
MONETARY POLICY REPORT

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MONETARY **POLICY REPORT**

* Presented by the technical staff
to the Board of Directors for its
meeting on 28 January 2021. .

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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 policy¹. In order to fulfill this mandate, the *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 the BDBR uses 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 inflation², 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 following business day. Additionally, the Monetary Policy Report (MPR)⁴, produced by the Central Bank's technical staff, is published in January, April, July, and October, together with the minutes. On the Wednesday of the week following the Board meeting, the Governor clarifies concerns about the minutes, and the Bank's Deputy Technical Governor presents the MPR. This dissemination scheme⁵ 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 Formerly known as the Inflation Report.

5 The current communication scheme was approved by the BDBR in its August 2019 meeting.

Content

01. Summary /9

1.1 Macroeconomic Summary /9

1.2 Monetary Policy Decision /12

02. Macroeconomic Forecasts and Risk Analysis /13

2.1 International Outlook /13

2.2 Macroeconomic Projections /19

2.3 Balance of Risks to the Macroeconomic Forecast /29

03. Current Economic Conditions /33

3.1 Inflation and Price Behavior /33

3.2 Growth and Domestic Demand /37

3.3 Labor Market /40

3.4 Financial and Money Market /42

Box 1: Index of Common Inflation Expectations for Colombia /44

Box 2: Measurement of Inflation Expectations and its Effect on Inflation Dynamics in Colombia /48

Box 3: Recent Dynamics in Colombian Beef Prices /52

Annex 1: Macroeconomic Projections from Local and Foreign Analysts /55

Annex 2: Main Macroeconomic Forecast Variables /56

Annex 3: Predictive Densities for other relevant Variables of the Macroeconomic Outlook /58

Graphs

Graph 1.1 Consumer Price Index /9

Graph 1.2 CPI excluding foods and regulated items /9

Graph 1.3 Gross domestic product, four-quarter accumulation /10

Graph 1.4 Output gap /10

Graph 1.5 Monetary policy interest rate, interbank rate and BBI /12

Graph 2.1 Real quarterly GDP among trade partners /13

Graph 2.2 Quarantine and social distancing index /14

Graph 2.3 Index of global supply chain pressures /14

Graph 2.4 Regional Peer Economic Activity and Selected Export Commodity Prices /15

Graph 2.5 Assumed quarterly oil price /16

Graph 2.6 Colombia's terms of trade index, foreign trade methodology /16

Graph 2.7 Assumed U.S. Federal Reserve Quarterly Interest Rate /17

Graph 2.8 U.S. treasury bonds and capital flows to emerging markets /18

Graph 2.9 Colombia's assumed quarterly risk premium (CDS) /18

Graph 2.10 Nominal exchange rate behavior and risk premiums for selected Latin American /19

Graph 2.11 Quarterly RER inflationary gap /19

Graph 2.12 Consumer Price Index (CPI) /20

Graph 2.13 CPI excluding food and regulated items /20

Graph 2.14 CPI for foods /21

Graph 2.15 CPI for regulated items /22

Graph 2.16 Bank and stockbroker inflation forecast /22

Graph 2.17 Total ISE and by sector /23

Graph 2.18 Quarterly GDP /23

Graph 2.19 Total goods exports (FOB) /24

Graph 2.20 Total goods imports (CIF) /24

Graph 2.21 GDP, four-quarter accumulation /25

Graph 2.22 Output gap /27

Graph 2.23 Annual current account /27

Graph 2.24 Average observed quarterly interest rate and rate expected by analysts /29

Graph 2.25 Consumer price index, predictive density /31

Graph 2.26 CPI excluding food and regulated items, predictive density /31

Graph 2.27 GDP, four-quarter accumulation, predictive density /32

Graph 2.28 Output gap, predictive density /32

Graph 3.1 CPI and core inflation indicators /33

Graph 3.2 CPI for goods and services, excluding food and regulated items /34

Graph 3.3 CPI for services excluding food and regulated items, and its components /35

Graph 3.4 CPI for regulated items and its components /35

Graph 3.5 CPI for foods by group and its components /36

Graph 3.6 PPI by origin /37

Graph 3.7 Quarterly gross domestic product /37

Graph 3.8 Gross domestic product and quarterly domestic demand /38

Graph 3.9 Final household and general government spending /38

Graph 3.10 Quarterly gross fixed capital formation /38

Graph 3.11 Exports, imports, and trade balance /39

Graph 3.12 Sector-level value added in Q3 2021 relative to Q4 2019 /39

Graph 3.13 Employment /40

Graph 3.14 Jobs by type of employment /40

Graph 3.15 Unemployment rate by location /41

Graph 3.16 Beveridge curve for seven largest cities /41

Graph 3.17 Real credit interest rates /42

Graph 3.18 Gross national currency portfolio /43

Graph 3.19 Credit establishment earnings /43

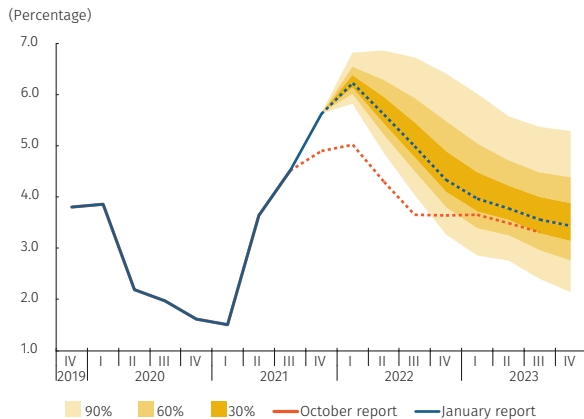
Tables

Chart 2.1 Economic growth among major trade partners /13

Chart 3.1 Average monthly interest rates /42

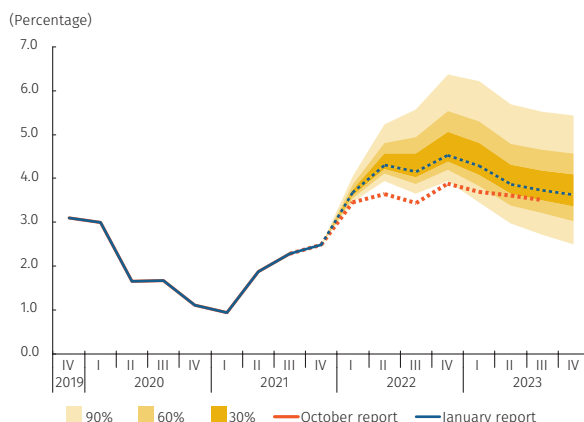
01 / Summary

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 4GM monetary policy models.
b/ The probability distribution corresponds to the forecast exercise from the January report
Source: DANE; calculations and projections by Banco de la República

Graph 1.2
CPI excluding foods and regulated items ^{a/, b/}
(annual change, end of period)

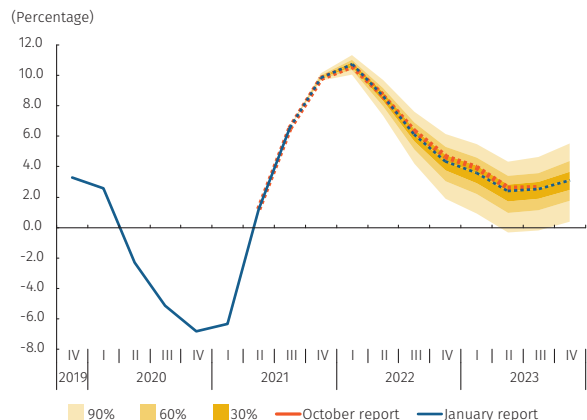


a/ This graph presents the forecast probability distribution on an eight-quarter time horizon. Density characterizes the prospective balance of risks with areas of 30%, 60%, and 90% probability surrounding the central forecast (mode), through a combination of densities from the Patacon and 4GM monetary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

1.1 Macroeconomic Summary

Several factors contributed to an increase in projected inflation on the forecast horizon, keeping it above the target rate (Graph 1.1). These included inflation in December that surpassed expectations (5.62%), indexation to higher inflation rates for various baskets in the consumer price index (CPI), a significant real increase in the legal minimum wage, persistent external and domestic inflationary supply shocks, and heightened exchange rate pressures. The CPI for foods was affected by the persistence of external and domestic supply shocks and was the most significant contributor to unexpectedly high inflation in the fourth quarter. Price adjustments for fuels and certain utilities can explain the acceleration in inflation for regulated items, which was more significant than anticipated. Prices in the CPI for goods excluding food and regulated items also rose more than expected. This was partly due to a smaller effect on prices from the national government’s VAT-free day than anticipated by the technical staff and more persistent external pressures, including via peso depreciation. By contrast, the CPI for services excluding food and regulated items accelerated less than expected, partly reflecting strong competition in the communications sector. This was the only major CPI basket for which prices increased below the target inflation rate. The technical staff revised its inflation forecast upward in response to certain external shocks (prices, costs, and depreciation) and domestic shocks (e.g., on meat products) that were stronger and more persistent than anticipated in the previous report. Observed inflation and a real increase in the legal minimum wage also exceeded expectations, which would boost inflation by affecting price indexation, labor costs, and inflation expectations. The technical staff now expects year-end headline inflation of 4.3% in 2022 and 3.4% in 2023; core inflation is projected to be 4.5% and 3.6%, respectively (Graph 1.2). These forecasts consider the lapse of certain price relief measures associated with the COVID-19 health emergency, which would contribute to temporarily keeping inflation above the target on the forecast horizon. It is important to note that these estimates continue to contain a significant degree of uncertainty, mainly related to the development of external and domestic supply shocks and their ultimate effects on prices. Other contributing factors include high price volatility and measurement uncertainty related to the extension of Colombia’s health emergency and tax relief measures (such as the VAT-free days) associated with the Social Investment Law (Ley de Inversión Social). The as-yet uncertain magnitude of the effects of a recent

Graph 1.3
Gross domestic product, four-quarter accumulation^{a/, b/, c/}
(annual change)

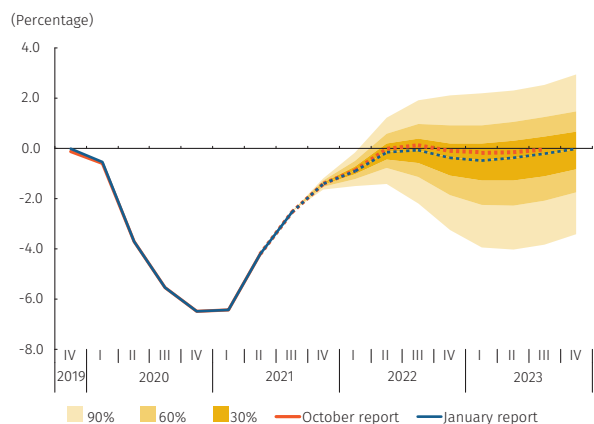


a/ This graph presents the forecast probability distribution on an eight-quarter time horizon. Density characterizes the prospective balance of risks with areas of 30%, 60%, and 90% probability surrounding the central forecast (mode), through a combination of densities from the Patacon and 4GM monetary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

real increase in the legal minimum wage (that was high by historical standards) and high observed and expected inflation, are additional factors weighing on the overall uncertainty of the estimates in this report. The size of excess productive capacity remaining in the economy and the degree to which it is closing are also uncertain, as the evolution of the pandemic continues to represent a significant forecast risk.

The technical staff revised its GDP growth projection for 2022 from 4.7% to 4.3% (Graph 1.3). This revision accounts for the likelihood that a larger portion of the recent positive dynamic in private consumption would be transitory than previously expected. This estimate also contemplates less dynamic investment behavior than forecast in the previous report amid less favorable financial conditions and a highly uncertain investment environment. Third-quarter GDP growth (12.9%), which was similar to projections from the October report, and the fourth-quarter growth forecast (8.7%) reflect a positive consumption trend, which has been revised upward. This dynamic has been driven by both public and private spending. Investment growth, meanwhile, has been weaker than forecast. Available fourth-quarter data suggest that consumption spending for the period would have exceeded estimates from October, thanks to three consecutive months that included VAT-free days, a relatively low COVID-19 caseload, and mobility indicators similar to their pre-pandemic levels. By contrast, the most recently available figures on new housing developments and machinery and equipment imports suggest that investment, while continuing to rise, is growing at a slower rate than anticipated in the previous report. The trade deficit is expected to have widened, as imports would have grown at a high level and outpaced exports. Given the above, the technical staff now expects fourth-quarter economic growth of 8.7%, with overall growth for 2021 of 9.9%. Several factors should continue to contribute to output recovery in 2022, though some of these may be less significant than previously forecast. International financial conditions are expected to be less favorable, though external demand should continue to recover and terms of trade continue to increase amid higher projected oil prices. Lower unemployment rates and subsequent positive effects on household income, despite increased inflation, would also boost output recovery, as would progress in the national vaccination campaign. The technical staff expects that the conditions that have favored recent high levels of consumption would be, in large part, transitory. Consumption spending is expected to grow at a slower rate in 2022. Gross fixed capital formation (GFCF) would continue to recover, approaching its pre-pandemic level, though at a slower rate than anticipated in the previous report. This would be due to lower observed GFCF levels and the potential impact of political and fiscal uncertainty.

Graph 1.4
Output gap^{a/, b/, c/}
(four-quarter accumulation)

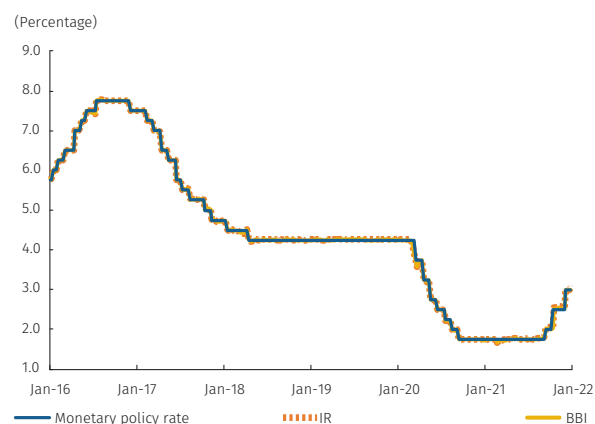


a/ The historical output gap estimate is calculated as the difference between observed GDP (four-quarter accumulation) and potential GDP (trend; four-quarter accumulation) based on the 4GM model. The forecast is calculated as the difference between the technical staff's GDP estimate (four-quarter accumulation) and potential GDP (trend; four-quarter accumulation) from 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 4GM monetary policy models.
c/ The probability distribution corresponds to the forecast exercise from the January report
Source: DANE; calculations and projections by Banco de la República.

Meanwhile, the policy interest rate would be less expansionary as the process of monetary policy normalization continues. Given the above, growth in 2022 is forecast to decelerate to 4.3% (previously 4.7%). In 2023, that figure (3.1%) is projected to converge to levels closer to the potential growth rate. In this case, excess productive capacity would be expected to tighten at a similar rate as projected in the previous report (Graph 1.4). The trade deficit would tighten more than previously projected on the forecast horizon, due to expectations of an improved export dynamic and moderation in imports. The growth forecast for 2022 considers a low basis of comparison from the first half of 2021. However, there remain significant downside risks to this forecast. The current projection does not, for example, account for any additional effects on economic activity resulting from further waves of COVID-19. High private consumption levels, which have already surpassed pre-pandemic levels by a large margin, could be less dynamic than expected. And the normalization of monetary policy in the United States could come more quickly than projected in this report, which could negatively affect international financing costs. Finally, there remains a significant degree of uncertainty related to the duration of supply shocks and the degree to which macroeconomic and political conditions could negatively affect the recovery in investment.

External demand for Colombian goods and services should continue to recover amid significant global inflation pressures, high oil prices, and less favorable international financial conditions than those estimated in October. Economic activity among Colombia's major trade partners recovered in 2021 amid countries reopening and ample international liquidity. However, that growth has been somewhat restricted by global supply chain disruptions and new outbreaks of COVID-19. The technical staff has revised its growth forecast for Colombia's main trade partners from 6.3% to 6.9% for 2021, and from 3.4% to 3.3% for 2022; trade partner economies are expected to grow 2.6% in 2023. Colombia's annual terms of trade increased in 2021, largely on higher oil, coffee, and coal prices. This improvement came despite increased prices for goods and services imports. The expected oil price trajectory has been revised upward, partly to supply restrictions and lagging investment in the sector that would offset reduced growth forecasts in some major economies. Elevated freight and raw materials costs and supply chain disruptions continue to affect global goods production, and have led to increases in global prices. Coupled with the recovery in global demand, this has put upward pressure on external inflation. Several emerging market economies have continued to normalize monetary policy in this context. Meanwhile, in the United States, the Federal Reserve has anticipated an end to its asset buying program. U.S. inflation in December (7.0%) was again surprisingly high and market average inflation forecasts for 2022 have increased. The Fed is expected to increase its policy rate during the first quarter of 2022, with quarterly increases anticipated over the rest of the year. For its part, Colombia's sovereign risk premium has increased and is forecast to remain on a higher path, to levels above the 15-year-average, on the forecast horizon. This would be partly due to the effects of a less expansionary monetary policy in the United States and the accumulation of macroeconomic imbalances in Colombia. Given the above, international financial conditions are projected to be less favorable than anticipated in the October report. The increase in Colombia's external financing costs could be more significant if upward pressures on inflation in the United States persist and monetary policy is normalized more quickly than contemplated in this report. As detailed in Section 2.3, uncertainty surrounding international financial conditions continues to be unusually high. Along with other considerations, recent concerns over the potential

Graph 1.5
Monetary policy interest rate, interbank rate and BBI a/
(weekly data)



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

effects of new COVID-19 variants, the persistence of global supply chain disruptions, energy crises in certain countries, growing geopolitical tensions, and a more significant deceleration in China are all factors underlying this uncertainty.

The changing macroeconomic environment toward greater inflation and unanchoring risks on inflation expectations imply a reduction in the space available for monetary policy stimulus. Recovery in domestic demand and a reduction in excess productive capacity have come in line with the technical staff's expectations from the October report. Some upside risks to inflation have materialized, while medium-term inflation expectations have increased and are above the 3% target. Monetary policy remains expansionary. Significant global inflationary pressures and the unexpected increase in the CPI in December point to more persistent effects from recent supply shocks. Core inflation is trending upward, but remains below the 3% target. Headline and core inflation projections have increased on the forecast horizon and are above the target rate through the end of 2023. Meanwhile, the expected dynamism of domestic demand would be in line with low levels of excess productive capacity. An accumulation of macroeconomic imbalances in Colombia and the increased likelihood of a faster normalization of monetary policy in the United States would put upward pressure on sovereign risk perceptions in a more persistent manner, with implications for the exchange rate and the natural rate of interest. Persistent disruptions to international supply chains, a high real increase in the legal minimum wage, and the indexation of various baskets in the CPI to higher inflation rates could affect price expectations and push inflation above the target more persistently. These factors suggest that the space to maintain monetary stimulus has continued to diminish, though monetary policy remains expansionary.

1.2 Monetary Policy Decision

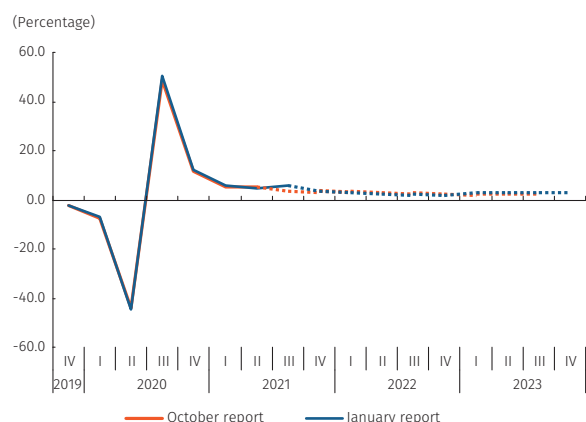
Banco de la República's board of directors (BDBR) in its meetings in December 2021 and January 2022 voted to continue normalizing monetary policy. The BDBR voted by a majority in these two meetings to increase the benchmark interest rate by 50 and 100 basis points, respectively, bringing the policy rate to 4.0% (Graph 1.5).

02/ Macroeconomic Forecasts and Risk Analysis

2.1 International Outlook

2.1.1 Foreign Demand

Graph 2.1
Real quarterly GDP among trade partners
(annualized quarterly change; projections according to full-year assumption)



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

Chart 2.1
Economic growth among major trade partners^{a/}

Trade partners	2020 (pre)	2021 (pre)	2022 (proj)	2023 (proj)
United States	-3.4	5.6	3.8	2.4
Euro zone	-6.5	5.1	4.3	2.6
China	2.3	8.1	4.9	8.2
Ecuador	-7.8	4.1	2.6	2.3
Brazil	-4.1	4.8	1.2	2.1
Peru	-11.0	13.7	3.4	3.2
Mexico	-8.3	5.4	2.9	2.3
Chile	-5.8	11.8	2.3	2.0
All trade partners ^{a/}	-6.7	6.9	3.3	2.6

labels: (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).

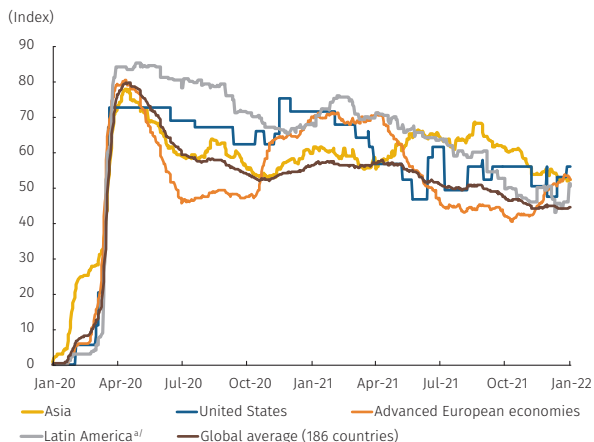
Real GDP growth of trade partners growth appears to have continued to recover in the second half of 2021 (Graph 2.1). This would suggest growth for the year above projections from the previous report. The technical staff expects more moderate average growth among Colombia's trade partners in 2022. Real GDP growth among Colombia's trade partners continued to recover in the third quarter, driven primarily by select countries in Latin American¹ and, to a lesser extent, the United States and the euro zone. Quarterly output declines in Mexico, Brazil, and China partially offset this development. Trade partner's growth appears to have continued its recovery in the fourth quarter, though at a slower rate than in the third. Current forecasts project average trade partner growth in 2021 of 6.9%, up from 6.3% forecast in the previous report (Chart 2.1). GDP of trade partners is expected to grow by 3.3% in 2022, below forecasts from the previous report (3.4%) and figures from 2021. This expected deceleration in 2022 would partly reflect a low basis of annual comparison, the withdrawal of fiscal and monetary stimulus in several countries, the effects of COVID-19, and persistent disruptions to global supply chains. Trade partner GDP is expected to grow by 2.6% in 2023, close to the average over the last two decades.

Recovery in the U.S. and the euro zone has come amid persistent production bottlenecks and outbreaks of COVID-19. Private demand in the U.S. recovered significantly in 2021, contributing to a strong rebound in economic activity² and a reduction in excess productive capacity in annual terms. Growth in the euro zone in 2021 did not make up for an output decline in 2020, and the output gap remained in significantly negative territory. Economic recovery in the U.S. and the euro zone continued in the fourth quarter but was limited by COVID-19 and disruptions to global supply chains, both of which should remain determinants for at least the short term. The spread of more contagious COVID-19 variants has recently led to record case numbers, and many of these economies have

1 Third-quarter performance was unexpectedly positive in Argentina, Chile, Costa Rica, Honduras, Panama, Peru, Uruguay, and the euro zone. Ecuador's GDP series for 2021 through the third quarter was revised upward.

