, end of period	1.67	1.39	1.39	1.40	1.09	1.60	1.83	2.18
CPI for services (excluding food and regulated items)	Percentage, annual change, end of period	4.09	3.79	3.60	3.13	3.01	3.10	3.37	3.45
CPI excluding food	Percentage, annual change, end of period	6.28	6.21	6.35	6.65	6.33	5.24	5.03	4.81
CPI for food [d/]	Percentage, annual change, end of period	-0.06	1.11	1.47	1.87	3.24	4.96	6.49	5.80
CPI for perishable food	Percentage, annual change, end of period	7.13	8.47	9.51	8.88	9.98	15.46	17.50	8.66
CPI for processed food	Percentage, annual change, end of period	-2.01	-0.91	-0.72	-0.08	1.43	2.18	3.57	5.04
Core inflation indicators [e/]									
CPI excluding food	Percentage, annual change, end of period	3.97	3.73	3.67	3.51	3.27	3.22	3.37	3.45
Core CPI 15	Percentage, annual change, end of period	3.45	3.24	3.19	3.22	3.24	3.34	3.66	3.78
CPI excluding food and regulated items	Percentage, annual change, end of period	3.28	2.99	2.87	2.57	2.41	2.65	2.92	3.10
Average of all core inflation indicators	Percentage, annual change, end of period	3.57	3.32	3.24	3.10	2.97	3.07	3.32	3.44
Representative market exchange rate (TMR)	Pesos per dollar, average for the period	2,860	2,839	2,961	3,160	3,135	3,242	3,337	3,413
Real exchange rate Inflationary gap	Percentage, average for the period	-3.3	-3.8	-0.4	4.5	2.3	3.2	4.0	4.8
Economic activity									
Gross domestic product (sats)*	Percentage, annual change, sats	2.2	2.2	2.8	3.0	3.2	3.4	3.0	3.1
Final consumption expense	Percentage, annual change, sats	3.8	4.0	3.9	4.1	3.4	4.1	4.5	5.2
Household final consumption expenditure	Percentage, annual change, sats	3.4	3.4	3.1	3.0	3.0	3.5	4.3	5.4
General government final consumption expenditure	Percentage, annual change, sats	6.4	7.0	7.8	8.2	6.3	5.6	4.8	4.4
Formación bruta de capital	Percentage, annual change, sats	-6.5	1.0	0.4	12.0	8.7	3.4	5.1	-4.8
Gross capital formation	Percentage, annual change, sats	-1.5	2.5	1.4	1.8	7.7	4.1	1.9	-4.3
Housing	Percentage, annual change, sats	-9.1	0.0	5.8	3.0	-6.4	-8.0	-8.2	-12.9
Other buildings and structures	Percentage, annual change, sats	-6.6	-1.3	-4.8	-1.4	12.8	-1.0	0.6	-6.4
Machinery and equipment	Percentage, annual change, sats	11.6	13.6	6.9	3.4	14.9	21.8	10.1	2.6
Cultivated biological resources	Percentage, annual change, sats	-10.8	-6.6	3.6	2.2	5.6	9.8	14.7	1.8
Intellectual property products	Percentage, annual change, sats	2.2	2.5	1.0	0.5	-1.0	-1.0	-0.9	0.2
Domestic demand	Percentage, annual change, sats	1.6	3.6	3.7	5.0	4.5	3.9	4.7	3.0
Exports	Percentage, annual change, sats	0.4	-2.3	1.5	2.9	4.9	9.2	1.8	-3.2
Imports	Percentage, annual change, sats	-1.6	4.7	5.2	15.2	11.7	8.8	10.8	-1.0
Product gap [f/]	Percentage	-0.6	-0.6	-0.5	-0.4	-0.2	0.1	0.2	0.3
Short-term indicators									
Real production of manufacturing industry	Percentage, var. annual, seasonally adjusted	2.5	2.7	3.7	2.8	1.1	2.5	0.7	0.9
Retail trade sales, excluding fuels or vehicles	Percentage, var. annual, seasonally adjusted	4.6	6.3	4.8	6.1	6.4	7.2	9.5	9.2
Coffee production	Percentage, var. annual, cum. for period	-5.8	13.1	-13.8	-6.6	-1.9	6.6	4.9	24.1
Oil production	Percentage, annual var., period average	0.4	1.0	1.1	2.6	5.4	3.2	1.4	-0.2
Labor market [g/]									
Total national									
Unemployment rate	Percentage, annual var., period average	9.7	9.9	9.7	10.5	10.8	10.6	11.1	11.0
Occupancy Rate	Percentage, annual var., period average	59.2	59.4	59.5	58.4	58.3	57.7	57.3	57.5
Overall participation rate	Percentage, annual var., period average	65.6	65.9	65.9	65.2	65.4	64.6	64.4	64.6
Thirteen cities and metropolitan areas									
Unemployment rate	Percentage, annual var., period average	11.1	11.0	10.8	11.5	11.8	11.4	11.3	11.6
Occupancy Rate	Percentage, annual var., period average	59.6	59.9	60.0	58.9	58.7	58.8	58.7	58.7
Overall participation rate	Percentage, annual var., period average	67.1	67.3	67.3	66.6	66.6	66.4	66.3	66.5
Balance of payments [h/i/]									
Current account (A + B + C)	Millions of dollars	-3,023	-3,471	-3,406	-4,141	-3,821	-3,219	-4,303	-3,467
Percentage of GDP	Percentage, nominal terms	-3.7	-4.2	-4.0	-5.0	-4.8	-4.1	-5.3	-4.2
A. Goods and services	Millions of dollars	-1,840	-2,557	-2,672	-3,487	-3,138	-2,998	-4,406	-3,607
B. Primary income (factor income)	Millions of dollars	-2,922	-2,784	-2,769	-2,967	-2,616	-2,502	-2,301	-2,298
C. Secondary income (current transfers)	Millions of dollars	1,739	1,870	2,035	2,313	1,932	2,281	2,404	2,438
Financial account (A + B + C + D)	Millions of dollars	-2,876	-2,719	-3,487	-3,872	-3,520	-3,333	-3,740	-2,706
Percentage of GDP	Percentage, nominal terms	-3.5	-3.3	-4.1	-4.7	-4.4	-4.2	-4.6	-3.3
A. Foreign investment (ii - i)	Millions of dollars	-910	-2,273	-2,375	-615	-2,652	-3,626	-1,678	-2,880
i. Foreign Investment in Colombia (FDI)	Millions of dollars	1,982	3,773	2,704	2,839	3,394	4,090	3,163	3,342
ii. Colombian abroad	Millions of dollars	1,072	1,500	330	2,224	741	465	1,485	462
B. Portfolio investment	Millions of dollars	1,715	350	482	-1,684	-1,382	-282	137	1,551
C. Other investment (loans, other credits and derivatives)	Millions of dollars	-3,817	-945	-1,763	-2,305	-1,836	48	-2,453	-1,579
D. Reserve assets	Millions of dollars	137	150	169	732	2.351	526	254	202
Errors and omissions (E&O)	Millions of dollars	146	752	-81	270	302	-114	563	761
Interest rates									
Policy interest rate [j/]	Percentage, period average	4.58	4.33	4.25	4.25	4.25	4.25	4.25	4.25
Policy rate expected by analysts [k/]	Percentage, period average								
IBR* overnight	Percentage, period average	4.6	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Commercial interest rate [l/]	Percentage, period average	9.4	9.4	9.3	9.0	9.1	9.0	8.9	8.5
Consumer interest rate [m/]	Percentage, period average	18.7	17.9	18.0	17.3	18.0	17.2	16.3	15.5
Mortgage interest rate [n/]	Percentage, period average	10.8	10.6	10.5	10.4	10.4	10.5	10.4	10.4