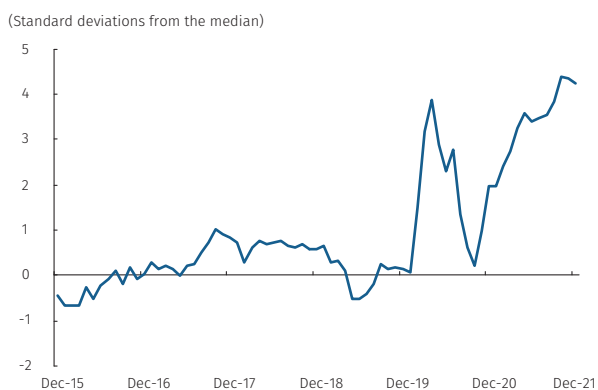
2 At the time of publication, preliminary figures put U.S. GDP growth in 2021 at 5.7%.

Graph 2.2
Quarantine and social distancing index^{a/}



Note: Quarantine and social distancing data until 02 January 2022
 a/Average of Brazil, Mexico, Chile, Colombia, Peru, and Ecuador
 Source: Hale, Thomas, Sam Webster, Anna Petherick, Toby Phillips, and Beatriz Kira (2020). Oxford COVID-19 Government Response Tracker, Blavatnik School of Government. Use Policy: Creative Commons Attribution CC BY standard; calculations by Banco de la República.

Graph 2.3
Index of global supply chain pressures



Note: Authors use international transportation cost indices (Baltic Dry, Harpex, among others) and some components from surveys of business conditions (PMI) for the euro zone, China, Japan, South Korea, Taiwan, the UK and the U.S.
 Source: 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

tightened or maintained significant health restrictions (Graph 2.2). This has affected economic reopening and population mobility. Consumer confidence has declined, and higher recent inflation could affect real household income. Nevertheless, private consumption is expected to continue to recover, driven by a reduction in the unemployment rate and accumulated savings spending. Signs of the negative effects of production bottlenecks and limits on input supply persist despite an increase in industrial production (Graph 2.3). Business conditions in the manufacturing sector weakened in December, suggesting more moderate growth in the short term. Current forecasts suggest that the U.S. and euro zone will continue to recover at a slower pace than in 2021 and below projections from the previous report. This falloff from last year would be due partly to a low basis of comparison, a smaller fiscal impulse, and less expansionary monetary policy, particularly in the United States.

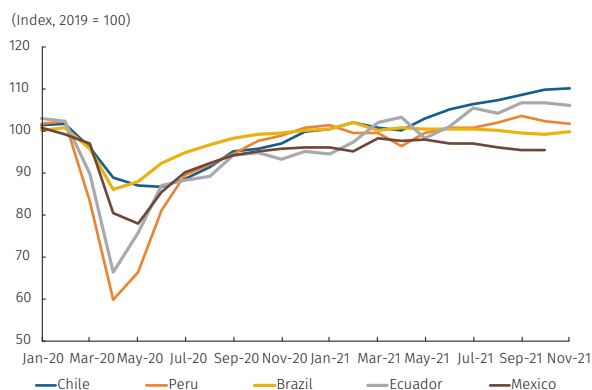
China’s growth outlook has been revised downward from the previous report. Chinese GDP grew in real terms by 4.0% in the fourth quarter of 2021, bringing growth for the year to 8.1%. External sales and industrial production favored economic activity, though this was limited by remaining global supply chain disruptions. Retail sales in December decelerated alongside the implementation of renewed COVID-19 health measures. Consumer confidence weakened in December and the unemployment rate increased, while the stock of new residential housing projects declined in annual terms. Evergrande defaulted and Fitch downgraded the company’s debt rating. In response, and with inflation below the target rate, the People’s Bank of China has taken measures to stimulate the economy³. In light of these conditions, the technical staff has revised its 2022 growth forecast. Economic activity in China is expected to decelerate more significantly than in 2021, partly due to increased COVID-19 cases, strict containment measures, persistent supply shocks, and issues in the real estate sector.

Regional trade partner growth in 2021 outpaced projections from the previous report but varied across countries. The average growth rate for trade partners in the region is expected to moderate in 2022. Third-quarter results were particularly positive in Chile and Peru (Graph 2.4, Panel A), and were driven by recovery in private consumption. Ecuador’s real GDP series was also revised upward. By contrast, third-quarter economic activity in Mexico was affected by an increase in COVID-19 cases and a shock in the industrial sector associated with global supply chain disruptions. The recovery in

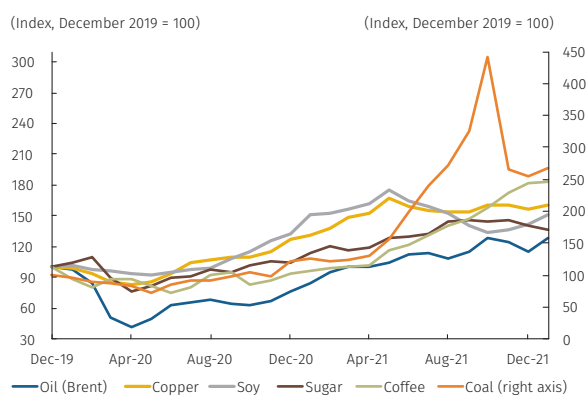
3 The Bank reduced its preferential loan rate to one year by 5 basis points (from 3.85% to 3.8%) in November and in December lowered its reserve requirement by 50 bp (from 12% to 11.5%).

Graph 2.4
Regional Peer Economic Activity and Selected Export Commodity Prices

A: Monthly economic activity indicator



B: Export commodity prices^{a/}



a/ Updated January 20, 2022

Sources: Bloomberg and Datastream; calculations by Banco de la República.

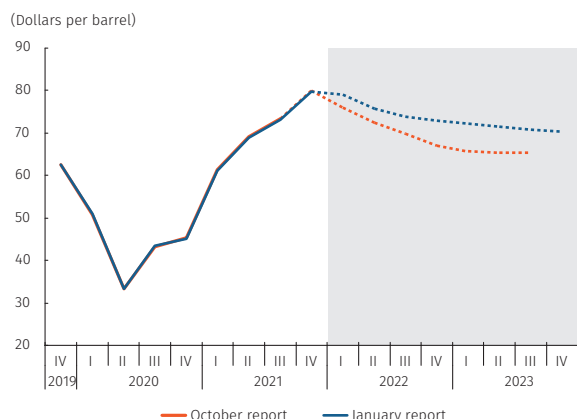
private consumption in Brazil was more than offset by a contraction in exports, particularly in the agricultural sector, leading the country into a technical recession. In general, major Latin American economies saw a reduction in COVID-19 cases and progress in vaccination campaigns in the fourth quarter. This allowed economic reopening to continue, alongside an easing of social distancing measures (Graph 2.2). Population mobility and labor market indicators improved as a result. Meanwhile, commodity export prices remained above pre-pandemic levels (Graph 2.4, Panel B), which should contribute to improvements in national incomes. Given the above, the technical staff revised its growth projections upward for Ecuador⁴, Chile, Peru, and Central America, and downward for Mexico and Brazil. Trade partner recovery in the region is expected to continue, thanks to economic reopening and favorable terms of trade. However, recent increases in COVID-19 cases, reductions in monetary stimulus in response to rising observed and expected inflation, declining consumer confidence, limited fiscal space, increased external financing costs, lower growth in the U.S. and China, and social political tensions in the region could limit growth in these economies. These factors also help explain downward revisions to 2022 growth projections for some trade partners in the region.

2.1.2 International Prices

Projected oil prices have risen over the entire forecast horizon (Graph 2.5). Average oil prices (Brent) in the fourth quarter reached USD 79.70 per barrel (bl). This was close to the projection from the previous report (USD 80/bl). Oil prices were unexpectedly high (USD 83.10/bl) in the year through January 18. High current and projected prices can be explained partly by delays in the recovery of global crude production. The Organization of Petroleum Exporting Countries and its allies (OPEC+) have kept significant production restrictions in place. Despite agreements that would allow for gradual production increases, some members of the bloc may face difficulty reaching these targets. Outside of OPEC+, production and investment in the sector has recovered only moderately, despite rising prices. On the demand side, high prices have been supported by continued global economic recovery and the limited effects on crude demand, to date, from new COVID-19 outbreaks. Concerns over energy supplies in Europe and Asia, due to natural gas shortages, have strengthened the outlook for oil consumption. At year-end 2021, crude inventories in Organization for Economic

⁴ Ecuador revised its GDP series upward for the year through the third quarter, based mainly on private consumption, which was supported by progress in vaccinations, reduced health restrictions, and improvements in population mobility and in the labor market.

Graph 2.5
Assumed quarterly oil price



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

Cooperation and Development (OECD) countries were below pre-pandemic levels. Oil markets are expected to continue to be tight in the short term, supporting high prices and making them more sensitive to geopolitical factors and/or unexpected supply disruptions. The market should loosen as global crude supply further recovers. Alongside the weaker growth outlook for major hydrocarbons consumers (China and the U.S.), a looser market would contribute to a gradual decline in international oil prices. The technical staff now projects average oil prices in 2022 of USD 75.3/bl and in 2023 of USD 71.2/bl (compared to USD 71/bl recorded in 2021).

Colombia’s terms of trade appear to have recovered significantly in annual terms in 2021 and should continue to be supported by high export prices in 2022. Through November 2021, Colombia’s terms of trade grew in annual terms by 19.9%, and by 0.4% compared to the same period in 2019. This development was supported by high export prices, especially for mining, oil, and agricultural products (Graph 2.6). Reduced oil, coal, and coffee production compared to pre-pandemic levels, however, limited the positive effects of higher prices on economic activity. On average, prices for these goods are expected to increase in annual terms in 2022, which would support an annual increase in terms of trade. Nevertheless, high dollar import prices and persistent supply chain disruptions would limit terms of trade recovery, as was the case in 2021.

Graph 2.6
Colombia’s terms of trade index, foreign trade methodology



Sources: Banco de la República.

Annual inflation in the United States and the euro zone rose to historically high levels in 2021. Headline annual inflation in the United States rose to 7.0%⁵ in December, the highest rate since June 1982. Energy (including fuels) and food prices contributed significantly to high annual inflation. Core inflation rose to 5.5% in December in annual terms. The development of headline inflation has come amid significant recovery in goods demand, high international commodity prices, increased labor costs, persistent disruptions to supply chains, and high international merchandise transport costs. Continued economic reopening has allowed for a recovery in some services prices, and pressures on the housing market continued to influence rental prices. Looking ahead, market surveys point to higher headline inflation than previously anticipated, suggesting that current inflation levels would prove to be more persistent than expected, converging above 2% at the end of 2022 and 2023. These expectations take into account a positive output gap on part of the forecast horizon. Some measures of expected inflation in the longer term are above 2.0%⁶. Core inflation

5 A 0.5% monthly increase in December compared to 0.8% for November.

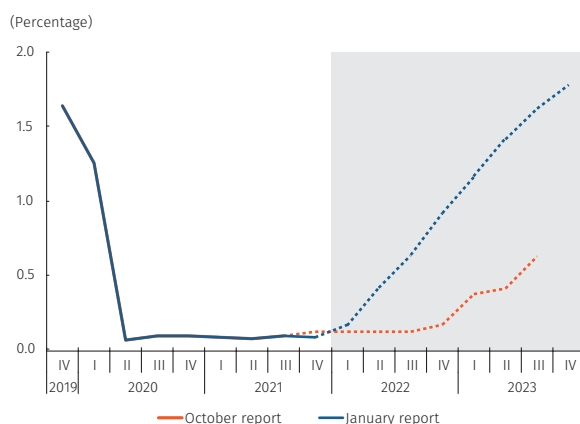
6 Break even inflation rates at 5 and 10 years, consulted on January 14, 2022, were 2.8% and 2.4%, respectively. Forward inflation expectations at five years were 2.1%.

in the euro zone was 2.6% in December in annual terms, while headline inflation was 5.0%, the highest level on record for the bloc. Natural gas scarcity, high energy prices, problems in global supply chains, and a low basis of comparison may have contributed to these results. Markets expect inflation below the 2.0% target at the end of 2022, amid persistent excess productive capacity.

2.1.3 International financial developments

U.S. monetary policy is expected to become less expansionary on the forecast horizon (Graph 2.7). In its meeting on December 14-15, the Federal Open Market Committee (FOMC) held the benchmark interest rate between 0.0% and 0.25%, in line with the technical staff's expectations⁷. The Fed also accelerated tapering, a process that should be complete in the first quarter of 2022. According to the meeting minutes, some FOMC members considered that balance sheet reduction (net bond sales) could begin earlier than suggested in previous meetings and that this could be faster than in the previous cycle (which began in 2018 and was suspended in September 2019). These announcements came in the context of inflationary pressures that proved more persistent than previously anticipated, as well as expected inflation above the target, the prospect of continued economic recovery, and a reduction in the employment rate. Median FOMC interest rate projections increased significantly from September, to 0.9% at the end of 2022 and to 1.6% at the end of 2023. Analyst expectations and futures market forecasts have also increased significantly, suggesting a higher interest rate path than projected in the previous report. That said, there remained some expectation dispersion on the pace of possible rate increases. The technical staff expects four Fed policy rate increases in 2022, beginning in March with one additional increase in each of the subsequent three quarters. This would bring the policy rate to between 1.0% and 1.25% at the end of the year. Three additional rate increases are expected for 2023, which would take the U.S. benchmark interest rate to between 1.75% and 2.0% at the end of the forecast horizon. Meanwhile, the European Central Bank (ECB) held interest rates in its December meeting and reduced its rate of net asset purchases under the Pandemic Emergency Purchasing Program (PEPP). The ECB said that net purchases would stop at the end of 2022. It also said it would slow the pace of net monthly purchases under its Asset Purchasing Program, which would start to be drawn down in the second quarter of 2022 and finalize shortly before increases in official interest rates begin.

Graph 2.7
Assumed U.S. Federal Reserve Quarterly Interest Rate

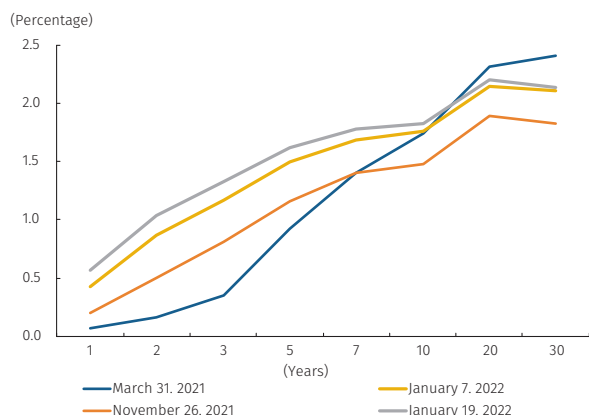


Source: St. Louis Federal Reserve; calculations and projections by Banco de la República.

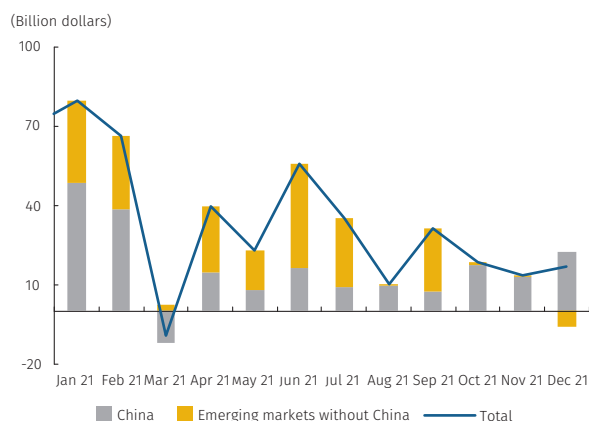
⁷ The FOMC in its meeting on January 26 held the federal funds rate unchanged, in line with the technical staff's forecast.

Graph 2.8
U.S. treasury bonds and capital flows to emerging markets

A: Daily U.S. treasury bond curve

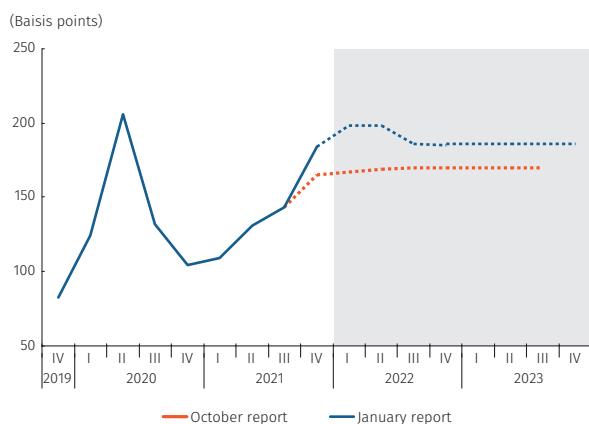


B: Net foreign investment flows to emerging economies^{a/}



a/ Investment flows in stock and debt instruments
Sources: U.S. Department of the Treasury and Institute of International Finance (IIF)

Graph 2.9
Colombia's assumed quarterly risk premium (CDS)^{a/}



a/ Five-year credit default swap
Source: Bloomberg, calculations and projections from Banco de la República.

Colombia's external financial conditions have become less favorable amid increased perceived risk and the expectation of a faster withdrawal of monetary stimulus in the United States. U.S. treasury bond interest rates increased on the entire yield curve on average in the fourth quarter, with more marked increases in the short-term (Graph 2.8, Panel A). This trend continued in the year through January 19, with average 10-year bond rates increasing by 22 basis points (1.75% on average) compared to the average from the fourth quarter. This came amid more persistent inflationary pressures, tapering acceleration, Fed announcements regarding the beginning of balance sheet reduction, and a potential policy rate increase in the first quarter of 2022. According to the Institute of International Finance (IIF) there was a net outflow of portfolio investment directed to emerging markets (excluding China) in the fourth quarter. There was a moderate flow of capital toward equities and away from fixed income instruments (Graph 2.8, Panel B). Several factors may have contributed to this development, including increased perceived risk related to problems in the Chinese real estate market; increased inflation and depreciation of emerging market currencies; the prospect of less expansionary monetary policy in the United States; and the Omicron variant of COVID-19. Foreign exchange market data for Colombia suggests net capital outflows of foreign portfolio investment of USD 1.352 billion in the fourth quarter of 2021. This contrasts with net capital inflows of USD 2.408 billion in the second quarter and US 82 million in the third.

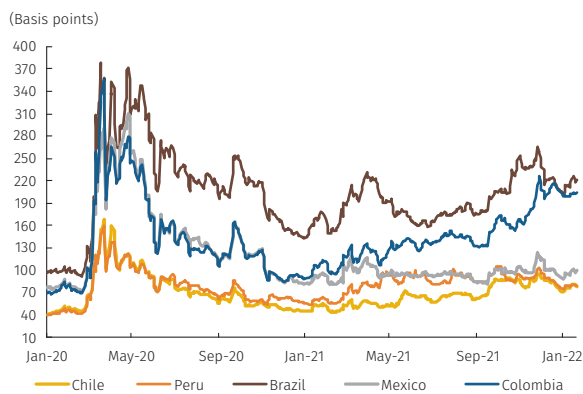
A higher risk premium is expected on the forecast horizon than anticipated in the October report (Graph 2.9). Average quarterly depreciation of the peso was 1.1% in the fourth quarter, and five-year credit default swaps averaged 184 bp (Graph 2.10). This was above figures recorded in the five previous quarters and exceeded the technical staff's estimate from the October report (165 bp). Risk premiums increased in other countries in the region in the fourth quarter and were most significant in Colombia and Brazil. In the year through January 19, credit default swaps averaged 201 bp, above figures from other countries with the same credit rating as Colombia. Several factors may have contributed to Colombia's high-risk premium in recent months, including: uncertainty related to the Omicron variant; the prospect of faster U.S. monetary policy normalization; concerns about the Chinese real estate sector; more persistent global inflation; and, most recently, geopolitical tensions. Some idiosyncratic factors, such as Colombia's fiscal and external imbalances, political uncertainty, and the country's 2021 loss of its investment grade on foreign currency debt, may also have played a role. Given the above, the technical staff now expects a higher risk premium on the forecast horizon, averaging 192 bp in 2022 and 186 bp in 2023.

Graph 2.10
Nominal exchange rate behavior and risk premiums for selected Latin American countries

A: Nominal exchange rate

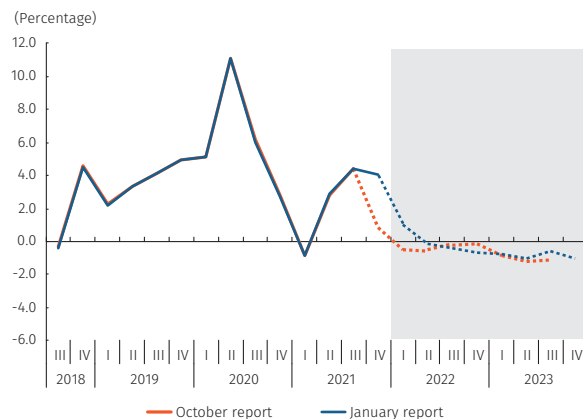


B: Five-year credit default swap



Note: Data until 21 January 2022
Source: Bloomberg; calculations by Banco de la República.

Graph 2.11
Quarterly RER inflationary gap^{a/}
(annual change, end-of-period)



a/ The real inflationary exchange rate gap (RER) captures inflationary pressures from the exchange rate. Positive values imply upward pressures on inflation. 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.

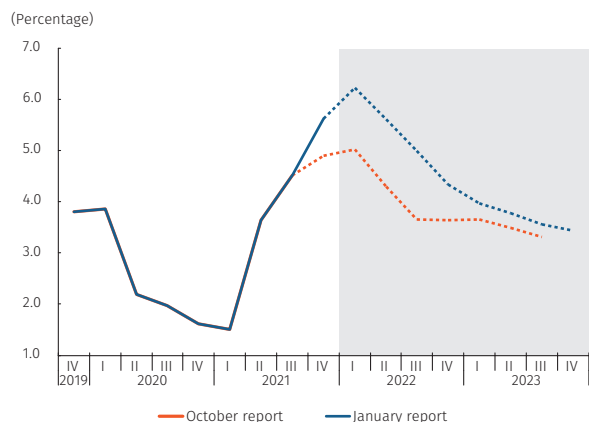
2.2 Macroeconomic Projections⁸

2.2.1 Inflation

Upward pressure on annual consumer inflation is expected to continue and be more significant and longer-lasting than anticipated in the previous report. The recent increase in the legal minimum wage and an indexation at higher levels of past inflation could constitute additional sources of pressure. Some inflationary pressure should nonetheless start to subside in the second quarter of 2022. Together with less expansionary monetary policy, this would allow for convergence to the target inflation rate slightly beyond 2023. On the forecast horizon, headline inflation will continue to be affected by the same upward pressures that have been at play for the last three quarters. These include external and exchange rate pressures and domestic supply shocks in the agricultural sector, which may end up being stronger and more persistent than previously anticipated. Given the lag in price transmission, these pressures would start to subside toward the end of the first quarter or in the second quarter of this year. Other potential sources of inflationary pressure include indexation at higher levels due to an increase in inflation at the end of 2021 and the recent adjustment in the legal minimum wage, which was higher than the technical staff expected. This wage increase exceeded inflation and productivity gains by a wide margin, something that had not occurred in 20 years. A real inflationary exchange rate gap that was somewhat higher than estimated in the previous report would also suggest more significant accumulated exchange rate pressures (Graph 2.11). These factors help explain the technical staff's upward revision to headline inflation in the central forecast scenario in this report (Graph 2.12). The technical staff continues to anticipate minimal downward pressures on inflation from aggregate demand, which would be in line with a tightening of the output gap at a rate similar to the estimate from the previous report. The current forecast also considers the withdrawal of some price relief measures that remain in place but are expected to lapse between 2022 and 2023. By their nature, these would affect annual inflation over the course of 12 months. Given the above, the technical staff expects convergence to target inflation to be delayed beyond the forecast horizon of this report. Headline inflation is expected to reach a high in the first quarter of this year (6.2%), before beginning to recede in line with food price behavior and as pressures from external sources and the domestic agricultural supply start to recede. The central forecast scenario projects inflation of 4.3% in the fourth quarter, and inflation somewhat above 3% at the

8 The results assume an active monetary policy in which Banco de la República's benchmark interest rate is adjusted to guarantee compliance with the inflation target.