Note: values in bold are forecasts or assumptions.
sats: seasonally adjusted time series, modified to eliminate the effect of seasonal and calendar influences.
a/ Quarterly data in bold are assumptions based on the annual forecast of each variable.
b/ Calculated with the main trading partners (excluding Venezuela) weighted by their share of trade.
c/ Calculations by *Banco de la República*; excluding the CPI item weight for food and non-alcoholic beverages. Consult González, E.; Hernández, R.; Caicedo, E.; Martínez-Cortés, N.; Grajales, A.; Romero, J. (2020). "Nueva clasificación del Banrep de la canasta del IPC y revisión de las medidas de inflación básica en Colombia", *Borradores de Economía*, No. 122, Banco de la República, available at: https://investiga.banrep.gov.co/es/be-1122.
d/ Calculations by *Banco de la República*; equal to the CPI item weight of Food and non-alcoholic beverages produced by DANE (does not include the subclasses corresponding to meals outside the home). See González, E.; Hernández, R. et al, Ibid.
e/ Calculations by *Banco de la República*. See González, E.; Hernández, R. et al, Ibid.
f/ The historical gap estimate is calculated based on the difference between observed GDP (cumulative 4 quarters) and potential GDP (trend; cumulative 4 quarters) resulting from the 4GM model; in the forecast it is calculated from the difference between the technical staff's estimate of GDP (cumulative 4 quarters) and potential GDP (trend; cumulative 4 quarters) resulting from the 4GM model.
g/ Rates are calculated based on seasonally adjusted annual populations.
h/ The results presented follow the recommendations of the sixth edition of the Balance of Payments and International Investment Position Manual (BPM6). See additional information and method changes at http://www.banrep.gov.co/ balance-payments.
i/ Results for 2021, 2022 and 2023 are preliminary.
j/ Corresponds to the quarterly average monetary policy interest rate calculated with the working days of the series.
k/ These projections are calculated as the average of the interest rate that would be in effect in each quarter according to the median of the monthly responses to the Monthly Survey of Economic Analyst Expectations (EME) conducted by *Banco de la República* in July 2023.
l/ Weighted average of interest rates on ordinary, treasury and preferential loans.
m/ Does not include loans granted through credit cards.
n/ Corresponds to the weighted average of interest rate of the disbursements in COP and UVR (real value unit for its Spanish acronym) for the acquisition of NON-VIS housing (housing that is not social interest housing).