Graph 2.12
Consumer Price Index (CPI)
(annual change; end-of-period)



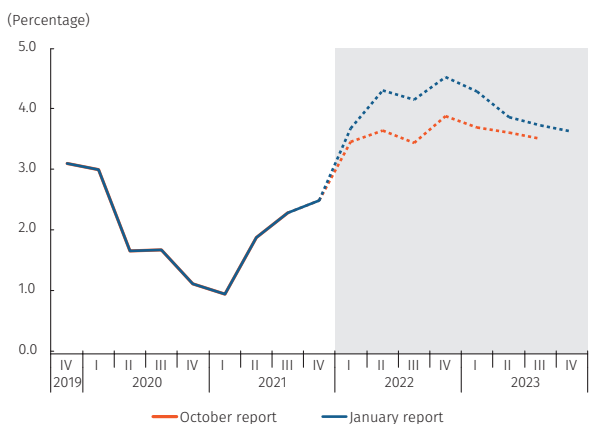
Source: DANE; calculations and projections by Banco de la República.

end of 2023. Convergence to target inflation would come within the framework of an active monetary policy that is growing gradually less expansionary. These estimates include significant uncertainty, which is laid out in more detail in Section 2.3.

The expected trajectory for core inflation has been revised upward, though the technical staff still anticipates a downward trend in 2023. This would bring core inflation close to the 3.0% target beyond the forecast horizon.

The central forecast scenario for this year and early 2023 projects core inflation (annual change in the CPI excluding food and regulated items) to increase and remain above 4.0%. This would surpass expectations from the previous report. The revised forecast trajectory is due largely to the increased impact of indexation, which would primarily affect service prices. The revision also reflects the increased duration and intensity of transitory external and exchange rate pressures. These largely affect goods prices, though they would also have an effect on services via food away from home. These pressures should begin to recede in the first half of 2022, alongside the expected recovery in global supply chains and transportation networks, a decline of commodities prices, and the closure of the inflationary real exchange rate gap. Together with indexation to a lower rate of inflation in 2023 and less expansionary monetary policy, this would allow for core inflation to recede and start converging toward the 3.0% target in 2023. That said, core inflation would be expected to reach 3.0% beyond the forecast horizon, in part due to transitory factors detailed later in this report. These forecasts also account for an output gap that should stop exerting downward pressure and the expected lapse of tax relief measures this year and next. Given all of the above, the central forecast scenario projects year-end core inflation in 2022 and 2023 of 4.5% and 3.6%, respectively (Graph 2.13).

Graph 2.13
CPI excluding food and regulated items
(annual change; end-of-period)

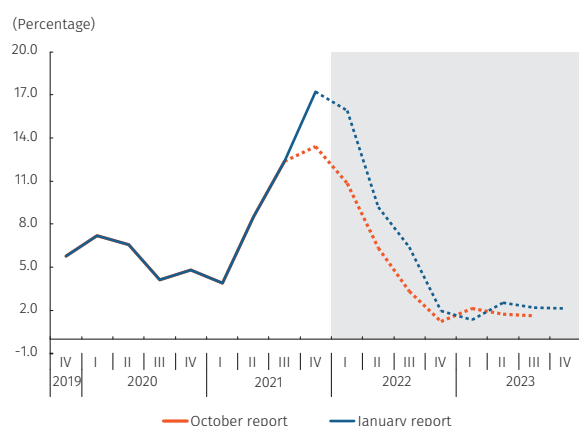


Source: DANE; calculations and projections by Banco de la República.

The withdrawal of tax relief measures should continue to affect the CPI for goods and the CPI for services, which would lead to temporary increases and greater volatility in core inflation.

The current forecast for price variation in the CPI for goods excluding food and regulated items accounts for the recent extension of Colombia’s health emergency through February 28. This status will prolong the suspension of VAT on cleaning and personal hygiene products. The forecast also accounts for the fact that the price shock on some items covered by three VAT-free days in 2021 was less significant than projected in the October report. The VAT-free days nonetheless induced price reductions in the fourth quarter, which could imply

Graph 2.14
CPI for foods
(annual change; end-of-period)



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

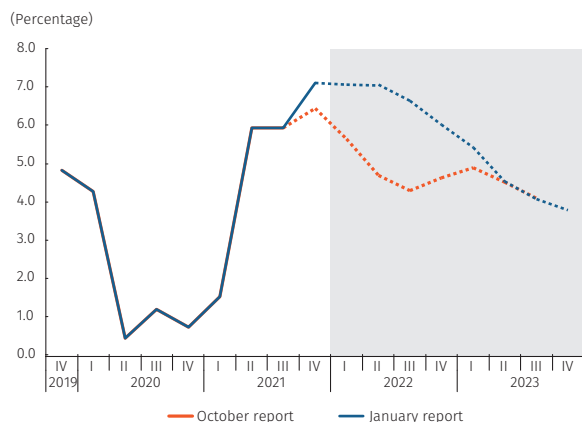
significant increases in the first quarter of 2022⁹. The revised estimate of the magnitude of this price shock is based on the incorporation of observed data and DANE's methodology in constructing this CPI. The forecast for the CPI for services excluding foods and regulated items, meanwhile, takes into account the upcoming withdrawal of relief measures on indirect taxes on hotels, tourism, and airline tickets, which is scheduled to take place in 2023. The majority of the impact on the CPI from the refund of indirect taxes on food away from home is expected at the beginning of 2023, with the return of taxation on establishments covered by Colombia's Simple Taxation Regime. This event would be expected to create a shock to annual inflation for the subsequent 12 months and would be one factor delaying core inflation's convergence to the target.

Annual change in the CPI for foods should decrease significantly in 2022, as domestic and external supply shocks from 2021 are abated. The expected trajectory of this index was nevertheless revised significantly upward from the October report. This was due to more significant and longer-lasting external pressures, and to domestic supply limits on certain foods, including some with significant weight in the consumer basket, such as meat and dairy products. Nevertheless, the central forecast scenario continues to project diminishing pressures in the first half of 2022. This would assume no significant new increases in international prices (currently at historical highs) and that global supply chain difficulties will be gradually overcome. Together with the expectation of favorable climate conditions and a positive agricultural cycle, this would also allow for a recovery in domestic food supplies. As a result, annual change in this price index is expected to end the year around 2.0% and remain close to this value through 2023 (Graph 2.14).

The CPI for regulated items is expected to continue to increase at a relatively high annual rate, following a higher trajectory than forecast in the previous report. This would be the consequence of indexation to increased inflation, higher international fuel prices, and some additional cost pressures. The central forecast scenario suggests that the most significant increases within the sub-basket for regulated items will come from fuel prices. This would be the result of previously mentioned exchange rate pressures and international oil prices, which have been revised upward in this report and are expected to stay relatively high on the forecast horizon (see Section 2.1.2). However, it is worth noting that the current fuel

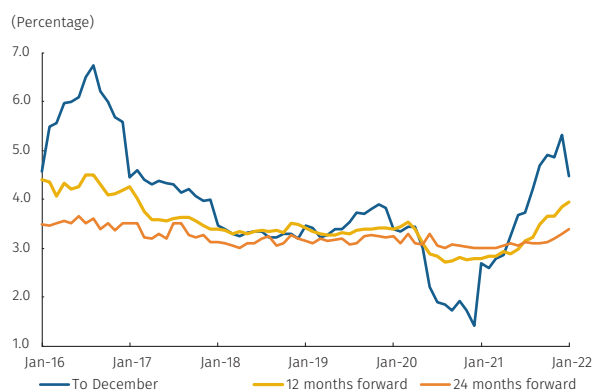
⁹ These forecasts do not consider VAT-free days beginning in 2022, and in particular to not account for those announced by the Treasury Ministry for March 11, June 17, and December 2. These dates were made public after the forecasts conducted in this report.

Graph 2.15
CPI for regulated items
(annual change; end-of-period)



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

Graph 2.16
Bank and stockbroker inflation forecast ^{a/}



a/ Median response to Banco de la República's monthly survey of economic analyst expectations.
Source: Banco de la República (monthly analyst survey).

price projection does not consider the full transmission of international prices in the domestic market within the next two years. Utility rates, meanwhile, should continue to reflect the transmission of costs associated with business investment requirements. Utility rate variation would also reflect upward pressures from elevated CPI, PPI, and exchange rate levels, as well as high international prices for some commodities. As mentioned above, some of these pressures proved more persistent than anticipated, which explains part of the upward revision to the annual forecast for the CPI for regulated items in the medium term. Regulated education and other components of this sub-basket are also expected to see larger increases due to indexation to higher inflation rates in 2021. Given the above, the price index for regulated items is expected to increase at an annual rate close to 7.0% in coming quarters, receding gradually at the end of this year and over the course of 2023 (Graph 2.15).

Market inflation expectations increased from October's report and are above the target rate along the forecast horizon. The median response to Banco de la República's monthly analyst survey from January 7-13 (Graph 2.16) suggests year-end headline inflation of 4.5% (3.5% in October) and inflation excluding food of 3.8% (3.2% in the October survey). For 2023, these figures would reduce to 3.5% and to 3.2%, respectively. Through January¹⁰, expectations based on breakeven inflation (BEI) adjusted for inflationary risk premiums and liquidity¹¹ increased to 3.89%, 3.83%, and 3.79% at two, three, and five years, respectively.

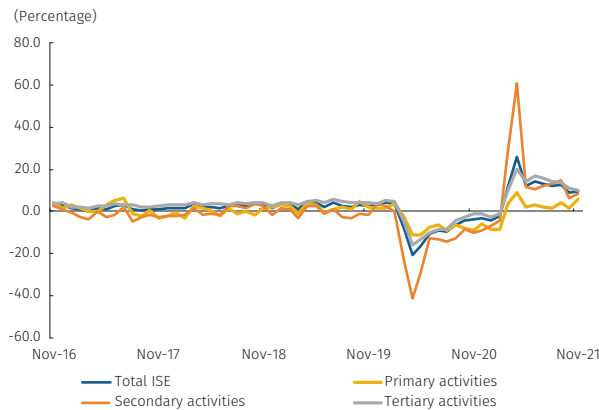
2.2.2 Economic activity

GDP appears to have grown somewhat more than expected in the fourth quarter, building on recovery from the third quarter. Third-quarter GDP growth was close to expectations and marked a return to economic recovery after backsliding in the second quarter as the result of roadblocks and the third wave of COVID-19. Available sector-level indicators, in particular the monthly

¹⁰ Information through January 21

¹¹ Inflation expectations net of inflationary and liquidity risk premiums are calculated as the difference between nominal rates and real rates excluding risk based on public debt markets at multiple terms (Abrahams et al., 2015; Espinosa et al., 2015). The so-called inflationary risk premium, then, 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.

Graph 2.17
Total ISE and by sector^{a/ b/}
(annual change)

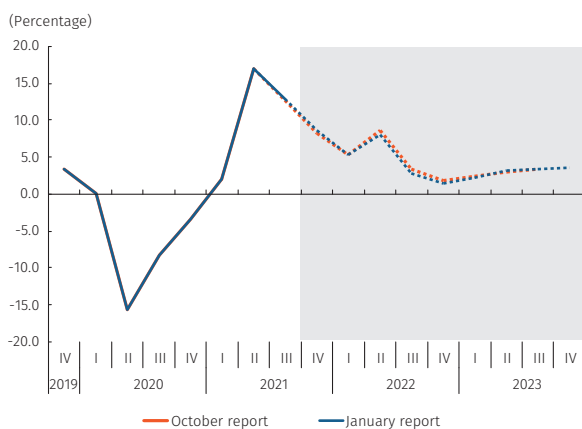


a/ Seasonally adjusted and corrected for calendar effects.

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 by Banco de la República.

Graph 2.18
Quarterly GDP^{a/}
(annual change)



a/ Seasonally adjusted and corrected for calendar effects.

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

economic tracking indicator (ISE) (Graph 2.17), suggest that the economy continued to expand at a significant rate in the fourth quarter in both annual (8.7%) and annualized quarterly terms (9.8%)¹² (Graph 2.18). The upward revision for the last quarter of 2021 would reflect greater dynamism in overall consumption and in some exports compared to expectations in October. This development would offset weaker performance in investment and somewhat larger-than-expected growth in imports. The most dynamic sectors in this period were: commerce, repairs transportation and lodging; industrial manufacturing; arts and recreation; and information and communications. Performance in construction and mining appears to have been weaker by contrast. Increased vaccination rates, a reduction in cases and deaths associated with COVID-19, and consumers' continuing ability to adapt to the pandemic help explain these results. So too would surplus savings, remittances, and a gradual recovery in employment and credit reflect positive dynamics in the fourth quarter. All of this came in the context of significantly expansionary monetary policy.

The technical staff expects domestic demand to have again led growth in the fourth quarter, thanks to consumption performance more than investment. Private consumption in the fourth quarter appears to have continued to expand at significant annual and quarterly rates, supported to a large extent by three VAT-free days and other discount programs. The positive effects of these programs would have been concentrated primarily in durable and semi-durable goods. That said, part of this consumption shock is expected to be transitory. Services consumption should have maintained its recovery trajectory, thanks to broader economic reopening as capacity limits have been relaxed and the education and health sectors have started to return to normal, among other factors. Overall private consumption throughout most of 2021, including in the fourth quarter, would also have been supported by repressed demand. Remittances and high coffee prices, which improved income in coffee-growing families, would also have played a role. Private consumption as a percentage of GDP is estimated to have reached historical highs for the year, both in nominal (70.7%) and real terms (73.3%)¹³. After growing well beyond projections in the third quarter, public consumption is expected to have declined quarterly in the fourth, primarily as the result of increases to annual salaries that were paid retroactively in the third quarter. Nevertheless, public consumption is expected to have sustained high levels in the fourth quarter, supported by COVID-19 vaccination spending, which would have accelerated in October and November.

¹² Seasonally adjusted and corrected for calendar effects series.

¹³ Between 2016 and 2019 this ratio was 68.6% on average in nominal terms and 68.8% in real terms.

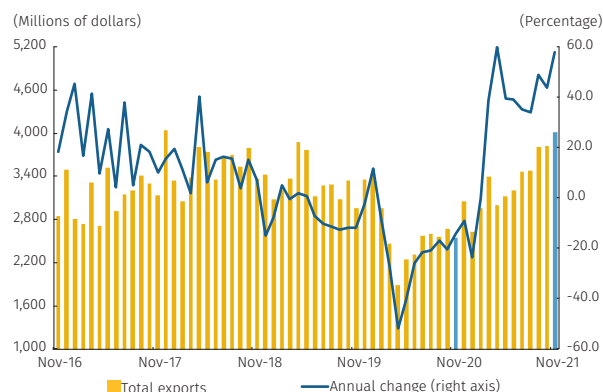
Public consumption growth therefore should have finished the year with an annual growth rate above 10%. Total consumption is estimated to have closed the year with annual growth in the double digits (13.5%), higher than the average for economic activity.

Investment continued to recover in the fourth quarter but remained below pre-pandemic levels, given an observed lag in the construction sector. Spending on machinery and equipment continued at high levels in the fourth quarter, according to capital goods import data (advances from DIAN to December). This would have continued to drive investment overall and was associated with the manufacturing sector and transport equipment purchases. By contrast, housing development initiation figures suggest that housing investment continued to lag other sectors. Fourth quarter growth for this sector is expected to have registered only slightly higher than in the third quarter. The fourth quarter forecast also projects only slight quarterly investment growth in other buildings and structures, a reflection of weak performance in public works and non-residential buildings that appears to have carried over from previous quarters.

Exports showed signs of recovery at the end of the year (Graph 2.19), though they are expected to have remained less dynamic than imports. As a result, the trade deficit would have widened in the fourth quarter. Observed dollar data from November suggests that exports grew significantly between quarters in constant pesos terms, nearly returning to pre-pandemic levels. External sales of non-traditional goods, coal, and services would have contributed to this result. Nevertheless, export growth is expected to have continued to be limited by the weakness of external oil sales. Provisional import data to December (Graph 2.20), meanwhile, also points to an increase compared to the third quarter, primarily driven by commodities, especially in industry, and consumer goods. Vaccine purchases, which accelerated significantly in the fourth quarter, would also have played a role in pushing imports to historical highs. As a result of this dynamic, Colombia’s trade deficit in constant peso terms is estimated to have grown in the fourth quarter compared to the third, reaching its highest level since quarterly data has been available. The contribution to annual GDP growth from the trade deficit would be negative, as has been the case over the course of the year.

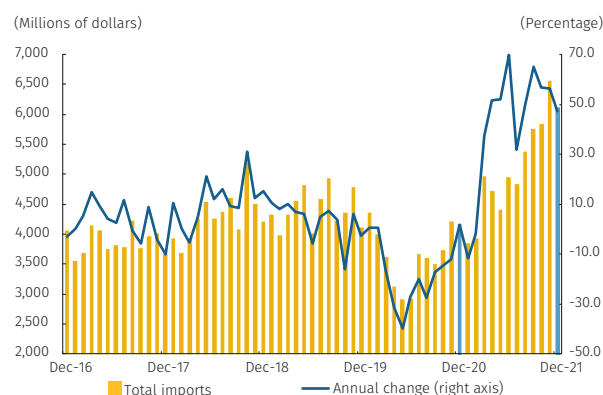
The technical staff now expects GDP growth in 2021 of 9.9%, similar to its October estimate (9.8%) (Graph 2.21). Domestic demand in 2021 appears to have developed better than anticipated in previous reports, recovering pre-pandemic levels far earlier than expected. This was above all thanks to consumption performance. Increased protections against COVID-19 have eased consumer

Graph 2.19
Total goods exports (FOB)
(monthly)



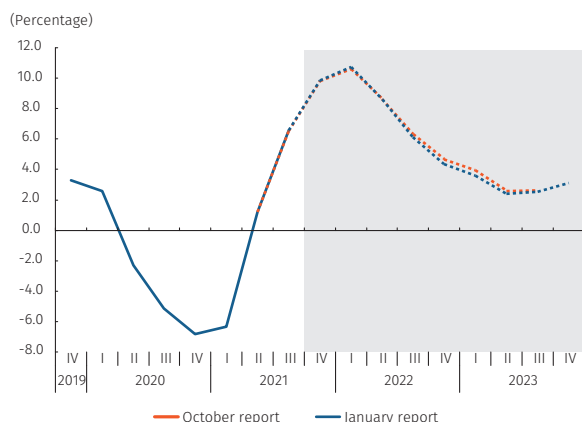
Source: DANE; calculations by Banco de la República.

Graph 2.20
Total goods imports (CIF)
(monthly)



Sources: DANE and DIAN (results from foreign trade advances); calculations by Banco de la República.

Graph 2.21
GDP, four-quarter accumulation^{a/}
(annual change)



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

uncertainty and caution, favoring private consumption. Public sector efforts and relatively favorable international conditions would also have played a role. If the technical staff's estimate is confirmed, GDP in 2021 would have surpassed 2019 levels, something previous reports did not project until 2022. That said, Colombia's recovery has come alongside significant increases in macroeconomic imbalances. After the initial shock of the pandemic, recovery has been uneven according to different spending segments and productive sectors, and employment growth has lagged behind growth in economic activity.

GDP is expected to grow by 4.3% in 2022, largely due to a relatively low basis of comparison from the first half of 2021. GDP growth would be expected to converge to pre-pandemic levels, due largely to public and private consumption growth that should become more moderate. Private consumption should continue to be supported in 2022 by Colombia's vaccination program, a recovery of consumer confidence, and lower unemployment rates and their positive effect on household income. However, increased inflation expectations, reduced savings levels, and a smaller-than-expected impact from the government's VAT-free days led to a downward revision to the growth forecast. This came despite the adjustment to the legal minimum wage. That some of the factors which have recently favored consumption would be transitory in nature can also help explain this revision. Similarly, the Medium-Term Fiscal Framework (MFMP for its initials in Spanish) calls for a moderation in growth of public consumption. The technical staff continues to expect that gross fixed capital formation will be the most dynamic component of domestic demand in 2022, as investment in construction should continue to recover to near pre-pandemic levels. Significant growth is expected in housing construction, given the evolution of the government's social housing subsidy programs and high sales volumes registered in 2021. Public works should also recover, thanks to national, regional, and local government projects that are already financed, and which should progress this year. Investment in machinery and equipment is projected to maintain very high levels from 2021, partly thanks to increased investment in the mining and energy sector. That said, the forecast for fixed investment growth has been revised downward in this report, keeping in mind slow growth in 2021 and the low level at which it closed the year, partly as a consequence of weakness in the construction sector. The political uncertainty inherent in an election year would also limit investment spending to some degree. Meanwhile, terms of trade should continue to improve which would help drive mining exports, despite the fact that international financial conditions are expected to tighten. Trade partner recovery is also expected to continue to consolidate, stimulating the rest of exports. The technical staff expects total exports

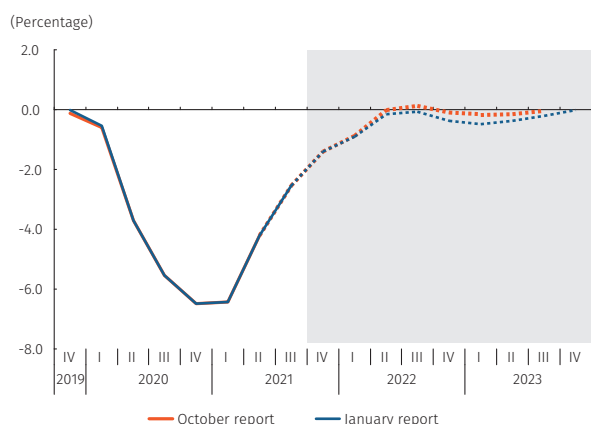
to be the most dynamic component of GDP in 2022. Given all of the above, Colombia's economy is expected to grow by 4.3% in 2022 (previously 4.7%). This forecast accounts for a low basis of comparison from the first half of 2021.