2020				2021				2022				2023				2024				2025	
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
-7.2	-43.7	49.3	12.9	5.6	5.7	5.6	4.5	1.0	1.5	3.4	2.2	0.3	**2.4**	**1.8**	**1.5**	**1.2**	**2.1**	**2.3**	**2.2**	**2.5**	**2.5**
51	33	43	45	61	69	73	80	98	112	98	89	82	78	**78**	**78**	**80**	**80**	**80**	**80**	**80**	**80**
1.23	0.06	0.09	0.09	0.08	0.07	0.09	0.08	0.12	0.76	2.20	3.65	4.52	4.99	**5.31**	**5.54**	**5.60**	**5.33**	**5.09**	**4.84**	**4.60**	**4.33**
125	206	132	104	110	131	143	185	209	238	275	314	283	275	**254**	**252**	**250**	**247**	**244**	**241**	**239**	**236**
3.86	2.19	1.97	1.61	1.51	3.63	4.51	5.62	8.53	9.67	11.44	13.12	13.34	12.13	**10.57**	**8.96**	**7.02**	**5.92**	**4.74**	**3.53**	**2.98**	**2.81**
3.26	1.40	1.57	1.03	1.06	2.70	3.03	3.44	5.31	6.84	8.33	9.99	11.42	11.62	.	.	.	.	.	.	.	.
2.41	0.73	1.15	0.63	1.05	2.57	2.97	3.31	6.41	8.30	11.57	15.04	15.08	14.26	.	.	.	.	.	.	.	.
3.22	2.00	1.86	1.29	0.89	1.61	2.01	2.18	3.79	5.21	5.93	7.41	8.73	9.04	.	.	.	.	.	.	.	.
4.27	0.44	1.19	0.73	1.52	5.93	5.94	7.10	8.32	9.80	11.46	11.77	14.72	15.64	**16.58**	**18.05**	**15.26**	**12.29**	**8.86**	**5.21**	**3.69**	**3.08**
7.19	6.55	4.13	4.80	3.92	8.52	12.40	17.23	25.37	23.65	26.62	27.81	21.81	14.31	**9.14**	**4.33**	**2.40**	**3.40**	**1.95**	**0.75**	**0.38**	**0.42**
9.79	2.52	-3.42	2.49	1.58	8.69	14.82	24.42	41.87	31.21	35.50	36.44	19.66	10.06	.	.	.	.	.	.	.	.
6.46	7.75	6.40	5.43	4.60	8.47	11.74	15.32	20.69	21.50	24.14	25.33	22.53	15.62	.	.	.	.	.	.	.	.
3.26	1.40	1.57	1.03	1.06	2.70	3.03	3.44	5.31	6.84	8.33	9.99	11.42	11.62	.	.	.	.	.	.	.	.
3.64	2.17	2.33	1.88	1.67	3.36	3.79	4.42	6.93	8.41	10.04	11.55	12.41	11.62	.	.	.	.	.	.	.	.
2.99	1.65	1.67	1.11	0.94	1.87	2.28	2.49	4.51	6.06	7.49	9.51	10.51	10.51	**9.34**	**7.91**	**6.20**	**4.95**	**4.35**	**3.74**	**3.39**	**3.28**
3.30	1.74	1.86	1.34	1.22	2.64	3.03	3.45	5.58	7.10	8.62	10.35	11.45	11.25	.	.	.	.	.	.	.	.
3,532	3,850	3,731	3,661	3,556	3,696	3,847	3,880	3,913	3,916	4,382	4,805	4,759	4,425	.	.	.	.	.	.	.	.
5.1	10.7	5.7	2.6	-0.6	2.6	4.2	3.8	2.8	1.2	7.8	14.3	11.1	2.5	**-3.0**	**-2.8**	**-2.8**	**-2.5**	**-2.1**	**-1.2**	**-0.6**	**-0.5**
0.0	-16.7	-9.1	-3.2	2.5	18.7	13.3	11.0	8.1	12.1	7.2	2.2	3.0	**0.7**	**0.2**	**-0.3**	**-1.6**	**0.6**	**1.9**	**3.1**	**3.7**	**3.5**
3.9	-14.0	-7.3	1.0	3.2	23.3	18.1	11.8	10.1	13.5	6.8	1.6	2.4	**-1.4**	.	.	.	.	.	.	.	.
4.7	-16.9	-8.4	1.1	3.1	25.7	19.2	12.8	11.1	14.9	9.0	3.9	3.0	**0.8**	.	.	.	.	.	.	.	.
-0.1	-1.8	-2.0	0.9	7.6	11.4	12.8	7.6	5.5	6.0	-3.6	-6.3	0.0	**-3.4**	.	.	.	.	.	.	.	.
-11.1	-31.1	-18.7	-23.7	-2.8	29.1	8.5	20.5	20.6	10.5	18.2	18.0	-9.6	**-5.1**	.	.	.	.	.	.	.	.
-12.4	-42.6	-25.6	-14.9	3.9	43.6	16.0	14.3	10.0	12.5	14.7	8.5	-1.7	**0.6**	.	.	.	.	.	.	.	.
-25.8	-49.0	-30.1	-24.4	24.9	66.0	32.1	44.8	2.0	5.7	10.2	0.6	11.4	**11.5**	.	.	.	.	.	.	.	.
-11.0	-50.4	-39.3	-24.6	-17.0	31.2	-1.4	4.0	-2.5	4.2	10.9	-8.9	-2.4	**0.4**	.	.	.	.	.	.	.	.
-4.7	-37.6	-9.3	1.2	11.9	57.9	24.7	12.3	28.0	24.2	20.5	25.3	-7.9	**-9.7**	.	.	.	.	.	.	.	.
2.7	1.9	-8.0	-3.3	4.6	0.0	-4.0	-4.5	-11.9	-10.7	-4.7	0.9	1.5	**3.5**	.	.	.	.	.	.	.	.
-1.2	-16.9	-13.1	-11.8	-6.4	10.9	12.8	10.1	14.5	16.9	15.0	3.6	0.6	**-2.9**	.	.	.	.	.	.	.	.
0.6	-18.0	-9.8	-2.9	1.9	24.8	16.6	12.7	12.5	13.1	9.0	3.7	-0.2	**-2.8**	.	.	.	.	.	.	.	.
-7.4	-31.8	-28.6	-22.7	-9.5	15.4	28.0	36.5	19.7	27.7	16.3	-0.9	4.9	**2.7**	.	.	.	.	.	.	.	.
-5.3	-33.3	-25.4	-15.2	-3.7	45.7	39.3	34.3	38.6	25.0	21.5	7.5	-7.4	**-7.7**	.	.	.	.	.	.	.	.
-0.3	-3.9	-6.1	-7.2	-7.0	-4.4	-2.6	-0.9	0.1	1.6	2.6	2.4	2.3	**1.7**	**1.0**	**0.2**	**-0.8**	**-1.3**	**-1.4**	**-1.3**	**-1.1**	**-1.0**
-1.5	-23.5	-7.3	0.0	6.7	27.6	20.1	12.9	11.9	20.9	6.9	3.7	-0.9	.	.	.	.	.	.	.	.	.
6.2	-14.7	-3.2	5.1	4.7	19.2	15.4	10.6	11.5	21.7	5.9	-1.1	-1.7	.	.	.	.	.	.	.	.	.
-13.8	-1.9	-3.6	-4.6	13.3	-24.7	-1.9	-18.8	-16.3	9.7	-18.2	-17.0	-0.7	-14.4	.	.	.	.	.	.	.	.
-2.1	-15.7	-15.4	-14.1	-14.6	-5.1	-0.1	-1.7	-0.1	5.1	1.3	3.6	3.2	.	.	.	.	.	.	.	.	.
11.9	21.1	18.2	15.5	14.7	15.2	12.6	12.6	12.0	11.1	10.8	10.9	10.5	**10.6**	**10.9**	**11.1**	.	.	.	.	.	.
55.6	44.5	49.1	52.6	52.6	52.0	53.6	54.0	55.8	56.7	57.0	56.4	57.1	.	.	.	.	.	.	.	.	.
63.1	56.4	60.0	62.2	61.7	61.3	61.3	61.8	63.5	63.8	63.9	63.3	63.9	.	.	.	.	.	.	.	.	.