Recent labor market performance and the current growth forecasts suggest that the national unemployment rate will continue to decline gradually, averaging between 10.5% and 13.0% in 2022. Employment recovery stalled at the national level in late 2021, driven by lagging job creation in secondary municipal capitals and rural areas. Employment grew moderately in urban areas, largely in the non-salaried and informal sectors, which faced lower hiring costs. Overall, employment remains below pre-pandemic levels and its recovery continues to come at a slower rate than for economic activity overall. The labor supply, meanwhile, has not grown significantly in the last year. Given the above, the national unemployment rate remained relatively stable in this period, while for urban areas it maintained a slight downward trend (see Section 3). Based on these observations and the macroeconomic scenario outlined in this report, the technical staff estimates that the national unemployment rate will continue to decline gradually, averaging between 10.5% and 13.0% in 2022; the most likely value would be 11.7% (similar to estimates from the October report). Isolated for urban areas, the unemployment rate is expected to average 13.0%, with a range between 11.7% and 14.3%. The urban unemployment gap is expected to be smaller than estimated in previous reports (see *Labor Market Report* from January 2022). The above suggests a less loose labor market in 2022 than observed at the beginning of the pandemic. The recent increase in the minimum wage, which was higher in real terms than labor productivity growth, could generate upward pressure on inflation through salary costs. These projections contain significant uncertainty related to the risks signaled later in this report.

GDP growth should continue to converge to its potential level through 2022 and beyond. The central forecast scenario suggests that Colombia's economy will continue to gradually converge toward its estimated long-term growth rate in 2022, a trend that would continue in 2023. The trade deficit should tighten on the forecast horizon to a greater extent than previously expected, based on stronger expected performance in exports and a moderation in imports. Significant risk factors weigh on these estimates, as explained in more detail in Section 2.3. If the technical staff's growth forecasts for 2021, 2022, and 2023 are confirmed, average annual growth between 2019 to 2023 would be 2.4%, a figure that is below long-term estimates prior to the pandemic.

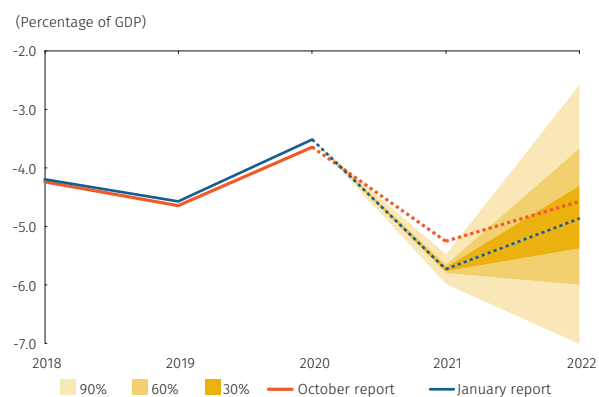
Excess capacity in the Colombian economy remains despite strong performance in 2021 but is expected to recede over the forecast horizon. Recent indicators suggest that economic activity continues to recover rapidly. GDP growth rates should be similar to estimates from the previous report, driven largely by consumption. Labor market performance continues to lag behind GDP performance. Price information, meanwhile, suggests significant increases in observed and expected headline inflation and a growth trend for core inflation, due primarily to diverse supply shocks. Based on this and indicators of economic activity, the current forecast projects an annual output gap for 2021 of -1.4%, equal to the estimate from the previous report. Projected economic recovery in 2022 would be in line with a tightening output gap to -0.4% at the end of the year (previously -0.1%); this should remain slightly negative over the rest of the forecast horizon (Graph 2.22). Reduced excess productive capacity suggests that potential output would continue to recover, growing 4.3% and 3.2% in 2021 and 2022, respectively. These estimates are also similar to those from the previous report. Significant uncertainty remains regarding

Graph 2.22
Output gap^{a/}
(four-quarter accumulation)



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

Graph 2.23
Annual current account^{a/ b/}



a/ The graph presents the probability distribution for the forecast for 2021 and 2022. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode), using as a reference, mainly, the densities from the Patacon model.

b/ The probability distribution corresponds to the forecast exercise in the January report.

Source: Banco de la República.

the effects of the pandemic and of diverse internal and external shocks on aggregate demand, potential output, and the output gap. A more detailed description of these risk factors can be found in Section 2.3 of this report.

2.2.3 Balance of Payments

The technical staff estimates that the current account deficit would have risen to 5.7% of GDP in 2021, alongside recovery in domestic demand (Graph 2.23). This increase in the external imbalance compared to 2020 would have reflected growth in private consumption and investment, in the context of high levels of spending and public deficit. This would imply an increase in goods and services imports and in earnings for firms with foreign capital serving the domestic market. The annual recovery of coal and oil prices should have contributed to profit remittance by foreign firms that export those products. Other factors that would have contributed to import growth include payments for merchandise transportation services; the gradual reactivation of tourism of Colombians abroad; vaccine purchases; and high global prices of goods and inputs on nominal imports. An increase in Colombia's terms of trade, a rebound in external demand for Colombian goods and services, high remittance levels, and the recovery of tourism-related income all would have limited the expansion of the current account deficit in 2021. Despite the fact that oil, coal, and coffee production are not expected to have returned to pre-pandemic levels, dollar export figures for these products should have grown in annual terms due to higher international prices. External industrial goods sales should have recovered significantly alongside increased foreign demand and higher prices in foreign markets. Given the above, the current account deficit is estimated to have been USD 18.121 billion (5.7% of GDP)¹⁴ in 2021, an upward revision from the October report (5.3%).

The current account deficit is expected to fall to 4.9% of GDP in 2022 (Graph 2.23). This decline would reflect several factors, including: a reduction in the fiscal deficit; moderating growth in domestic demand; an improvement in export prices; tighter international financial conditions; and a recovery in the production and export of commodities such as oil¹⁵, coal, and coffee. Higher prices of these commodities would also contribute to growth in

14 The current account deficit in the fourth quarter was estimated at 6.5% of quarterly GDP. More significant imbalances in goods and services trade and in factor income, partially offset by high remittances income, would have explained the annual and quarterly increase in the external deficit.

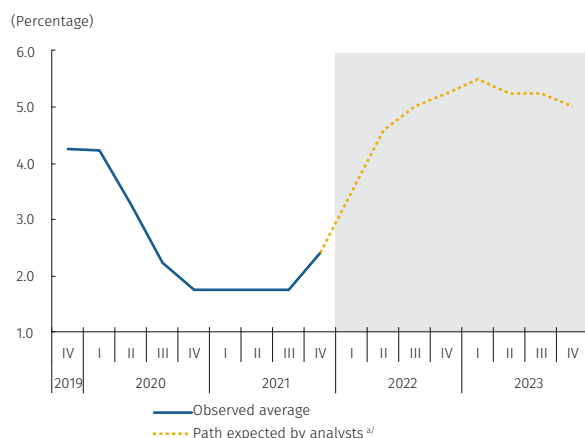
15 The current account deficit forecast is based on assumed Colombian oil production of 736 thousand barrels per day (KBPD) on average in 2021 and 783 KBPD on average for 2022. Production in 2019 and 2020 was 886 KBPD and 781 KBPD, respectively.

external dollar sales figures. Furthermore, growth in economic activity among Colombia's trade partners would support additional demand growth for the remainder of the country's exportable products. International visitor arrivals are expected to normalize gradually over the course of the year. Domestic demand, meanwhile, would continue driving imports, though at a lower rate than in 2021. Merchandise transportation costs and import prices are expected to remain elevated in the first half of 2022 before starting to moderate. Overall, an expected reduction in the goods and services imbalance should support a correction in the current account deficit. Increased income from transfers should also play a role, as remittances would remain high and in light of expected income from insurance payments¹⁶. The expected correction in the current account deficit in 2022 would be limited by the increase in earnings among businesses with foreign capital, supported by recovery in economic activity and rising export prices for some commodities. Increased interest payments associated with higher debt and external interest rates would also be a factor. Given the above, the current external deficit forecast for 2022 (4.9% of GDP) has been revised upward from the previous report (4.6%). Uncertainty remains high. The main forecast risks are associated with domestic economic activity, the performance of external demand, and modifications in export and import prices, among other factors.

Colombia should maintain its access to global capital markets on the forecast horizon, though with less favorable financing conditions than anticipated in the previous report. External capital inflows rebounded in 2021. Capital directed to the public sector, in particular, should have contributed significantly to external financing in the form of new debt, the liquidation of assets abroad, and the entry of non-residents to the local debt market. Foreign direct investment (FDI) also recovered, though it remained below 2019 levels. As was the case for direct Colombian investment abroad, there appears to have been an increase in the balance of other net external assets by the private sector in 2021, primarily via financial investments and deposits. Capital inflows in 2022 are expected to be driven by the ongoing economic recovery, the prospect of improved commodities prices and production, and one-off operations in the local stock market. That said, increased risk premiums and the prospect of a faster normalization in U.S. monetary policy could increase financing costs. FDI should continue to increase, as capital to the public sector continues to support current account deficit financing, although to a lesser extent than last year, in line with the expected reduction of the fiscal deficit. Forecasts on the financial account of the balance of payments and the outlook for external financing costs remain subject to high levels of uncertainty.

¹⁶ The Spanish insurance provider MAPFRE disbursed USD 983 million in policy payments related to EPM's *Hidroituango* project. Prior to 2022 the firm had paid out USD 350 million and on January 25 the insurer announced it had paid the remainder (633 million).

Graph 2.24
Average observed quarterly interest rate and rate expected by analysts^{a/}



a/ These projections are calculated as the average rate that would be active in each quarter according to the median of the analyst response to the Central Bank's monthly economic analyst survey from January 2022.
Source: Banco de la República.

2.2.4 Monetary Policy and Interest Rates Expected by Analysts

Median year-end monetary policy interest rates expected by analysts are 5.25% in 2022 and 5.0% in 2023 (Graph 2.24). The median response by analysts to the Central Bank's monthly survey in January pointed to an average intervention interest rate of 5.25% in the fourth quarter of 2022 and 5.0% in the fourth quarter of 2023.

The technical staff projects a monetary policy interest rate path slightly higher, on average, than market analyst expectations. Less favorable international financial conditions, a tightening output gap, and expected inflation above the target are coherent with a path of monetary policy normalization that is higher than the market survey from January projects for the first three months of 2022, and similar to forecasts, on average, over the remainder of the forecast horizon. The evolution of international financial conditions, the dissipation of shocks on international costs and prices that have affected inflation, and the behavior of excess capacity continue to contribute to uncertainty on the forecast horizon. These considerations should be evaluated carefully as new information comes available.

2.3 Balance of Risks to the Macroeconomic Forecast

Predictive density exercises¹⁷ attempt to account for the main risks to the macroeconomic forecast. These risks currently include less favorable international financial conditions than projected in the central forecast scenario; the adverse effects of pandemic uncertainty on economic activity; the possible impact on inflation of production bottlenecks and increased and more persistent cost pressures; and indexation to higher levels of inflation, primarily for services and regulated items.

The risk of tighter international financing conditions could limit access to international financing and increase funding costs (upside risk to inflation, downside risk to growth). On the forecast horizon there exists the risk of inflationary surprises and that inflation expectations in the United States could be higher than anticipated. This could lead the Federal Reserve to increase its interest rate beyond levels considered in the central forecast scenario, increasing risk premiums in emerging markets and reducing the availability of international financing. In this context, the predictive density exercise incorporates an upward bias related to the Fed's policy interest rate and

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

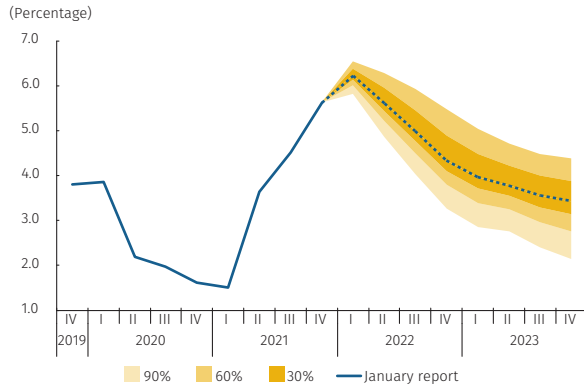
Colombia's risk premium, which could imply higher peso depreciation against the dollar, a downward bias on growth, and an upward bias on inflation.

Downward biases on aggregate demand for 2022 account for the possibility that recovery in consumption could prove more transitory and investment performance less dynamic than considered in the central forecast scenario (downside risk to growth and inflation). The predictive density exercise incorporates downward biases in 2022 on consumption in an effort to reflect the transitory nature of results observed in 2021, which were partly affected by household pent-up demand and strong performance in public spending. Downside risk factors associated with the evolution of the pandemic and its possible effects on activity and consumer and investor confidence are also taken into account. Investment in 2022 is also biased downward, reflecting uncertainty over fiscal policy and the inherent dynamics of an election year. These factors would imply downward biases on economic activity and inflation. For 2023 the risks that could affect aggregate demand are relatively balanced around the central forecast scenario.

Risks related to cost pressures and bottlenecks in global production and distribution networks remain and could be more significant and persistent than considered in the central forecast scenario. Finally, the predictive density exercise incorporates the risk of more significant effects on prices from indexation to higher levels of inflation¹⁸ and an increase to the legal minimum wage that was higher than considered in the central scenario. This would constitute an upside risk to inflation. The exercise incorporates an upward bias on international commodity prices and for imported goods, associated with the potential for longer-lasting disruptions to global supply chains that could affect core inflation in a more prolonged way and, in particular, the goods basket. Other factors that would generate upside risks compared to expected inflation excluding food and regulated items are related to more significant effects from indexation on prices and the historic increase in the real legal minimum wage. These would have their most significant effects on food away from home and rental housing. Additionally, the exercise for core inflation accounts for uncertainty around the effects of VAT-free days in 2022 and the lapse of consumption tax relief in the first quarter of 2023. Risks to the food basket forecast are relatively balanced, as upside risks materialized in the second half of 2021 and were incorporated into the central forecast scenario. For regulated items, forecast risks include the possibility of a larger adjustment than expected in fuel prices, given projected oil price, and in energy fees. The exercise also accounts for the risk of higher increases in utility rates than considered in the central scenario, given indexation related with this basket. Given the above, the projected path for inflation is biased upward on the forecast horizon.

¹⁸ For example, these could come from a higher level of indexation, a larger adjustment in prices as upward risks materialize in the CPI, or because informal segments in regulated sectors (e.g., rental housing) register increases above those established by the relevant regulations.

Graph 2.25
Consumer price index, predictive density^{a/}
(annual change, end-of-period)

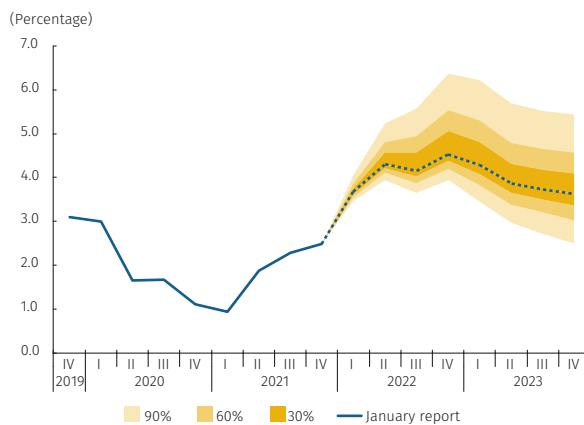


	Q1 2022	Q4 2022	Q4 2023
Mode	6.23	4.33	3.43
< Mode	38.4%	29.5%	38.9%
Intervals			
< 2	0.0%	0.1%	3.6%
2 -- 4	0.0%	18.3%	58.8%
> 4	100.0%	81.6%	37.5%

a/ The graph presents 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: DANE; calculations and projections by Banco de la República.

Overall, the balance of risks includes an upward bias on the inflation forecast and a downward bias on forecasts for GDP and the output gap on the forecast horizon (Graphs 2.25-2.28). Given the above, inflation is expected with 90% probability to be between 3.3% and 6.4% at the end of 2022 and between 2.1% and 5.3% at the close of 2023. Core inflation, also with 90% certainty, would be expected to be between 3.9% and 6.4% at the end of 2022 and between 2.5% and 5.4% at the end of 2023. GDP growth is biased downward and expected to be between 1.9% and 6.2% in 2022 and between 0.4% and 5.5% in 2023.

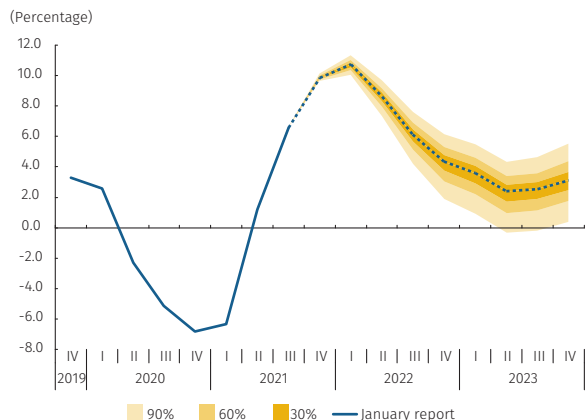
Graph 2.26
CPI excluding food and regulated items, predictive density^{a/}
(annual change, end-of-period)



	Q1 2022	Q4 2022	Q4 2023
Mode	3.66	4.52	3.63
< Mode	30.4%	19.7%	36.6%
Intervals			
< 2	0.0%	0.0%	1.5%
2 -- 4	91.3%	5.8%	50.8%
> 4	8.7%	94.1%	47.7%

a/ The graph presents 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: DANE; calculations and projections by Banco de la República.

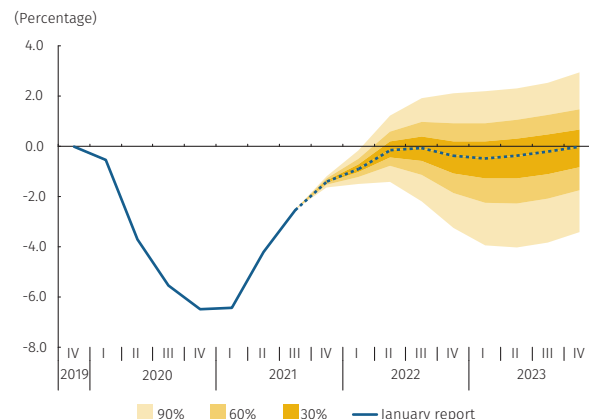
Graph 2.27
GDP, four-quarter accumulation, predictive density^{a/, b/}
(annual change)



	Q1 2022	Q4 2022	Q4 2023
Mode	9.87	4.34	3.11
< Mode	49.6%	59.7%	54.7%
Intervalos			
< 2	0.0%	6.2%	27.2%
2 -- 5	0.0%	70.7%	63.3%
5 -- 8	0.0%	23.0%	9.4%
> 8	100.0%	0.0%	0.0%

a/ The graph presents 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.
b/ Seasonally adjusted and corrected for calendar effects.
Source: DANE; calculations and projections by *Banco de la República*.

Graph 2.28
Output gap, predictive density^{a/, b/}
(four-quarter accumulation)



	Q1 2022	Q4 2022	Q4 2023
Mode	-1,41	-0,37	-0,02
< Mode	49,8%	54,8%	55,6%
Intervalos			
< -1	99,9%	39,8%	35,4%
-1 -- 0	0,1%	24,4%	20,6%
> 0	0,0%	35,7%	43,9%

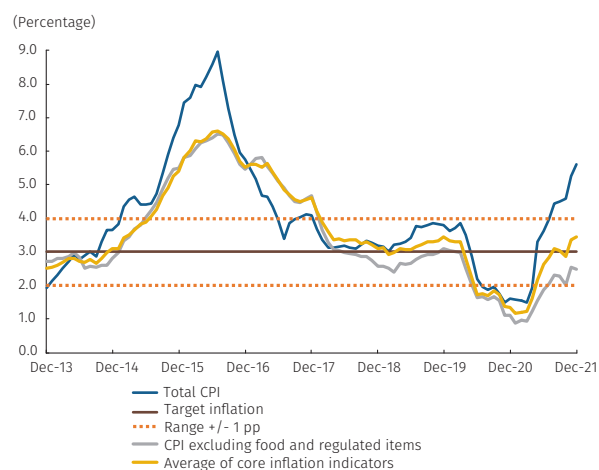
a/ The historical estimate of the output gap is calculated as the difference between observed GDP (four-quarter accumulation) and potential GDP (trend; four-quarter accumulation) from the 4GM model; for the forecast it is calculated as the difference between the technical staff's GDP estimate (four-quarter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

03/ Current Economic Conditions

3.1 Inflation and Price Behavior

Annual consumer inflation closed 2021 above the target at 5.62% (Graph 3.1), as a consequence of several external and internal factors. Annual consumer inflation showed a significant upward trend in the fourth quarter, pressured above all by increased food prices that surpassed projections from the previous Monetary Policy Report. Inflation has also increased in recent months, and indeed over the course of 2021, in other major economies around the world and in Latin America. For Colombia, external factors associated with higher commodities prices and disruptions to global supply chains and logistics networks continued to play an important role driving inflation, especially at the end of 2021. Increased pressure from peso depreciation against the dollar, which started to pass through more clearly on domestic prices in recent months, was another external driver of inflation. Domestically, upward pressures from demand recovery became more relevant, reflected in a reduction in excess productive capacity. Diverse domestic supply factors, including an unfavorable agricultural cycle and higher beef prices, have affected overall food prices and some service prices, such as for foods away from home. These external and domestic factors were most significant in the second half of the year¹⁹.

Graph 3.1
CPI and core inflation indicators
(annual change)



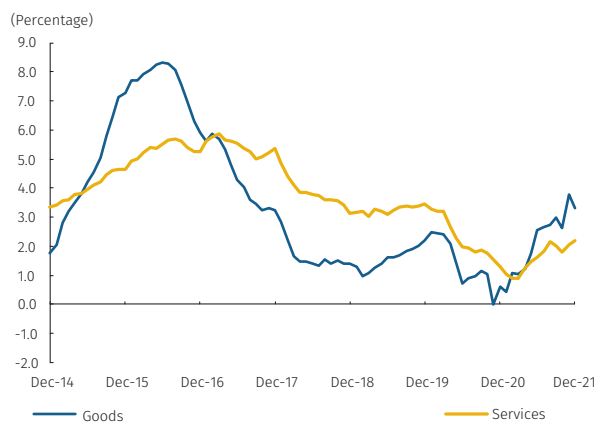
Sources: DANE and Banco de la República.

Core inflation (annual change in the CPI excluding food and regulated items) ended the year below the inflation target and close to the technical staff's previous estimate.

Annual change in the CPI excluding food and regulated items was 2.49% in December. The increase from September (2.28%) (Graph 3.1) was driven primarily by increased goods prices. This came despite the downward effects of VAT-free days and, to a lesser extent, increases in services prices. This development was in line with the technical staff's projections from the October report. However, some component behavior did vary from the estimate. The CPI for goods was higher than anticipated, for example, primarily as the result of lower-than-expected downward pressures from VAT-free days and higher upward pressures from external sources and the exchange rate. This was offset by a smaller annual change in services prices, explained especially by a significant decline in the CPI associated with household internet plans in October.

¹⁹ In the first six months of the year, the increase in inflation was influenced, largely, by a low basis of comparison due to price relief measures in 2020, and by the effects of roadblocks in April and May as part of a national strike.

Graph 3.2
CPI for goods and services, excluding food and regulated items
(annual change)



Source: DANE; calculations by Banco de la República.