12.0	25.1	21.9	17.3	16.8	16.7	14.0	13.1	12.2	11.3	11.1	10.8	11.0	**11.3**	**11.6**	**11.8**	.	.	.	.	.	.
56.8	44.1	49.0	53.4	53.3	53.1	54.4	54.5	57.3	58.0	58.4	58.5	58.5	.	.	.	.	.	.	.	.	.
64.5	58.9	62.7	64.5	64.1	63.8	63.3	62.7	65.3	65.3	65.7	65.6	65.8	.	.	.	.	.	.	.	.	.
-2,295	-1,962	-2,013	-2,997	-3,108	-4,052	-4,834	-5,958	-5,372	-4,885	-6,065	-4,931	-3,422	.	.	.	.	.	.	.	.	.
-3.1	-3.6	-3.0	-4.0	-4.0	-5.5	-6.0	-6.9	-6.2	-5.4	-7.0	-6.1	-4.2	.	.	.	.	.	.	.	.	.
-3,098	-2,651	-3,263	-4,092	-3,691	-5,026	-5,258	-6,028	-4,964	-3,131	-4,429	-3,786	-2,382	.	.	.	.	.	.	.	.	.
-1,369	-1,029	-1,172	-1,380	-1,867	-1,652	-2,339	-2,865	-3,585	-4,584	-4,742	-4,340	-4,137	.	.	.	.	.	.	.	.	.
2,173	1,718	2,422	2,475	2,450	2,627	2,763	2,935	3,177	2,830	3,106	3,195	3,097	.	.	.	.	.	.	.	.	.
-1,735	-1,938	-1,857	-2,584	-2,789	-3,761	-4,504	-5,640	-4,901	-4,943	-5,719	-5,068	-2,827	.	.	.	.	.	.	.	.	.
-2.3	-3.5	-2.8	-3.4	-3.6	-5.1	-5.6	-6.5	-5.7	-5.5	-6.6	-6.3	-3.5	.	.	.	.	.	.	.	.	.
-1,924	-1,725	-258	-1,818	-1,438	-1,013	-2,528	-1,402	-3,544	-3,652	-2,942	-3,329	-3,565	.	.	.	.	.	.	.	.	.
3,175	1,371	844	2,069	2,307	1,997	2,707	2,550	4,832	5,039	3,102	3,896	4,305	.	.	.	.	.	.	.	.	.
1,251	-353	586	251	869	984	179	1,149	1,288	1,387	160	567	740	.	.	.	.	.	.	.	.	.
-168	-3,429	323	1,506	1,319	-6,089	851	-675	1,866	-759	-233	-463	913	.	.	.	.	.	.	.	.	.
528	627	-2,127	-3,976	-2,860	3,167	-2,981	-3,697	-3,349	-606	-2,703	-1,487	-345	.	.	.	.	.	.	.	.	.
-171	2.590	205	1.705	190	174	154	135	127	74	159	210	169	.	.	.	.	.	.	.	.	.
560	25	155	413	319	291	330	318	471	-58	346	-137	595									
4.23	3.26	2.24	1.75	1.75	1.75	1.75	2.40	3.69	5.68	8.56	10.85	12.53	13.17	.	.	.	.	.	.	.	.
														13.25	**12.75**	**11.42**	**10.17**	**9.04**	**7.92**	**7.00**	**6.46**
4.2	3.2	2.2	1.7	1.7	1.7	1.8	2.4	3.7	5.7	8.6	10.9	12.5	13.2	.	.	.	.	.	.	.	.
8.4	8.3	7.0	6.2	6.0	5.7	6.0	6.9	8.6	10.8	14.2	17.8	19.9	18.6	.	.	.	.	.	.	.	.
15.8	15.5	14.8	14.2	14.0	13.7	14.3	14.8	16.7	19.1	22.9	27.2	30.1	28.5	.	.	.	.	.	.	.	.
10.4	10.4	10.2	9.6	9.2	8.9	9.0	9.3	9.9	11.5	13.4	16.4	18.2	18.1	.	.	.	.	.	.	.	.