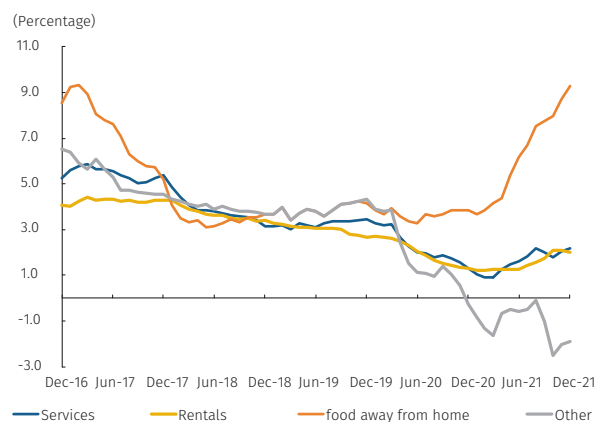
Core inflation has remained on an upward trajectory since the second quarter of 2021. Reduced excess productive capacity at the end of the year, together with significant dynamism in domestic demand, substantially reduced the downward pressures on core inflation that began with the onset of the COVID-19 pandemic. These had offset upward pressures originating from other sources, such as the external shocks associated with microchip shortages, port closures, and dispatch delays. Due to their scale and duration, global logistical challenges have affected a wide array of products. In the technical staff's view, these inflationary pressures would have been reinforced by more significant accumulated peso depreciation against the dollar in recent months. That said, annual change in the core inflation basket (excluding foods and regulated items) fell from 2.54% in November to 2.49% in December. This can be explained, primarily, by lower annual growth in goods prices (from 3.8% to 3.3%) due the effects of the VAT-free days, and by a smaller annual variation in rental services prices (from 2.1% to 2.0%).

The CPI for goods grew in annual terms in the fourth quarter despite transitory price relief from three VAT-free days²⁰. Annual change in the CPI for goods was 3.3% in December, higher than projected in the previous report and approximately 30 basis points higher than in September (3.0%) (Graph 3.2). VAT-free days exerted less downward pressure than expected. Prices for items that were covered by the temporary VAT exemptions trended downward, while those that were not trended upward, driven particularly by high demand for private transportation (bicycles, motorcycles, and other vehicles). These sectors drove upward pressure on the CPI for goods in recent months. As mentioned in the previous report, goods prices have also been driven upward by recent peso depreciation against the dollar and by bottlenecks in global supply chains. This has been the case due to scarcity in raw industrial materials and in microchips, which has slowed the production of some goods (vehicles, appliances, electronics) in multiple countries. New outbreaks of COVID-19 have also led to logistical problems (container scarcity, port delays and closures), which has driven transportation costs up and put pressure on agro-industrial goods prices, especially.

The CPI for services also trended upward in the period, driven by food away from home. Services were the only major segment of the CPI to close the year with an annual growth rate below the inflation target (2.2%) (Graph 3.2). Annual change in the CPI for rentals, which weighs close

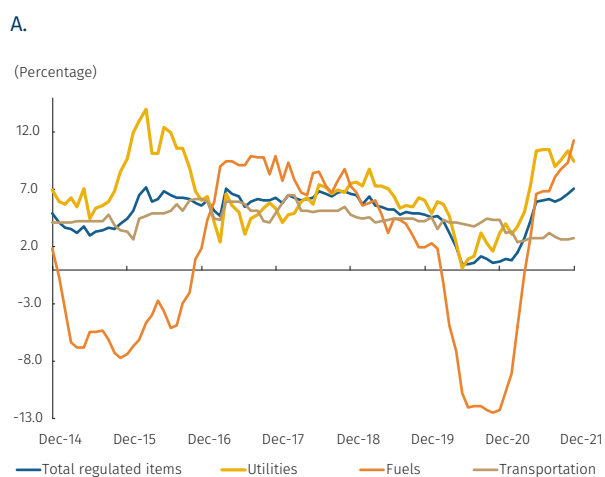
²⁰ The three VAT-free days in 2021 were held on October 29, November 19, and December 3. The categories that were exempt from VAT during these days were: shoes and clothing, sporting goods, school supplies, games and toys, electrical appliances, and agricultural inputs.

Graph 3.3
CPI for services excluding food and regulated items, and its components (annual change)

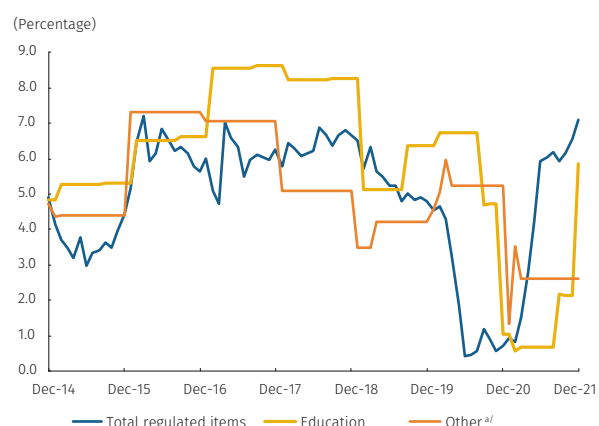


Sources: DANE; calculations by Banco de la República.

Graph 3.4
CPI for regulated items and its components (annual change)



B.



a/ Includes moderated EPS quotas, administrative certificates and documents, and honorarium payments

Source: DANE; calculations by Banco de la República.

to a quarter of the overall CPI and accounts for more than half of the services basket, ended 2021 at 2.0%. This sub-basket had shown a moderate upward trend over the course of the year, increasing by 70 basis points compared to 2020 (Graph 3.3). As with previous quarters, increases in this sector in the fourth quarter partially reverted rebates from 2020 associated with the pandemic²¹. Food away from home pressured inflation upward more than expected over the course of 2021 (from 3.8% in December 2020 to 7.7% in September and 9.3% in December). Several factors help explain this development, including increasing food prices over the course of 2021, a significant adjustment in utility rates, and the permanent closure of a large number of restaurants²². Prices in the “other services” category closed the year in negative territory (-1.9%), helping to push inflation downward. In particular, this came from discounts on fixed and mobile communications services as the result of a new operator’s entry into the market. Matriculation rebates from several institutes of higher education also played a role. The downward surprise in the services basket compared to what was expected in October was due, primarily, to increased supply in household internet plans.

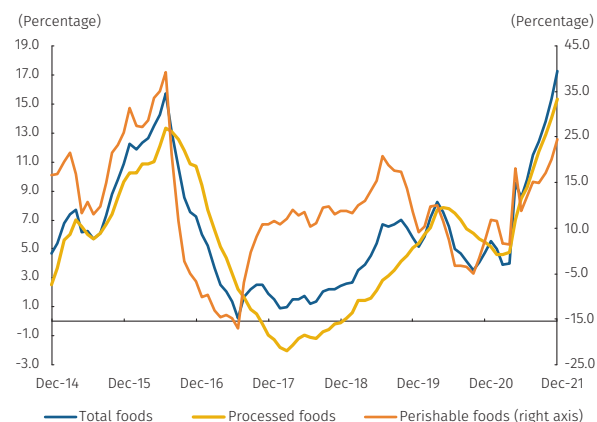
The CPI for regulated items pressured consumer inflation upward in the fourth quarter, driven by fuel prices and energy and water utility rates. Annual change in the CPI for regulated items increased continuously in 2021²³, growing in September to 5.9% and ending the year at 7.1% (Graph 3.4). Over the course of 2021, the upward trend in the CPI for regulated items was led by fuel prices, which grew in annual terms from -12.2% in December 2020 to 11.3% in December 2021, recovering a significant part of their pandemic-related decline. A significant rebound in international oil prices has had an effect on domestic fuel prices, and also increased the cost of thermal energy generation. Rates for this public utility, as well as for water and gas, have incorporated the costs of increased investment aimed at improving coverage and service quality. For water and energy rates, higher inflation in the PPI and the CPI have contributed to increases related to indexation. Accumulated exchange rate depreciation, in general, increased production and generation costs in 2021 both for fuels (gas and gasoline) and for utilities. Finally, annual change in regulated education prices (primary and secondary), which was relatively stable in

21 This could be explained, in part, by the annual adjustment at the end of the year, which was greater than inflation at the end of 2020.

22 See the Bogotá Chamber of Commerce Report: <https://www.ccb.org.co/Clusters/Cluster-de-Gastronomia/Noticias/2020/Noviembre-2020/Cuestion-de-supervivencia-22-mil-restaurantes-han-cerrado-sus-puertas>

23 In 2020 the annual change in the CPI for this basket closed at 0.73%, a very low level sustained by the fall in international fuel prices and price relief on some utilities.

Graph 3.5
CPI for foods by group and its components
(annual change)



Source: DANE, calculations by Banco de la República.

the first half of 2021, rebounded significantly in December. The CPI for regulated education did not show any change in that period, however, the significant increase in annual prices was the result exclusively of a low basis of comparison²⁴. Other segments of the CPI for regulated items (transportation and other) closed the year without significant change, with annual price variation below the inflation target (Graph 3.4).

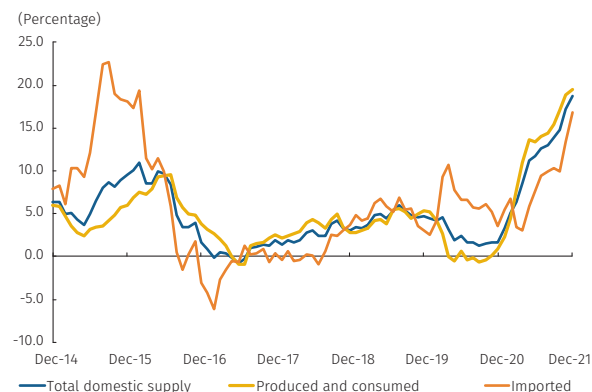
As was the case over the course of the year, foods registered significant price increases in the fourth quarter. Annual change for this segment was the highest among all major components of the CPI and was the result of multiple pressures originating both internally and externally. Annual change in food prices increased significantly over the course of 2021, rising from 4.8% in December 2020 to 12.4% in September 2021 and finishing the year at 17.2% (Graph 3.5). The upward dynamic in prices was observed both in processed foods and perishable foods. In the first case, prices ended 2021 with an annual adjustment of 15.3%, an increase that can be explained largely by external pressures and, to a lesser extent, domestic factors. Among the external pressures, some of which have already been mentioned in previous reports, were an increase in international agricultural commodities and input prices; supply restrictions on input and food supplies in some exporting countries; logistical and transportation problems; difficulties in labor procurement; adverse climate conditions; and the reactivation of external demand. This last factor, together with Colombia's re-designation in February 2020 as being free of foot and mouth disease, led to considerable increases in live cattle and carcass meat exports. Domestically, prices were pushed upward by roadblocks in the middle of 2021, which partially disrupted production (especially in the poultry sector). In the case of perishable foods, where prices ended the year up 24.4% in annual terms, the increase can be explained largely by domestic factors. Here too the roadblocks were significant, as they disrupted agricultural activity and affected productivity and production. An unfavorable production cycle in recent quarters, especially for fruit, yucca, plantains, and, more recently, potatoes, also played a role.

Annual producer inflation in 2021 (18.71%)²⁵ was higher than at any point since July 1998 (18.95%), driven upward by global supply restrictions, high transportation costs, and domestic shortages of certain foods. Producer inflation

24 In December 2020 DANE reported a significant decline in prices for basic education, the product of a delay in the enrolment cycle and delays in information administered by education institutions.

25 This figure is provisional until the beginning of February, when DANE will publish its annual producer inflation figures (definitive domestic supply for all of 2021).

Graph 3.6
PPI by origin
(annual change)



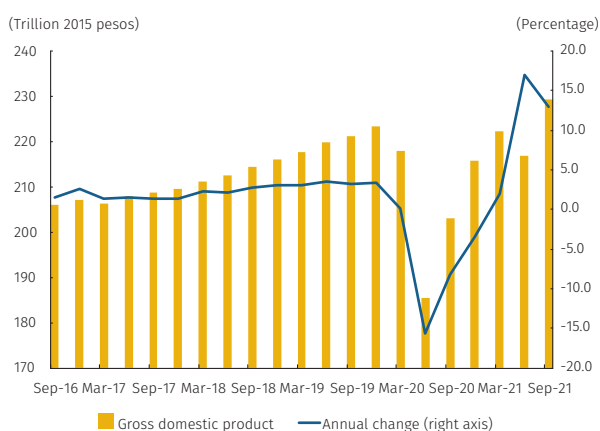
Source: DANE; calculations by Banco de la República.

(the PPI for domestic supply) increased continuously over the course of 2021, rising from 1.65% in December 2020 to 13.83% in September and 18.71% at the end of the year (Graph 3.6). Elevated producer inflation increased costs, generating significant pressure on consumer prices. The upward pressures in the PPI came both domestically and from imports. For the imports segment of the PPI, annual change in December 2021 was 16.8%, driven by global transportation and logistics problems, and by demand pressures from economic recovery, especially in the U.S. and China. The imports component of the PPI also incorporated accumulated peso depreciation against the dollar since the beginning of 2021. The annual change in prices for the domestic component of the PPI (which closed 2021 at 19.5%) also increased due to a reduced domestic supply of some foods (meats, fruit, and coffee) and a significant price adjustment in mining, led by crude oil extraction, which increased in annual terms by more than 67%.

3.2 Growth and Domestic Demand

GDP returned to growth in the third quarter after a disruption in the second, rising above pre-pandemic levels. Colombian GDP (seasonally adjusted and corrected for calendar effects) increased 5.7% in the third quarter compared to the second, returning to growth after an interruption in the form of roadblocks at the end of April and May and restrictive measures implemented to contain the third wave of the COVID-19 pandemic. In annual terms, the economy grew by 12.9% in this series in the third quarter (13.2% in the original series) (Graph 3.7), very similar to projections from the previous report (12.7%). With this, GDP rose 2.6% above its pre-pandemic level (end of 2019). However, there remain significant differences in the degree of recovery among distinct economic sectors and spending components, and unemployment levels continue above those observed in February 2020.

Graph 3.7
Quarterly gross domestic product^{a/}
(level and annual change)

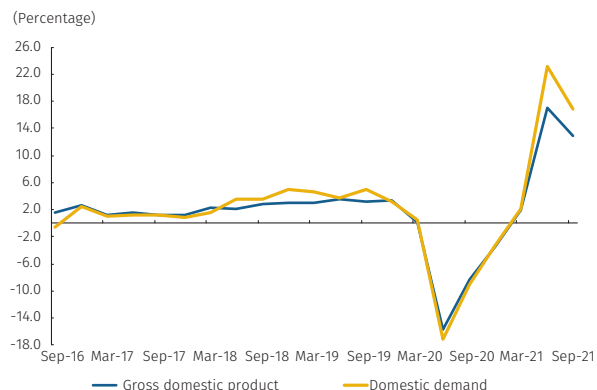


a/ Seasonally adjusted and corrected for calendar effects
Source: DANE; calculations by Banco de la República.

Domestic demand again outperformed GDP in the third quarter, thanks to private and public consumption. Quarterly growth in domestic demand for the period was 5.9% and 16.9% in annual terms (Graph 3.8), rising 6.6% above pre-pandemic levels. The main contributor to this rise came from growth in overall consumption, which increased 4.1% from the second quarter, thanks to significant contributions from both private and public consumption. Despite the fact that gross fixed capital also grew between quarters (7.4%), it did not recover levels lost in the second, and performed weaker than expected.

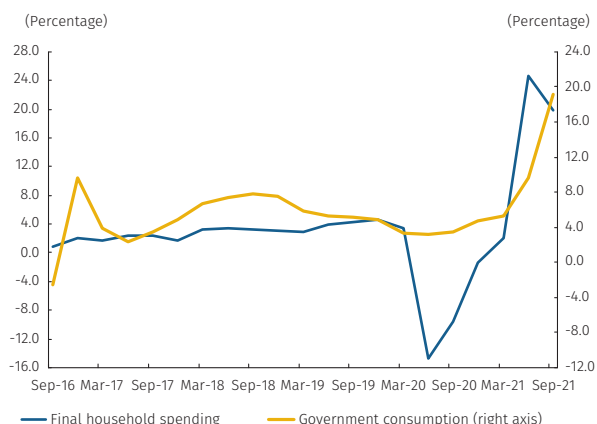
The near complete reopening of economic sectors, together with significant effort in public sector spending, led to a recovery in overall consumption in this period.

Graph 3.8
Gross domestic product and quarterly domestic demand^{a/}
(quarterly, annual change)



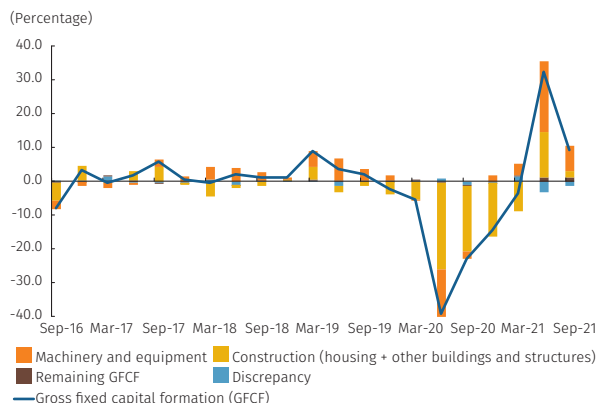
a/ Seasonally adjusted and corrected for calendar effects
Source: DANE; calculations by Banco de la República.

Graph 3.9
Final household and general government spending^{a/}
(annual change)



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

Graph 3.10
Quarterly gross fixed capital formation^{a/}
(annual change, contributions)



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

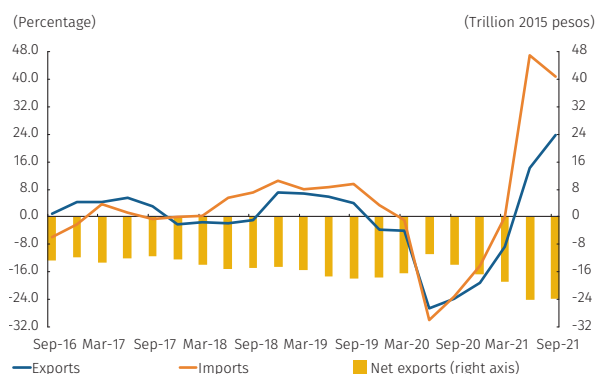
Within this aggregate, household consumption registered significant annual and quarterly growth rates (19.9% and 2.6%, respectively), rising 7.5% above pre-pandemic levels (Graph 3.9). The main contributors to the quarterly increase came from services and durable goods consumption, which have already surpassed pre-pandemic levels by 4.6% and 22.4%, respectively. The significant recovery in private consumption has been possible thanks to several factors, including: the near complete reopening of economic sectors and increases in capacity limits; spending of household savings that built up during the critical phases of the pandemic; employment recovery; positive remittance behavior; and increases in coffee prices, which have favored income among coffee-growing families. All of this has come in the context of monetary policy that remains expansionary alongside low interest rates and ample credit conditions. Public consumption, for its part, performed much better than expected, registering a multi-year high in quarterly growth (10.3%) and annual growth (19.2%) that outpaced that for GDP and domestic demand. This performance can be explained, primarily, by an increase in salaries for public officials (2.6%), which was paid retroactively in the third quarter, and by an increase in intermediate consumption (honoraria, general spending, and materials and supplies) with the return of in-person work in many public offices. Public spending was also supported by the COVID-19 vaccination campaign. Overall consumption grew in annual terms by 19.4%, rising 9.9% above the fourth quarter of 2019.

Gross fixed capital formation grew less than expected due to a slow recovery in construction investment and remains well below pre-pandemic levels. Total investment grew in annual terms by 9.2% (Graph 3.10), increasing moderately in levels that nonetheless remain 13.3% behind figures prior to the pandemic. Investment performance was limited by the construction sector. Housing investment, for example, reversed only about a third of its second-quarter decline, and other buildings and structures fell again in quarterly terms (-5.0%). In the first case, weakness in non-social housing development continued. In the latter, supply side data suggests continued weak performance in public works. By contrast, investment in machinery and equipment grew between quarters, recovering above pre-pandemic levels and close to those from the first quarter of 2021. This result was consistent with an increase in capital goods imports, primarily through increased transportation equipment purchases.

The trade deficit continued to grow in real peso terms, despite significant recovery in exports in the third quarter. External sales grew 11.3% in quarterly terms thanks to positive performance both in goods and in services. In the first case, quantity figures suggest that the increase was concentrated in coffee, iron-nickel alloy,

and non-traditional exports, which grew 68.8%, 89.2% and 27.5%²⁶, respectively, from the second quarter. By contrast, coal and oil exports continued at low levels. The resolution of port blockages, together with the recovery of some trade partners, allowed for positive performance of non-traditional exports. Imports continued to increase in levels in the third quarter (5.4%), rising 10% above pre-pandemic figures. This was driven primarily by consumer goods purchases and was consistent with the increase in domestic demand. While the net contribution of external demand to annual GDP growth was negative (-4.9 pp), its downward contribution was smaller than in the second quarter (Graph 3.11).

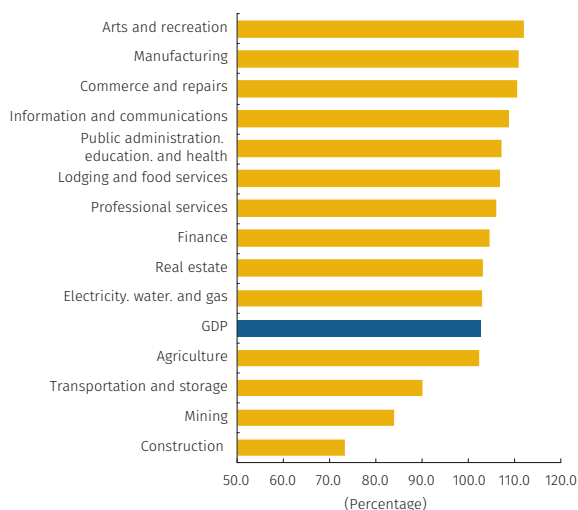
Graph 3.11
Exports, imports, and trade balance ^{a/}
(annual change and trillion 2015 pesos)



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

Most major production components surpassed pre-pandemic levels in the third quarter, though some sectors lagged behind (Graph 3.12). Industrial manufacturing, retail and wholesale commerce, and the repair and maintenance of vehicles returned to growth after falling in levels in the second quarter. Value added from industrial manufacturing registered substantially higher levels than those prior to the pandemic, which would be associated with domestic demand performance and the recovery of trade partner economies. Significant recoveries in numerous services sectors have been driven by a variety of factors, including Colombia’s national vaccination campaign; consumers’ growing ability to adapt to pandemic conditions; improved labor market performance; a gradual recovery of household income; and excess savings. The improvement in the lodging and food services sector is particularly of note, where value added has surpassed pre-pandemic levels. By contrast, transport and storage, mining, and construction have lagged behind. Growth in construction (both in buildings and in public works) was appreciably lower than expected in the last report, receding in quarterly terms and registering levels well below those from 2019.

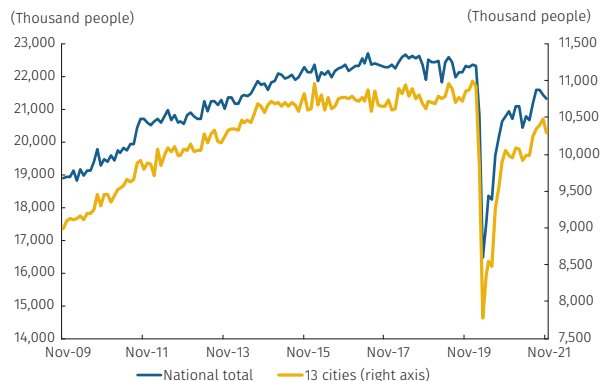
Graph 3.12
Sector-level value added in Q3 2021 relative to Q4 2019 ^{a/}
(Q4 2019 = 100%)



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

26 According to quantities index calculated by Banco de la República.

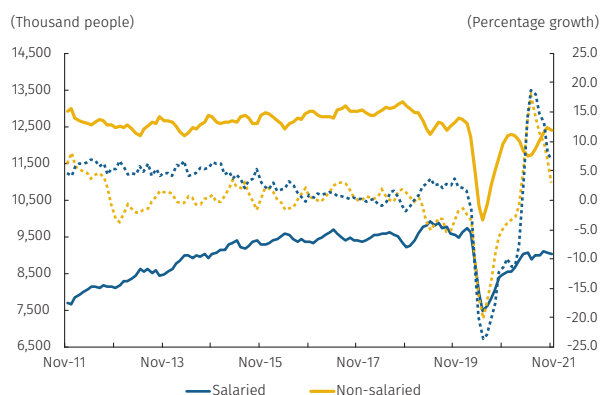
Graph 3.13
Employment
(seasonally adjusted monthly series)



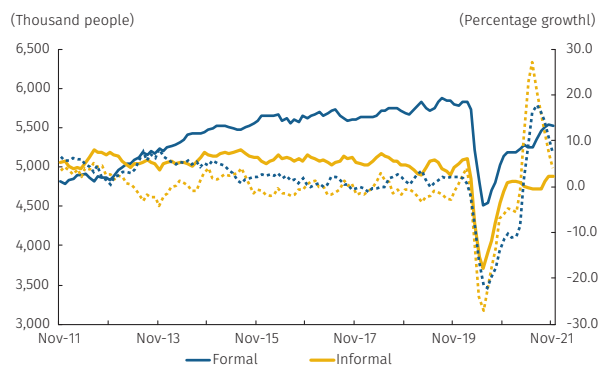
Source: DANE (GEIH); calculations by Banco de la República.

Graph 3.14
Jobs by type of employment
(seasonally adjusted moving quarter)

A: Salaried and non-salaried: national total



B: Formal and informal; 13 cities and metropolitan areas



Notes: The dotted lines represent annual growth (right axis). The national statistics agency (DANE) officially considers workers to be informal if they do not work in business establishments or companies that have up to five total employees across all sites, including management and/or partners and excluding self-employed workers, laborers, or government employees.
Source: DANE (GEIH); calculations by Banco de la República.

3.3 Labor Market²⁷

Employment recovery has stalled in recent months, with job figures in November that remained below pre-pandemic levels. According to the seasonally adjusted monthly series²⁸ from DANE's Integrated Household Survey (GEIH for its initials in Spanish), total national employment contracted in monthly terms in October by -0.7% (148,000 jobs) and in November by -0.6% (133,000 jobs) (Graph 3.13). This was due to less dynamism in job creation in rural areas and secondary municipalities, as well as by slow recovery in urban employment, which in November fell by 1.8% (189,000 jobs) compared to October. As a result, the recovery in employment has stalled and still lags well behind the recovery in economic activity. There are close to 1 million fewer employees than in February 2020. In addition, the recovery has been heterogeneous, with sectors such as transportation and communications and professional activities that already register employment similar to levels from before the pandemic, while in sectors such as manufacturing and recreation it is still below 2019 levels.

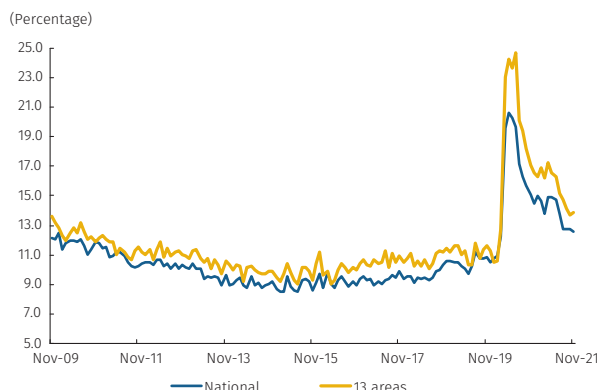
National non-salaried employment and urban informal employment have been the most dynamic sectors. After falling in the first half of the year, national non-salaried employment recovered in the second half of 2021 and has already returned close to pre-pandemic levels. Recovery in salaried employment has been less dynamic and its levels have remained relatively stable in recent months, but lower than pre-pandemic levels (Graph 3.14, Panel A). In urban areas, formal employment behavior is similar to that observed in salaried employment. While in October and November the formal and informal sectors remained stable, it is the informal sector that has driven job growth in recent months (Graph 3.14, Panel B). The informality rate has stopped declining as a result. Despite this, alternative indicators based on administrative registers, such as the PILA pension system, suggest that formal employment has been more dynamic. The number of people filing for pensions continues to rise, for example, and has now returned to pre-pandemic levels.

The national unemployment rate has remained relatively stable in recent months, while the urban unemployment rate has declined gradually. After a significant contraction

27 For a more detailed analysis of the recent evolution of the labor market, see Banco de la República's Labor Market Report, available at <https://www.banrep.gov.co/es/reporte-mercado-laboral>

28 The labor market is seasonal, which is to say that its values are systematically higher or lower depending on the month of the year. This phenomenon needs to be isolated using statistical techniques in order to make comparisons between months in the same year. As a result, the information presented in this section corresponds to the series without those calendar effects, known as the seasonally adjusted series.

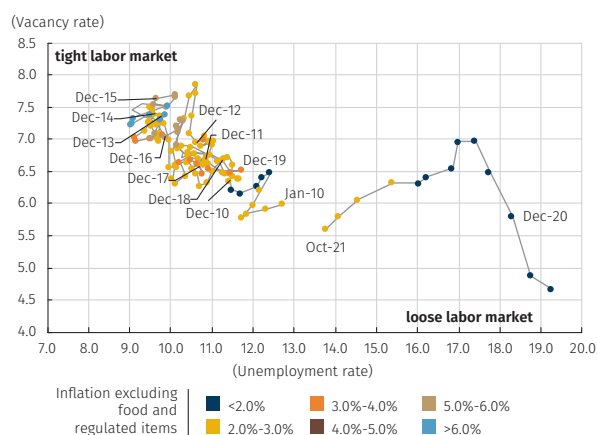
Graph 3.15
Unemployment rate by location
(seasonally adjusted monthly series)



Source: DANE (GEIH); calculations by Banco de la República.

of the labor supply at the beginning of the pandemic and its subsequent recovery alongside the gradual reopening of distinct economic sectors, labor force participation remains stagnant, and a year has passed without a significant increase. Alongside less dynamic job growth, this has led the seasonally adjusted national unemployment rate (12.6% in November (Graph 3.15)) to remain relatively stable. The urban unemployment rate has retained a slight downward trend, and in November was 13.9%. While the labor market overall has corrected somewhat after the initial shock of the pandemic, there remain significant variations within the market, many of which were accentuated by the health crisis. For example, the unemployment rate gap for women is still high (7.2 pp in the moving quarter to November) despite some improvement on the margin due to a smaller reduction in the unemployment rate for men than for women.

Graph 3.16
Beveridge curve for seven largest cities



Notes: Seasonally adjusted series. Moving quarter. Based on vacancy rate estimated using GEIH hiring methodology, see Morales, L.F., & Lobo, J. 2017. Estimating Vacancies from Firms' Hiring Behavior: The Case of a Developing Economy, *Barradores de Economía*, no. 1017. The estimate of the Beveridge curve is not available for the period between March and September 2020, due to the fact that the vacancy indicator with which it would normally be obtained could not be calculated because of a reduction in the number of questions in the GEIH. Source: DANE (GEIH) and Banco de la República.

The labor market remains loose, though with less deflationary pressures than registered at the start of the pandemic. In recent months, job vacancy indices have shown mixed behavior. On one side, calculations based on classified ads and the Public Employment Service show a significant recovery in the demand for new jobs. This would be coherent with the observed increase in the portion of business managers who expect payroll increases in the next six months, as indicated by Banco de la República's monthly economic expectations survey. This survey also shows an increase in bottlenecks in firms' hiring, and as a result these expectations have not yet translated into an acceleration of job creation. On the other hand, job vacancy indices estimated based on hiring in the GEIH show demand for new jobs that has remained relatively stable. This, together with unemployment rates that remain at levels above those observed at the beginning of 2020, suggest, in light of a Beveridge curve²⁹ (Graph 3.16), that the labor market would continue to be loose but correcting, and therefore would generate less deflationary pressures than those observed prior to the pandemic. Labor income information from the GEIH points in the same direction and signals that real median monthly income through the non-salaried segment, while recovering, continues far below pre-pandemic levels (around 8 pp lower). For its part, real labor income in the salaried sector has continued to be relatively stable.

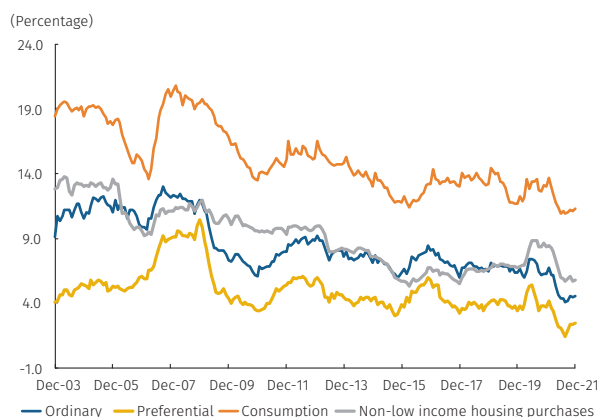
29 The Beveridge curve is a graphic representation of the relationship between the vacancy rate and the unemployment rate.

Chart 3.1
Average monthly interest rates

	Feb-20	Mar-21	Jun-21	Sep-21	Dec-21
Interbank					
Policy rate	4.25	1.75	1.75	1.76	2.70
Overnight interest rate (TIB)	4.26	1.71	1.76	1.79	2.73
BBI overnight	4.25	1.71	1.75	1.77	2.72
BBI 1-month	4.25	1.75	1.76	1.93	2.96
BBI 3-month	4.25	1.74	1.91	2.27	3.36
BBI 6-month	4.27	1.77	2.15	2.76	3.97
Deposits					
Savings	2.37	1.02	0.96	0.97	1.19
DTF 90-day	4.46	1.77	1.91	2.05	3.08
CD 180-day	4.69	2.16	2.21	2.45	3.71
CD 360-day	5.36	2.58	3.23	3.16	5.10
CD > 360-day	5.71	2.92	3.89	3.68	7.14
Credit					
Preferential	7.01	4.53	4.84	4.98	6.00
Ordinary	9.74	7.27	7.18	7.34	8.18
Non-low income housing construction	9.35	7.19	7.00	7.46	7.92
low income housing construction	9.08	6.42	6.52	6.86	7.33
Non-low income housing purchases	10.50	9.09	8.88	9.06	9.40
low income housing purchases	11.89	10.43	10.41	10.98	11.55
Personal loans consumption	17.09	15.42	16.11	17.09	17.51
Payroll lending consumption;	13.55	12.10	11.47	11.23	11.65
Credit card	25.48	24.19	23.87	23.49	24.47

Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República

Graph 3.17
Real credit interest rates
(average monthly data deflated with CPI excluding foods)



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

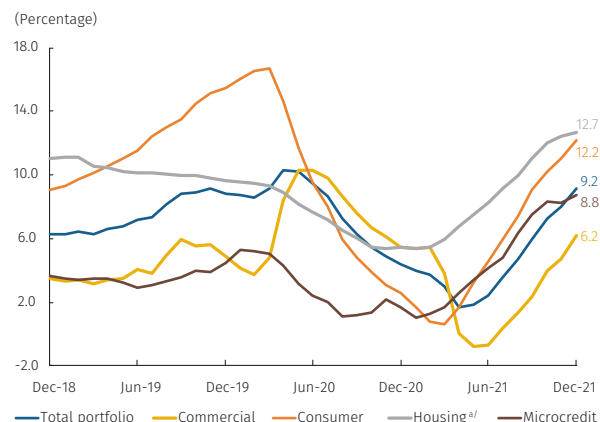
3.4 Financial and Money Market

Financial conditions are somewhat tighter than detailed in the previous report but remain loose and continue to support economic activity. Last September, the BDBR began the process of monetary policy normalization. This has been reflected in increases in savings and credit interest rates. However, real active and passive interest rates in the financial system remain at low levels. Credit continues to accelerate, particularly in the household portfolio, which grew in annual terms at a rate similar to that for nominal estimated GDP in 2021. This has come alongside strong performance in private consumption, a recovery in confidence, relatively stable real income, and high portfolio levels in national currency relative to output. Credit risk continues to moderate but remains high. Earnings in the financial system returned to pre-pandemic levels.

The increase in the monetary policy interest rate passed through on interbank, term savings, and credit rates, but remains low in real terms. Overnight money market interest rates – the interbank rate and the benchmark banking indicator (BBI) – increased to levels similar to the monetary policy rate in the fourth quarter. The quarterly increase in savings deposit rates was moderate (20 bp). The BBI and deposit interest rates at longer-term have been increasing since the second quarter, pointing in part to expected increases in the monetary policy rate (Chart 3.1). As a result, in December the BBI at one, three, and six months was above the policy rate on average by 26 bp, 66 bp, and 127 bp, respectively. CD rates at 90, 180, 360 days and beyond rose, on average, to 3.1%, 3.7%, 5.1%, and 7.1%. Interest rates increased in the quarter for all credit modalities, with the largest increase in preferential interest rates (102 bp) and the lowest in non-low income housing purchases (35 bp). Despite the transmission of policy rate increases on credit rates, these remain at historically lows in real terms (Graph 3.17).

Credit continues to accelerate and contribute to positive output performance. The loan balance in national currency reached COP 540 trillion in December, increasing in annual terms by 9.2% compared to 5.9% in September. This performance was led by household credit, particularly consumer credit, which in December grew in annual terms by 12%, close to the nominal GDP increase estimated for 2021 (Graph 3.18). The mortgage portfolio maintained its positive performance of the last two years, increasing in annual terms in December by 13%, primarily as the result of peso disbursements for non-low-income housing purchases, which represent close to 75% of this modality. The commercial portfolio also accelerated from 2.4% annually in September to 6.2% in December, with ordinary loans (medium and small businesses) increasing and

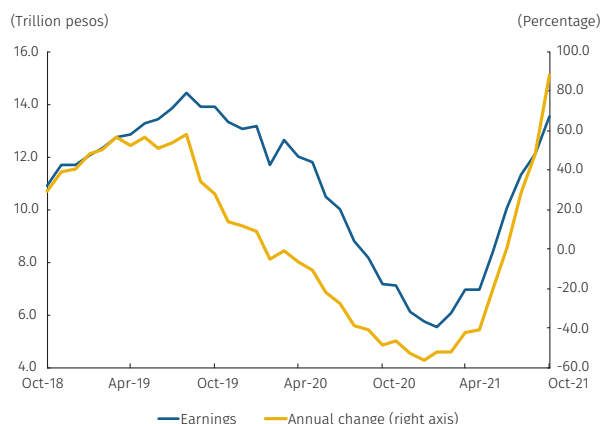
Graph 3.18
Gross national currency portfolio
(annual change, average monthly data)



a/Adjusted housing: banking portfolio plus securitizations
Source: Office of the Financial Superintendent of Colombia; Calculations by *Banco de la República*.

disbursements at more than three years rising from 26% to 33%. This behavior came in the context of reduced tension in portfolio risk indicators and a recovery in earnings among credit establishments. In fact, the portfolio deterioration associated with COVID-19 may already have been assimilated, as suggested by the stability both in the default indicator (including write-offs)³⁰, and in liability provisions and a decline in the risk portfolio (which through October in 2021 fell from COP 63 trillion to COP 55 trillion). In October accumulated earnings for 12 months reached COP 13.5 trillion, surpassing 2019 figures (COP 13.2 trillion) (Graph 3.19). Intermediaries maintain ample margins in solvency, liquidity, and funding stability indicators.

Graph 3.19
Credit establishment earnings
(12-month accumulation and annual change)



Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República*.

30 Default portfolio plus write-offs in relation to the gross portfolio.

Box 1 Index of Common Inflation Expectations for Colombia

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Anderson Grajales-Olarte
Julián Mateus
Carlos Quicazán
Sebastián Rojas*

This box outlines the uses and construction of *Banco de la República's* (*BanRep*) index of common inflation expectations for Colombia (ICEI for its initials in Spanish). This new tool of analysis captures commonalities within a wide array of indicators of expected inflation from diverse economic agents and across varying time horizons.

As mentioned in previous Monetary Policy Reports¹, inflation expectations provide vital information for central banks. They allow policymakers to evaluate the current and future states of the economy and can be used to guide monetary policy and compare inflation forecasts. In this context, the ICEI captures within a single indicator the commonalities contained within a diverse set of expected inflation indicators.

The construction of *BanRep's* ICEI follows closely on work published by Ahn et al. (2020) in the U.S. Federal Reserve's *Fed's Notes* on its own Index of Common Inflation Expectations (CIE). The Fed's index considers 21 indicators of expected CPI, core CPI, and personal consumption expenditures (PCE) inflation. The sources of information include surveys of various economic agents and information gleaned from financial markets

The following sections describe methodological aspects of *BanRep's* ICEI, the data sets used for its estimation, and its primary results.

1. Methodology

The ICEI estimate is based on a dynamic factor model (DFM)² that captures the common movements within a set of time series, extrapolating a unique unobservable³ signal or common factor. *BanRep* has used this methodology in the past, for example for forecasts of economic activity (Galeano-Ramírez et al., 2021) and an indicator for the Colombian labor market (Cristiano-Botia et al., 2021).

ICEI construction standardizes⁴ the measures of expected inflation to reduce possible estimation biases caused by the volatility of some series. As a result, the ICEI level cannot be interpreted in economic terms. However, the indicator does provide information over the common dynamic of the set of expectations being analyzed.

The space-state representation used in the construction of the ICEI is as follows:

$$Y_t = Z_t x_t + \varepsilon_t$$

$$x_t = \rho x_{t-1} + \eta_t$$

Where Y_t is a vector of observed variables, Z_t is the vector of parameters to be estimated, and x_t is a latent factor that accounts for the common signal in the expectation measures and follows an AR(1) process. The terms ε_t and η_t denote shocks to the measurement and transition equations, respectively, and ρ is the persistence of the factor x_t . The ICEI contains both monthly and quarterly expectations. As a result, a weighing matrix of ones and zeros is introduced into the measurement equation, allowing for unobserved variables in the period t to be discarded in quarterly observations.

The estimate of the DFM parameters is done by maximizing the likelihood function through a particle swarm optimization (PSO) metaheuristic (Kennedy et al., 1995). In addition to the parameters of the model, the estimate of the common factor of the set of expectations under consideration is obtained through this exercise.

The ICEI could be projected⁵ on a particular indicator of inflation expectations, or even on a series of observed inflation, to obtain an interpretable level. However, the results depend to a large degree on the individual indicator, whose selection is subjective. With that in mind, *BanRep* does not forecast the ICEI and the analysis is focused on its dynamic, more so than on its level in absolute terms. That said, relative comparisons can be drawn on the ICEI level over the length of the historical series of the indicator.

2 Stock and Watson (2011) conducted a literature review related to the applications, empirical findings, and theoretical results of the DFM.

3 Ahn et al. (2020) represents the unobserved common factor as the measure considered by the set of inflation expectations, whose weights are directly related with collective movements of the series.

4 To standardize a series, the indicator average is removed and divided by its standard deviation. The new indicator will have an average of 0 and the standard deviation will equal 1.

5 The projection consists of reverting the standardization process used in the time series in question. For example, the Fed projects the CEI for expected inflation at 10 years from the Survey of Professional Forecasters.

* The authors work in the Macroeconomic Models Department and the Operations and Financial Markets Analysis Department at *Banco de la República*. The opinions expressed herein are exclusively their responsibility and do not necessarily reflect those of *Banco de la República* or its Board of Directors.

1 See <https://www.banrep.gov.co/es/informe-politica-monetaria-enero-2021-0> and <https://www.banrep.gov.co/informe-politica-monetaria-abril-2021-0>

2. Data

Construction of the ICEI considers 40 indicators of expected inflation, which include data on both the headline inflation basket and the basket excluding food. These indicators account for diverse terms, frequencies (monthly or quarterly), and sources of information (surveys and financial market information). Chart B1.1 illustrates the set of indicators included in the ICEI estimate. The sample period runs from January 2010 to January 2022, during which the average of the set of indicators of expected inflation is relatively stable around the long-term target.

2.1 Surveys

Surveys explicitly delve into inflation expectations among diverse economic agents. *BanRep*'s ICEI is constructed using several different surveys: a monthly survey of analyst expectations (EME for its initials in Spanish); a monthly survey of financial opinion (EOF) among analysts and portfolio managers; a monthly survey by Focus Economics; and a quarterly survey of economic expectations (ETE) among academics, union members, and business managers from diverse economic sectors⁶.

Forecast horizons for the EME and ETE are up to 24 months, for the EOF to the end of the following year, and for the Focus Economics survey for the end of the year in progress and each of the following four years.

Chart B1.1
Inflation expectations included in the ICEI^{a/}

Frequency	Indicator	Inflation type	Time horizon			
			Short term		Medium term	Long term
			1 year	2 years	2-5 years	5+ years
Monthly	BEI	Headline	BEI 1Y	BEI 2Y, FBEI 1Y-1Y	BEI 5Y, FBEI 2Y-3Y	BEI 6-10Y, FBEI 5Y-5Y
	Disaggregated BEI	Headline	Exp_BEI1Y	EXP_BEI2Y, EXP_FBEI 1Y-1Y	Exp_BEI 5Y, Exp_FBEI 2Y-3Y	Exp_BEI 6Y-8Y, Exp_FBEI 5Y-3Y
	EME	Headline	EME 1Y	EME 2Y		
	EOF	Headline	EOF 1Y			
	Focus Economics	Headline			Year-end next 2, 3 and 4 years	
	EME	Excluding food	EME SY 1Y	EME SY 2Y		
				Industrial 1Y	Industrial 2Y	
Quarterly	ETE	Headline		Financial 1Y	Financial 2Y	
				Warehouses 1Y	Warehouses 2Y	
				Transport 1Y	Transport 2Y	
				Academics 1Y	Academics 2Y	
				Unions 1Y	Unions 2Y	

a/ Expected inflation taken from BEI disaggregated for expectations, inflation risk premium, and a component of relative liquidity of TES in pesos and TES UVR. Sources: *Banco de la República*, Fedesarrollo, Focus Economics, SEN, and MasterTrader.

2.2. Financial Market

The ICEI also incorporates expected inflation indicators implicit in the sovereign bond market data, specifically breakeven inflation (BEI) and forward breakeven inflation (FBEI) rates.

BEI measures average inflation expected by economic agents investing in sovereign bonds. For Colombia, specifically, these illustrate the difference in yield between domestic currency bonds (TES in pesos) and inflation-linked bonds (TES in UVR). However, BEI rates can also reflect not just expected inflation but also uncertainty about those expectations, as well as liquidity frictions. In order to measure the specific component of BEI related to expected inflation (Exp_BEI), *BanRep* uses the decomposition methodology presented in Espinosa-Torres et al. (2015).