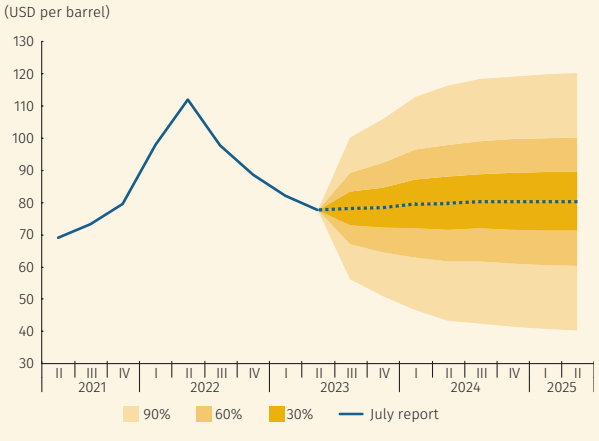
Annex 3
Predictive densities for other relevant macroeconomic forecasting variables

Graph A3.1
Quarterly assumptions of 12-month growth of trading partners based on annual projections, predictive density[a/]



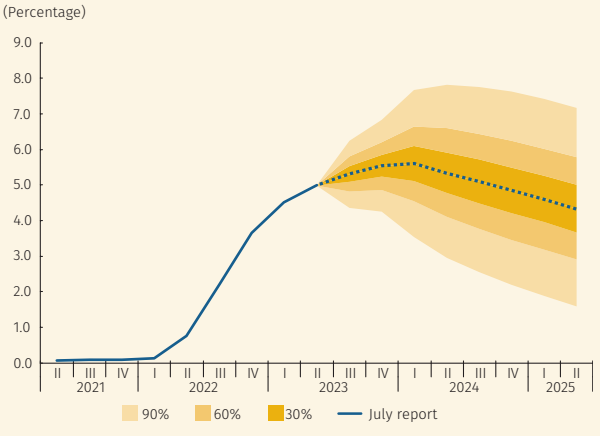
a/ The graph displays the probability distribution and its most likely path on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode).
Sources: Bloomberg, statistics bureaus, central banks; calculations and projections by *Banco de la República*.