BanRep also monitors FBEI rates, which provide a measure of expected inflation that controls for the effects of short-term shocks. For example, the FBEI rate at two to five years reflects average inflation expected over the course of a five-year period that begins after two years. In this example, inflation expectations for the first two years would be removed from the analysis.

The ICEI incorporates information from the BEI and FBEI rates, including estimates of the specific component of expected inflation (Exp_BEI and Exp_FBEI) on different

6 *BanRep* administers the EME and the ETE. The EOF is administered by the Colombian stock exchange (BVC) and Fedesarrollo for analysts and portfolio managers.

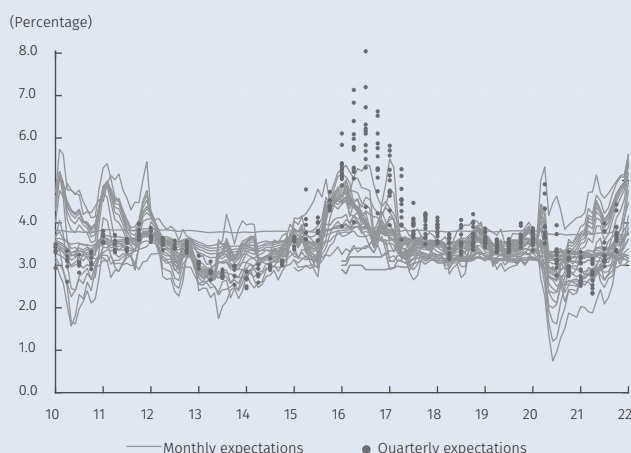
time horizons (see Chart B1.1). How BEI and FBEI rates are calculated is illustrated in Annex B1.1.

Graph B1.1 shows the different inflation expectations included in the construction of the ICEI, illustrating the common movement among them over the sample period. For periods in which inflation has moved away from the target rate, financial market expectations have reacted faster than survey expectations. For example, since 2010 the standard deviation of the BEI to one year is 0.95 percentage points (pp), higher than for expected inflation in the EME in the same period (0.44 pp). The graph also shows that, during periods of high inflation, expectations from the ETE tend to be at the higher end of the distribution.

3. Main Results

The ICEI is estimated at different terms, with the goal of controlling for the potential effects that the aggregation of expected inflation at different time horizons could have

Graph B1.1
Inflation expectations in Colombia



Sources: Banco de la República, Fedesarrollo, Focus Economics, SEN, and MasterTrader.

on the analysis of the indicator. Graph B1.2 illustrates the common factor in the short (less than two years, panel A), medium (between two and five years, panel B) and long term (more than five years, panel C). Inflation expectations used in the construction of the ICEI at each time horizon are shown in grey.

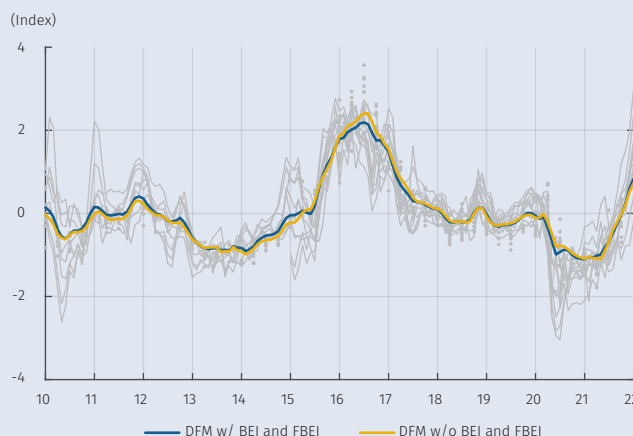
The ICEI also accounts for the effect that inflation and liquidity risk premiums could have relative to BEI and FBEI rates and, in turn, on the ICEI, primarily in the long term. To deal with this issue, Graph B1.2 shows the dynamic factor estimated with BEI and FBEI rates (blue line) and without them (yellow line).

For each time horizon under consideration, the recent ICEI behavior suggests a rapid fall in expected inflation in the first half of 2020, associated with the COVID-19 pandemic. Expected inflation has increased since then. However, the longer the time horizon, the more pronounced this upward trend appears. For example, the short-term ICEI suggests an upturn in expected inflation starting at the beginning of 2021, while the medium- and long-term indicators suggest an increase on these time horizons starting in the second half of 2020.

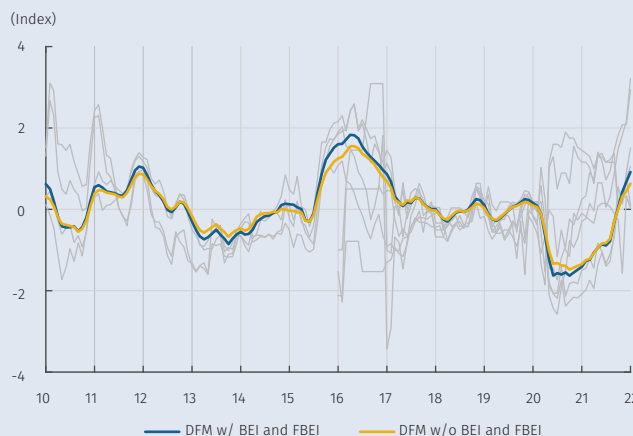
In general, the ICEI suggests expected inflation in January 2022 was higher than pre-pandemic levels, but lower than inflation levels expected by economic agents during the *El Niño* period that prevailed at the end of 2015 and in 2016.

Graph B1.2
Common indicator of annual inflation expectations (ICEI)
(January 2010 to January 2022)

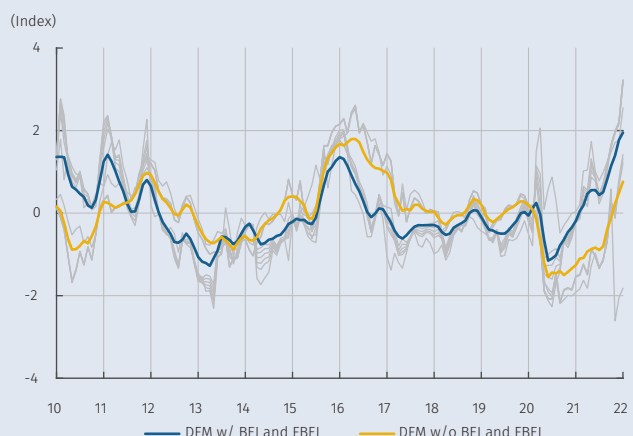
A. Short Term



B. Medium term



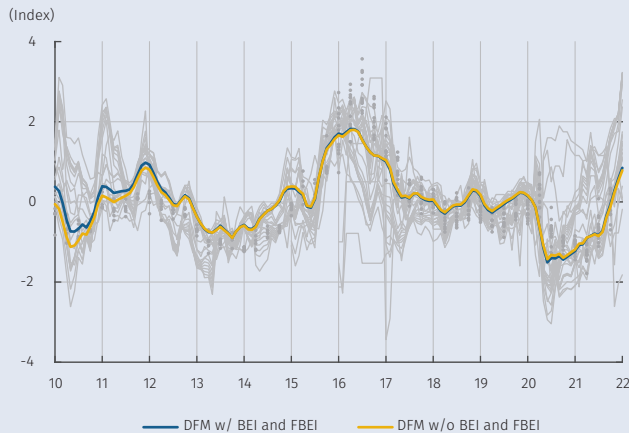
C. Long term



Sources: Banco de la República, Fedesarrollo, Focus Economics, SEN, and MasterTrader; calculations by Banco de la República.

Graph B1.2 (continued)
Common indicator of annual inflation expectations (ICEI)
(January 2010 to January 2022)

D. All terms



Sources: Banco de la República, Fedesarrollo, Focus Economics, SEN, and MasterTrader; calculations by Banco de la República.

On the long-term horizon, which includes the BEI and FB EI, the ICEI suggests a rapid increase in expected inflation after the pandemic, higher than expected by economic agents in the peak of 2016. The difference in these two indicators is due primarily to the inflation risk premium, which at this term implies a significant difference between the BEI overall and the component of BEI that specifically reflects expected inflation. On the remaining time horizons, the differences in the ICEI estimated using the DFM with and without the BEI and FB EI are small.

The ICEI constructed using expected inflation indicators on all time horizons reflects a similar dynamic to the medium-term indicator.

These results underline the ways in which the ICEI offers *BanRep* a new tool to analyze expected inflation at different terms. It captures, in one series, the dynamics implicit in a diverse set of indicators. The index suggests that expected inflation has been on an upward trajectory since the end of 2020, and that as of January 2022 was above pre-pandemic levels.

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Annex B1.1

This annex presents technical details on the calculation of BEI and FB EI rates:

Breakeven Inflation (BEI)

The BEI rate $\pi_t^{e,n}$ in time t at term n years is defined as follows:

$$\pi_t^{e,n} = \frac{(1+i_t^n)}{(1+r_t^n)} - 1$$

where i_t^n and r_t^n correspond to the bond return at a nominal rate (e.g. TES pesos) and a real rate (e.g.: TES UVR) respectively. The bonds have the same term of n years, and the same credit quality. The BEI rate $\pi_t^{e,n}$ reflects the average inflation expected over the course of the next n years.

2. Forward breakeven inflation (FB EI)

The FB EI rate $\pi_t^{e,a-b}$ represents the average inflation expectation over the course of b years beginning after a years. The FB EI rate $\pi_t^{e,a-b}$ is represented as follows:

$$\pi_t^{e,a-b} = \left[\frac{(1+\pi_t^{e,n})^n}{(1+\pi_t^{e,a})^a} \right]^{1/b} - 1$$

where $\pi_t^{e,a}$ and $\pi_t^{e,n}$ correspond to the BEI rates at terms a and n years, where $n = a + b$.

Box 2

Measurement of Inflation Expectations and its Effect on Inflation Dynamics in Colombia

Andrés Sánchez-Jabba*

This box shows estimates for New Keynesian Phillips Curves (NKPC) employing several measures of inflation expectations using information from financial markets and economic surveys. The coefficient properties (value, statistical significance, predictive capacity and goodness-of-fit) that result from varying these measurements within this variable are then analyzed. The latter is done to establish whether the incidence of inflation expectations on core inflation dynamics in Colombia depends on the measurement of this variable.

Market-based inflation expectations are calculated as the difference between real and nominal yields on domestic bonds (TES) with the same maturity term. This difference, known in the economic literature as breakeven inflation (BEI), reflects the minimum return required by an investor in order to hold these assets. Forward BEI (FBEI) controls for financial market effects and short-term inflationary shocks, reflecting expectations after certain time has elapsed. On the other hand, survey expectations are obtained from polls that reflect economic agents' forecasts of variables of interest (e.g., expected inflation). This eliminates the need to use additional instruments to approximate this variable (Adam and Padula, 2011; Henzel and Wollmershäuser, 2008).

Among the limitations of market-based measures of inflation expectations lies the difficulty in separating expectations from other factors that plausibly affect returns required by investors, such as inflationary risk and liquidity premium (Ríos and Girón, 2013; Melo-Velandia and Granados-Castro, 2012; Melo-Velandia and Moreno-Gutiérrez, 2010; Arias et al., 2005). Therefore, this exercise uses measures of BEI and FBEI that separates these components using the methodology outlined in Espinosa-Torres, et al. (2017).

Conversely, although surveys provide an explicit measure of expected inflation, they rely on methods and information specific polled agents, which can limit their effectiveness (Clements, 2019; Pesaran and Weale, 2006). To address this, the estimations conducted in this exercise include aggregate inflation expectations. The aim is to

mitigate respondent subjectivity and control for possible heterogeneity among agents.

Inflation dynamics are captured through an NKPC specification. In its hybrid version, which exhibits the best adjustment to the empirical evidence, the NKPC states that current inflation depends on past inflation, inflation expectations, and a measure of real economic activity, usually approximated through the output gap or based on real marginal costs. This can be expressed with the following equation:

$$\pi_t = \gamma_b \pi_{t-1} + \gamma_f E_t \{ \pi_{t+1} \} + \lambda x_t + \varepsilon_t$$

Where π_t is inflation in period t ; x_t approximates real economic activity¹; and $E_t \{ \pi_{t+1} \}$ denotes expected inflation.

Market-based expectations are obtained from *Banco de la República's* Operations and Financial Markets Analysis Department, while survey expectations come from the Bank's Quarterly Survey of Economic Expectations (ETE for its initials in Spanish). The use of quarterly data is determined by the availability of information for gross domestic product, which is necessary for the measurement of the output gap. Expectations reflect expected inflation in one year². Estimates were derived for the period 2008-2020 using the generalized method of moments for the following inter-annual measures of inflation: core inflation; inflation excluding food; inflation excluding food and regulated goods³. The exercise using survey data included expectations from the financial, academic, industrial, and retail sectors⁴.

The validity of models was assessed using Hansen's specification test⁵ and by comparing estimated coefficients with those reported by the literature concerned with NKPC estimations⁶. For all measures, 85% (or more) of the proposed specifications were valid according to Hansen's criterion, the exception being FBEI models, for which only

- 1 Real economic activity is measured through GDP and real marginal deviations with respect to their long-term trends; real marginal costs are calculated as the ratio between work income and nominal GDP, adjusted by the portion of output attributable to the labor factor.
- 2 BEI and FBEI are calculated as quarterly averages based on daily observations, although the results do not change when based on the median.
- 3 To focus the analysis on the influence of expectations on core inflation, the following inflation measures (which include volatile components) were discarded: headline inflation; food inflation; inflation for food and regulated goods. This helps minimize biases derived from possible correlation between expected inflation indicators and persistent shocks on headline inflation.
- 4 In addition to facilitating the estimation of non-linear models within these parameters, the generalized method of moments mitigates endogenous problems arising from measurement errors in expected inflation indicators.
- 5 The null hypothesis of Hansen's specification test establishes that the instruments employed in the estimation are jointly valid. The instruments included in the econometric exercise were: between three and six lags of inflation and real economic activity.
- 6 A total of 19 studies of the Phillips Curve, which reported 121 coefficients for expected inflation, were consulted.

* The author works at *Banco de la República's* Economic Policy Research Department. The opinions expressed herein do not necessarily reflect the views of *Banco de la República* or its Board of Directors.

21% passed the specification test⁷. The literature suggests that the effect of inflation expectations on inflation dynamics should be statistically significant and that the value of the estimated coefficient should lie between 0.1 and 1.2 (or between 0.46 and 0.95 under Colombian data) with an expected value of 0.67. The predictive capacity of inflation expectations was evaluated through Fisher's and Pesaran and Timmerman's tests, whose results suggest that the measures used in this exercise correctly predict the direction of changes in core inflation (Chart B2.1).

Graph B2.1 summarizes the results, which include 336 estimations. In general, these assert the statistical significance of the effect associated with inflation expectations, as well as their goodness-of-fit. This is reflected in the root-mean-square error and the R-squared. As expected, the value of the coefficient shows minor variations across measurements and economic agents, attributable to the measurement differences and heterogeneities mentioned above. However, these remain relatively bounded around values reported in the literature, without significant deviations between models. This indicates that the effect of inflation expectations on inflation dynamics in Colombia is highly robust, as said effect exhibits consistent patterns when employing different measures for this variable.

Chart B2.1
P-value from Fisher and Pesaran-Timmerman (P-T) directionality tests for expected inflation ^{a/}

Source	Core inflation					
	excluding food		excluding food and regulated items		Core 15	
	Fisher	P-T	Fisher	P-T	Fisher	P-T
Finance	0.000	0.000	0.000	0.000	0.000	0.000
Academia	0.000	0.000	0.000	0.000	0.000	0.000
Industry	0.000	0.000	0.000	0.000	0.000	0.000
Retail	0.000	0.000	0.000	0.000	0.000	0.000
ETE	0.000	0.000	0.000	0.000	0.000	0.000
BEI	0.000	0.000	0.000	0.000	0.000	0.000
FBEI	0.000	0.000	0.000	0.000	0.000	0.000

a/ The null hypothesis of the Fisher (Pesaran-Timmerman) test establishes that the series of expected inflation and observed inflation are independent (they come from independent distributions). At 95% statistical confidence, the null hypothesis is rejected when the p-value is less than 0.05. In this context, the rejection of the null hypothesis indicates that the measure of inflation expectations being analyzed in the test correctly predicts the direction of the changes observed in core inflation.
Source: calculations by the author.

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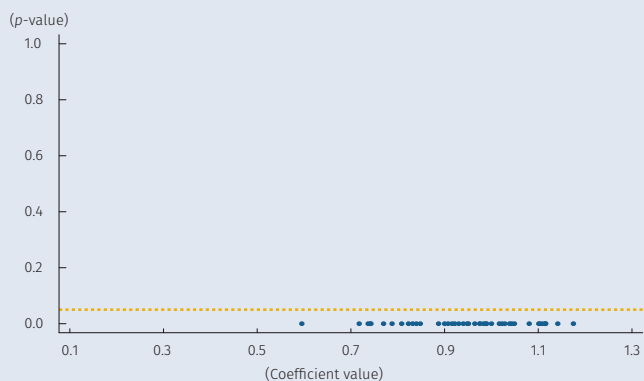
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7 A possible explanation for this relates to the time horizon, as the FBEI is formulated after a year has passed, which can affect the precision of this variable on a Phillips Curve. Equally, it could indicate that short-term shocks on headline inflation affect the formation of expectations relevant for price formation gathered by the measures of core inflation.

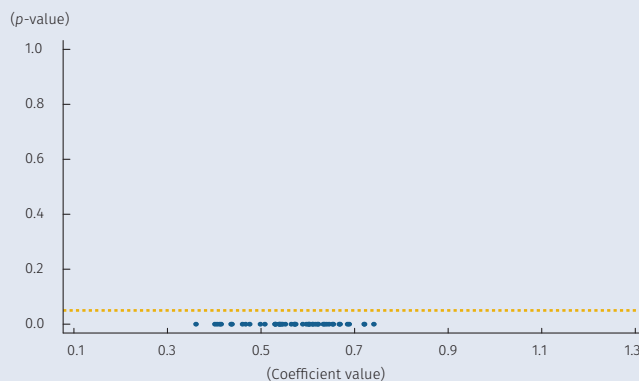
Graph B2.1
Effect of inflation expectations on inflation dynamics in Colombia using market and measures indicators (2008-2020)^{a/}

A. p-value (vertical) and coefficient value (horizontal)^{b/}

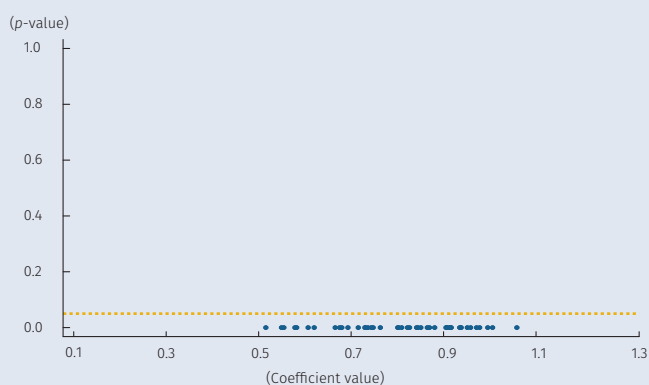
i. Finance



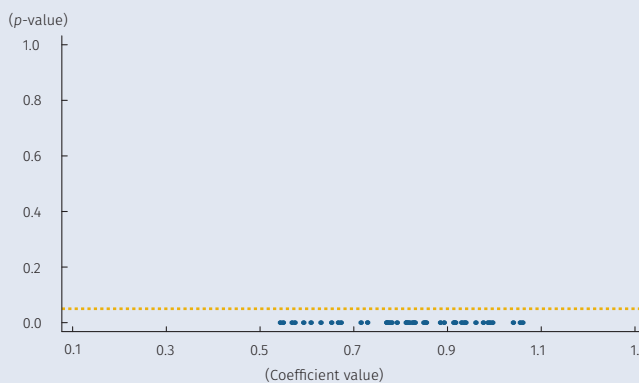
ii. Academia



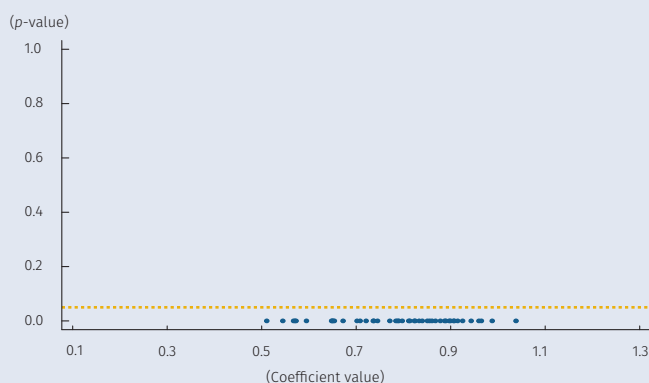
iii. Industry



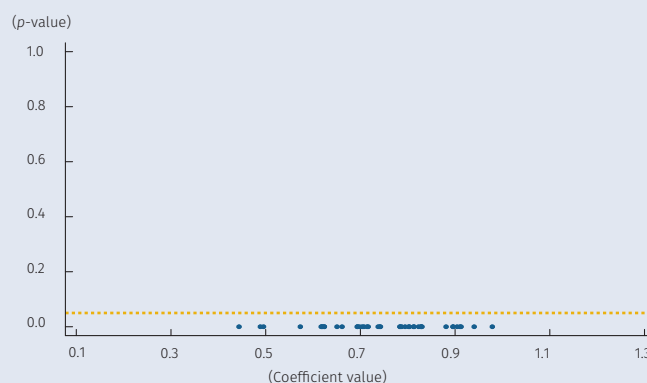
iv. Retail



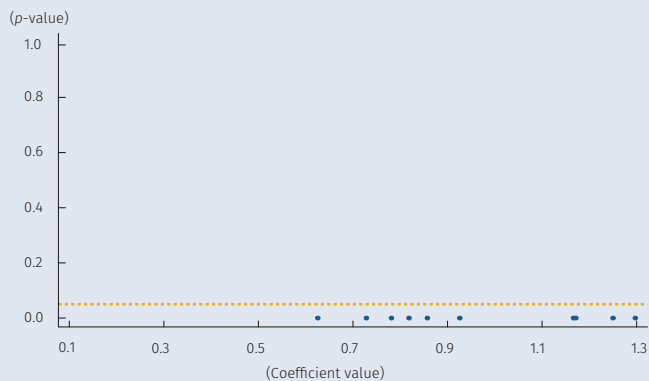
v. ETE



vi. BEI



vii. FBEL



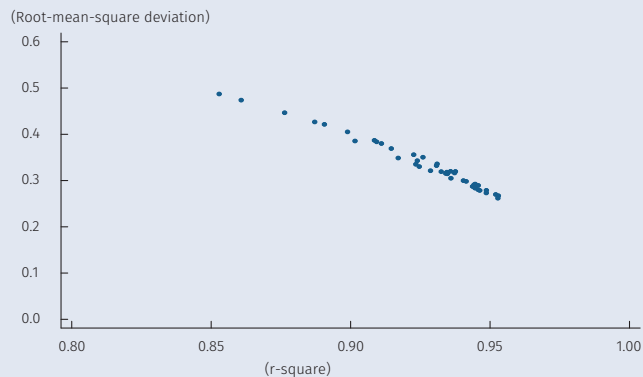
a/ This graph summarizes the results of the estimations for Colombia off the New Keynesian Phillips Curve using various measures of inflation expectations.
b/ The y-axis indicates the p-value of the effect associated with expected inflation, the x-axis shows the value of the estimated coefficient. The horizontal yellow line marks the threshold for statistical significance with 95% confidence. If the p-value is below the yellow line, it is concluded that the effect of the expected inflation indicator is statistically significant
Source: calculations by the author.