Graph A3.2
Quarterly oil price assumption, predictive density [a/]



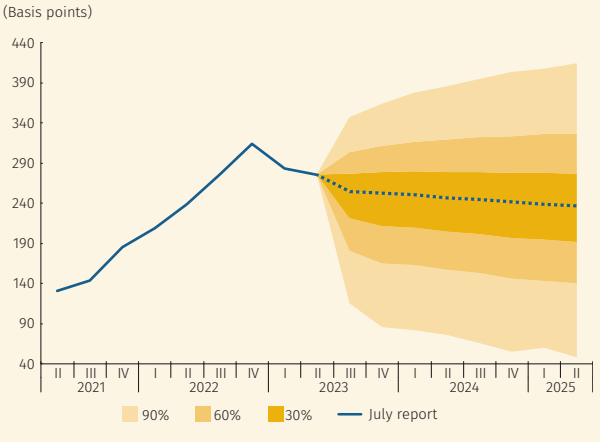
a/ The graph displays the probability distribution and its most likely path on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode).
Source: Bloomberg, calculations and projections by *Banco de la República*.

Graph A3.3
U.S. Federal Reserve quarterly interest rate assumption, predictive density [a/]



a/ The graph displays the probability distribution and its most likely path on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode).
Source: Federal Reserve Bank of St. Louis, calculations and projections by *Banco de la República*.

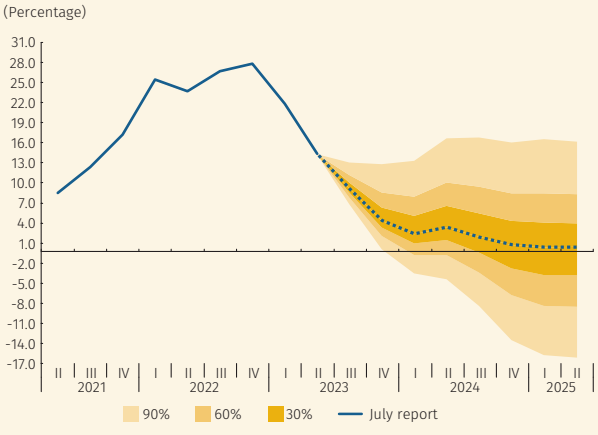
Graph A3.4
Colombia's quarterly risk premium (CDS) assumption, predictive density [a/ b/]



a/ Five-year credit default swaps
b/ The graph displays the probability distribution and its most likely trajectory on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode), using a combination of densities from the Patacon and 4GM models.
Source: Bloomberg, calculations and projections by *Banco de la República*.

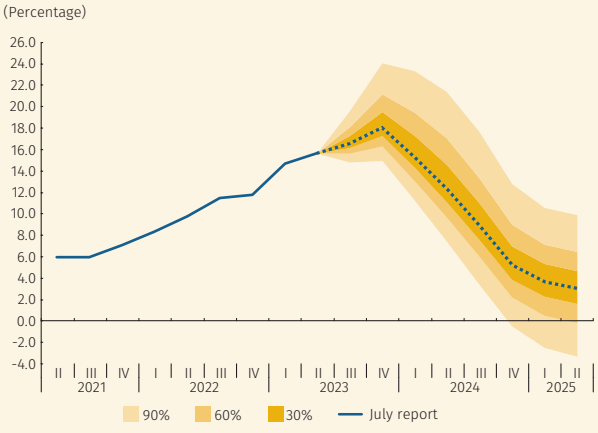
Annex 3 (continuation)
Predictive densities for other relevant macroeconomic forecasting variables

Graph A3.5
CPI for foods, predictive density [a/]
(Annual change, end-of-period)



a/ The graph displays the probability distribution and its most likely trajectory on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode), using a combination of densities from the Patacon and 4GM models.
Sources: Bloomberg, statistics bureaus, central banks; calculations and projections by *Banco de la República*.

Graph A3.6
CPI for regulated items, predictive density [a/]
(Annual change, end-of-period)



a/ The graph displays the probability distribution and its most likely trajectory on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode), using a combination of densities from the Patacon and 4GM models.
Source: calculations and projections by *Banco de la República*.

This Report was coordinated, edited, and designed by the Publishing Management Section of the Administrative Services Department, with font Fira Sans 10.

Printed by: *Xpress Estudio Gráfico y Digital S.A.S.*
August 2023