Graph B2.1 (continued)

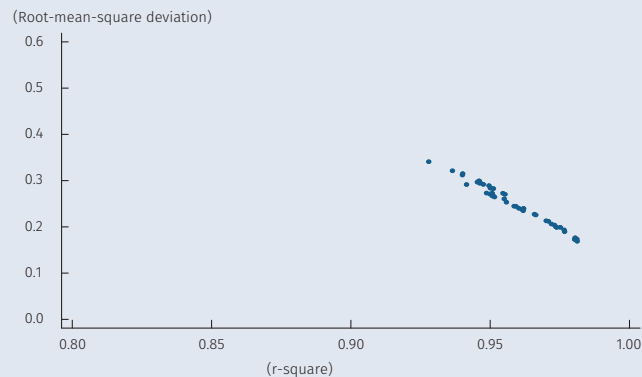
Effect of inflation expectations on inflation dynamics in Colombia using market and measures indicators (2008-2020)

B. Root-mean-square deviation (vertical) and R-squared (horizontal)^{c/}

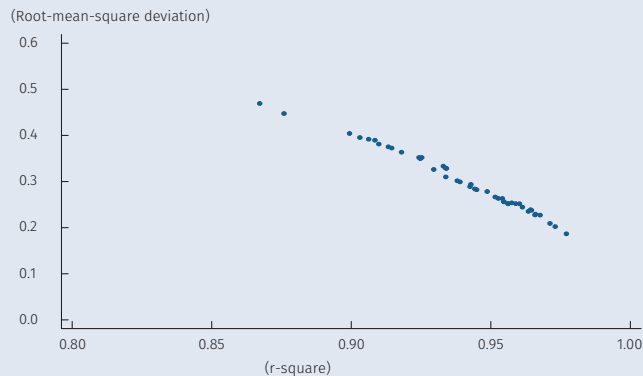
i. Finance



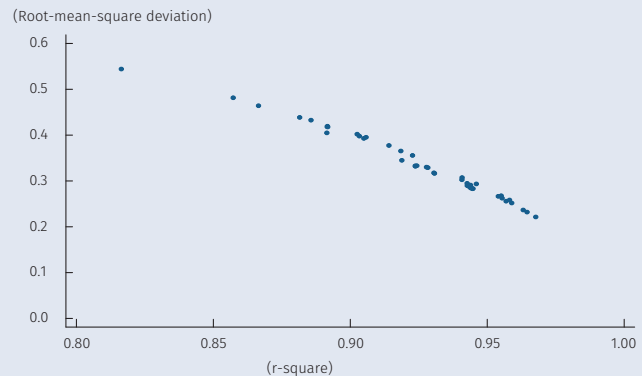
ii. Academia



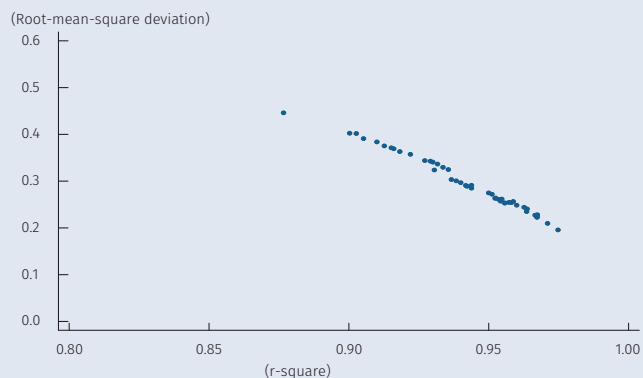
iii. Industry



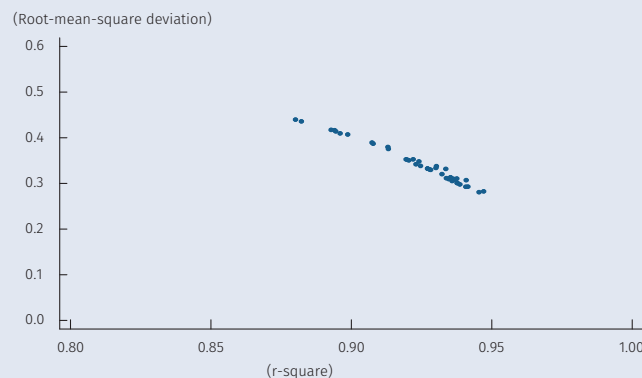
iv. Retail



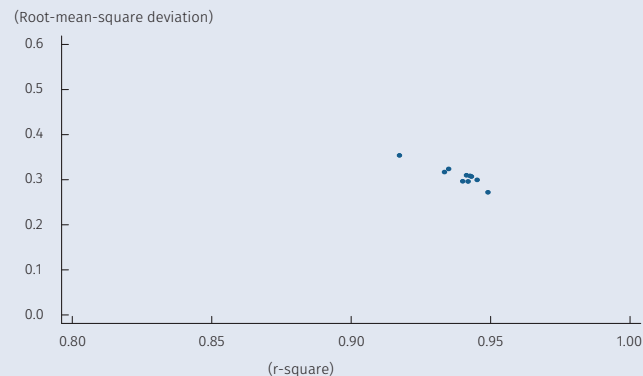
v. ETE



vi. BEI



vii. FBFI



c/ The y-axis indicates the root-mean-square deviation; the x-axis denotes the R-squared of the estimated model. The lower (larger) the value of the root-mean-square deviation (R-squared), the better the goodness-of-fit of the estimated model. Source: calculations by the author.

Box 3 Recent Dynamics in Colombian Beef Prices¹

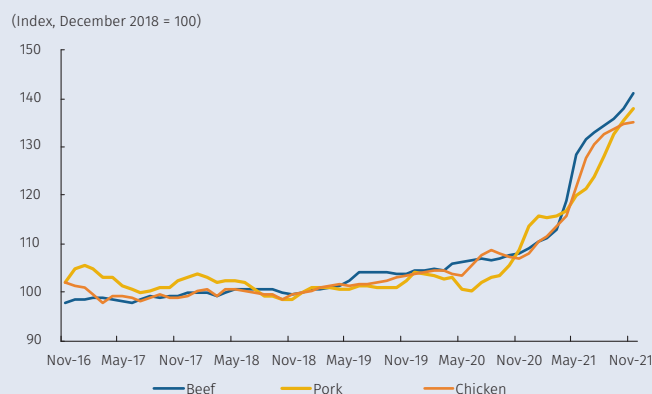
Margarita Gáfaró
Dairo Estrada
Alexander Almeida*

This box provides a descriptive analysis of recent dynamics in Colombian beef prices. It first highlights price behavior for beef and its main substitutes, then discusses possible hypotheses for recent developments. Finally, it offers a medium-term outlook for price behavior.

Graph B3.1 illustrates consumer price indices (CPIs) for different animal proteins in Colombia. The graph suggests that chicken, pork, and beef prices grew below 1% annually between July 2017 and July 2019, before substantial increases in 2021. Between January and November 2021, beef prices rose 29.5%, chicken 24.9%, and pork 21.5%.

The recent increase in domestic meat prices coincides with rising international prices (Graph B3.2). These have been associated with high commodity prices for corn and soy, which are important in meat production, and with demand pressures as economies recover from COVID-19. This external price environment could affect Colombian beef prices directly, through increased foreign demand and higher production costs, and indirectly through higher prices for protein substitutes.

Graph B3.1
CPI for meat by type

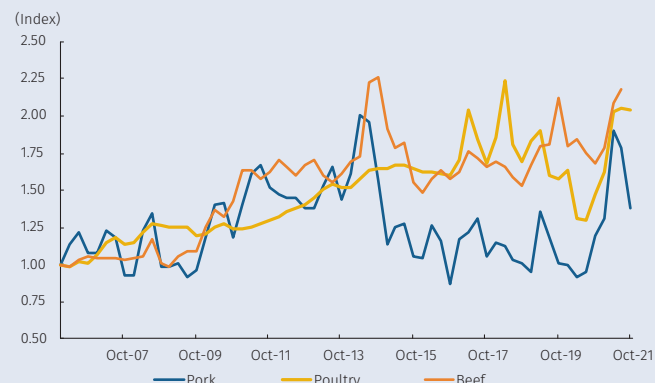


Source: DANE; calculations by the authors

¹ The authors would like to thank Edgar Caicedo from Banco de la República and Oscar Cubillo from FEDEGAN, whose insight was vital for the writing of this report, and FEDEGAN, which provided essential information.

* The authors work in Banco de la República's branch office in Cali. The opinions expressed herein are their exclusive responsibility and do not necessarily reflect the views of Banco de la República or its Board of Directors.

Graph B3.2
International price index in dollars for meat by type^{a/}
(2006, Q4 = 100)



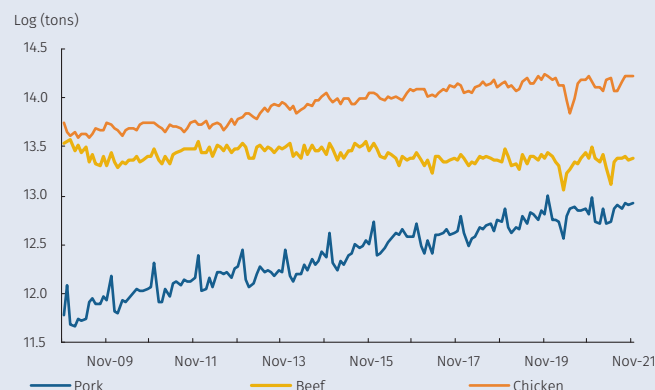
a/ Each price corresponds to the price for the main exporter of each product
Source: International Monetary Fund; calculations by the authors

1. Production Shocks on Beef Substitutes

Between 2017 and 2020, Colombian pork and chicken production grew by 129.0% and 52.7%, respectively, while beef production declined 12.3% (Graph B3.3). Growth in the pork and chicken supply, associated partly with improvements in production technology, generated downward pressure on prices for these products and their substitutes, including beef. However, this effect may have been reversed in 2021 amid higher input costs and roadblocks associated with a national strike that particularly hampered chicken and pork production. According to the National Federation of Grain, Legume, and Soy Farmers (FENALCE for its initials in Spanish), the price to domestic producers for grains, legumes, and soy, all of which are important for pig- and chickenfeed, rose 56% from January 2020 to November 2021. Meanwhile, roadblocks in the second quarter of 2021 affected food deliveries to some poultry and pig farms in Colombia's southwest, affecting animal growth and reproduction cycles and leading to persistent effects in medium-term supply.

The shock to chicken and pork production may have set off a demand shock in the market for substitute proteins. Given

Graph B3.3
Production volume for beef, pork, and chicken^{a/}



a/ Weight for pork and beef includes production for domestic consumption and exports. Chicken production is measured as weight in meat
Source: DANE and FENAVI; calculations by the authors

the lag between calf reproduction and cattle slaughter, and retention and liquidation cycles for livestock, the supply of beef is relatively inelastic in the short term. In this context, a demand shock might put upward pressure on beef prices.

Graph B3.4 shows the evolution of the margin between consumer and producer prices for beef in Colombia. This indicator, which serves as a proxy of commercial margins on domestic beef production, grew 5% between January and November 2021 after four years of relative stability. This increase, after a demand shock along the lines of what would be expected from increases in chicken and pork prices, would be consistent with imperfect competition in the beef market.

Graph B3.4
Commercialization margin for beef^{a/}
(December 2018 = 100)

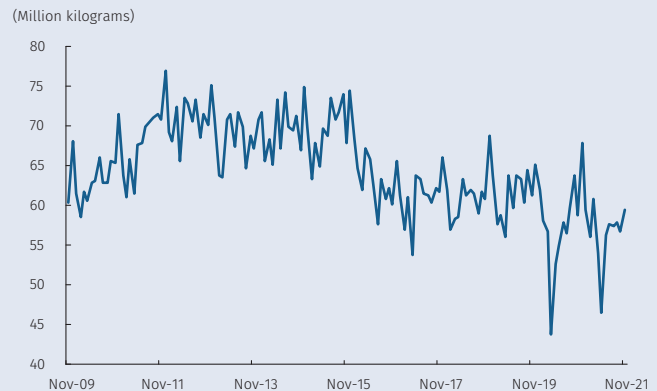


a/ Calculated as the CPI for beef over the PPI for beef for domestic supply
Source: DANE; calculations by the authors

2. Exports

A reduction in the supply of beef intended for local consumption, amid increased exports, may also have put upward pressure on meat prices². Graph B3.5 suggests that the volume of meat for local consumption indeed fell to a historical low in 2021. This decline was likely the result of a confluence of factors, including roadblocks in the second quarter of 2021; retention in the livestock cycle associated with expectations for higher prices in the medium term; and an increase in exports that displaced cattle for domestic consumption toward international markets.

Graph B3.5
Weight of meat slaughter for domestic consumption^{a/}

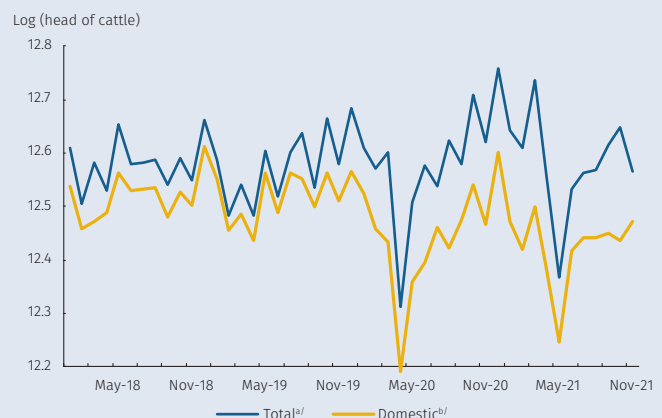


a/ Change in weight of cattle sacrificed for the domestic market
Source: DANE

Graph B3.6 illustrates monthly changes in head of cattle withdrawn from the domestic inventory. The blue line shows the total number for domestic consumption and export (meat and live cattle). The yellow line shows slaughter intended for domestic consumption. The gap between the blue line and the yellow line represents total exports. Between June and October 2021, cattle exports grew 90%, while the figure for domestic consumption remained relatively stable. In 2020 and 2021 between 10% and 20% of cattle withdrawn from monthly inventory was exported. Of these, live cattle represented close to 50%. The most recent available data shows a small fall in exports to November 2021 and an increase in slaughter for domestic consumption.

Meanwhile, total export values increased 22% between 2020 and 2021 (to October), growing from USD 267,177 to USD 327,500. These values remained below those registered in 2008 and 2009 (between USD 600,000-USD 700,000) and in 2013 (close to USD 500,00) (Graph B3.7).

Graph B3.6
Slaughter and export of head of cattle

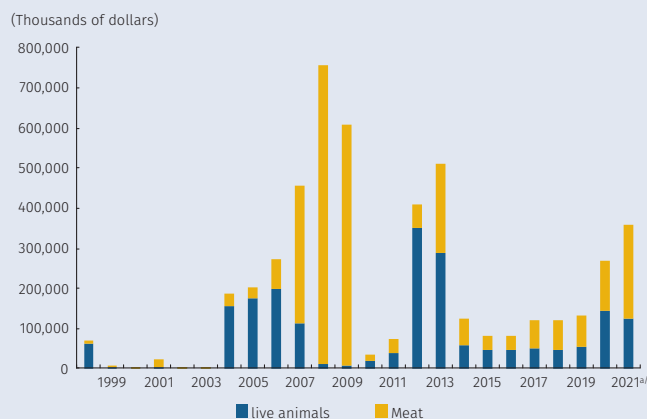


a/ Total slaughter (for domestic consumption and export of meat) plus exports of live cattle

b/ Cattle slaughter for domestic consumption
Source: DANE and FEDEGAN; calculations by the authors.

2 In February 2020 Colombia recovered its designation as being free of foot-and-mouth disease, after temporarily losing that status in 2018.

Graph B3.7
Value of beef exports: living animals and meat products



a/ Data through October 2021
Source: FEDEGAN; calculations by the authors

The significant increase in livestock exports may not fully explain the increase in domestic meat prices. For starters, the volume of cattle for domestic consumption remains close to four times higher than the volume of exports. In fact, previous periods exhibited higher export levels without leading to substantial reductions in supply or higher prices (Graph B3.7). That said, increased exports in the context of high international prices, such as those that currently prevail, could have generated upward pressure on prices and contributed, to some degree, to the increases observed in 2021.

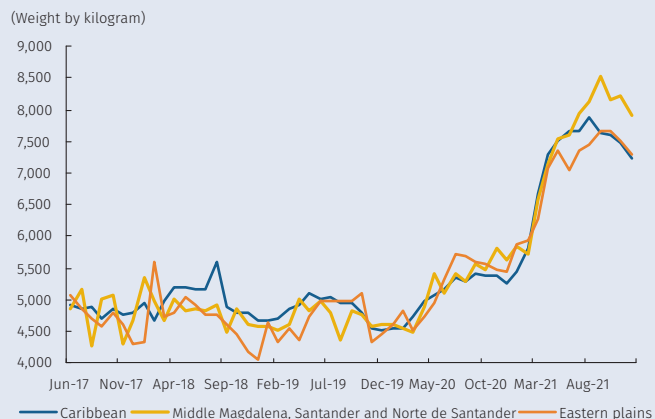
3. Direct Effects of Domestic and External Shocks

Graph B3.6 illustrates the decline in cattle slaughter in May 2021 that coincided with the national strike. Difficulties in transporting meat and live cattle could have explained this decline. However, these difficulties should have been resolved as roadblocks were lifted. It is unlikely that this would have had persistent effects on calf supply. Likewise, fattening cattle in Colombia feed primarily on grass, and as a result higher input prices on food concentrates would not be expected to lead to significant increases in production costs. While prices for some nutritional supplements and medicines would have increased, their contribution to total costs is relatively low.

4. Medium-term Outlook

According to information from FEDEGAN, the domestic inventory in head of cattle rose 30.6% between 2015 and 2021, and the percentage of heifers sacrificed declined 2.63

Graph B3.8
Average price of bull calves
(Kilograms of living cattle)



Source: FEDEGAN; calculations by the authors.

percentage points in the same period. As a consequence, herd pressures are not expected in the immediate future. At the same time, while the price for bull calves increased close to 30% between January and May 2021, these price adjustments moderated starting in the second half of 2021 (Graph B3.8). This could suggest a possible deceleration in the growth of final beef prices in the medium term. Export dynamics in the medium term remain highly uncertain and will depend on the country's retention of its designation as being free from foot-and-mouth disease and the evolution of global demand, specifically for the type of environmental and quality certified beef produced in Colombia.

In conclusion, the upward trend in beef prices in 2021 was likely the result of a confluence of supply and demand factors. These include the recovery in international demand, and with it the increase in exports of meat and live cattle, and increased production costs of substitute goods such as chicken and pork, which could have put upward pressure on beef prices.

Looking forward, there do not appear to be pressures on livestock inventory that would affect supply in the medium term. As a result, the evolution of domestic prices for beef would depend largely on export behavior and the evolution of international prices on inputs such as corn and soy, which are important in the production of substitutes such as chicken and pork.

Annex 1

Macroeconomic Projections from Local and Foreign Analysts ^{a/b}

	Units	Jan-22	Dec-22	Jan-23	Dec-23	Jan-24
Total CPI	Monthly Variation (average)	0.89	n. a.	n. a.	n. a.	n. a.
CPI excluding foods	Monthly Variation (average)	0.66	n. a.	n. a.	n. a.	n. a.
Total CPI	Annual Variation, end of period (average)	6.13 ^{c/}	4.42	4.03	3.51	3.38
CPI excluding food	Annual Variation, end of period (average)	3.90 ^{c/}	3.82	3.65	3.19	3.04
Nominal Exchange Rate	Pesos per dollar, end of period	3,980	3,800	3,818	3,785	3,660
Policy Rate	Percentage, end of period	3.75	5.50	5.50	5.00	5.00

	Units	Q4 2021	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
GDP	Annual variation, original series	8.2	9.7	5.1	6.0	3.5	2.7	4.0	3.2	3.5	3.4	n. a.
Unemployment	Thirteen cities, average of period	12.2	n. a.	13.0	12.5	11.8	11.4	n. a.	11.6	11.2	10.9	n. a.
IBR (90 days)	Effective annual rate, end of Period	n. r.	n. a.	4.2	5.2	5.5	5.5	n. a.	5.4	5.4	5.3	5.1
DTF	Effective annual rate, end of Period	n. r.	n. a.	4.0	4.9	5.3	5.4	n. a.	5.3	5.4	5.3	5.2
Fiscal Deficit (NCG) ^{d/}	Percentage of GDP	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	6.8	n. a.	n. a.	n. a.	n. a.
Current Account Deficit ^{d/}	Percentage of GDP	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	5.0	n. a.	n. a.	n. a.	n. a.

n. a.: not available.

n. r.: not relevant given that data is already observed.

a/ Starting with the Monetary Policy Report from July 2020, the survey of foreign and local macroeconomic analysts has been suspended and data corresponding to the Central Bank's *Monthly Survey of Economic Analyst Expectations* is included.

b/ Corresponds to the median response from the Central Bank's *Monthly Survey of Economic Analyst Expectations*, except for the CPI and CPI excluding food, which correspond to averages.

c/ Data calculated based on the results of the *Bank's Monthly Survey of Economic Analyst Expectations*.

d/ Positive values represent deficit and negative values represent surplus.

Source: Monthly Survey of Economic Analyst Expectations, *Banco de la República*, January 2022.

Annex 2

Main Macroeconomic Forecast Variables

		Years										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Exogenous variables												
External ^{a/}												
Trade partners GDP ^{b/}	Percentage, annual change, seasonally adjusted	3.6	2.7	2.1	1.6	2.6	2.5	1.4	-6.7	6.9	3.3	2.6
Oil price (Benchmark Brent)	Dollars per barrel, average for period	109	99	54	45	55	72	64	43	71	75	71
Federal funds (Fed) effective interest rate	Percentage, average for period	0.11	0.09	0.13	0.40	1.00	1.83	2.16	0.38	0.08	0.53	1.50
Credit default swaps at 5 years for Colombia	Basis points, average for period	113	101	184	212	129	114	99	141	142	192	186
Domestic												
Colombia real neutral interest rate	Percentage, average for period	1.5	1.4	1.5	1.6	1.3	1.3	1.2	1.3	1.5	1.8	1.9
Potential (trend) GDP	Percentage, annual change	4.3	3.9	3.2	2.6	2.4	2.5	3.0	-0.6	4.3	3.2	2.7
Endogenous variables												
Prices												
CPI Total	Percentage, annual change, end of period	1.94	3.66	6.77	5.75	4.09	3.18	3.80	1.61	5.62	4.33	3.43
CPI excluding food ^{d/}	Percentage, annual change, end of period	2.46	3.28	5.25	5.51	5.03	3.51	3.45	1.03	3.44	.	.
CPI tradables	Percentage, annual change, end of period	0.86	1.75	7.27	5.91	3.24	1.40	2.18	0.63	3.31	.	.
CPI non-tradables	Percentage, annual change, end of period	3.67	3.34	4.64	5.26	5.38	3.13	3.45	1.29	2.18	.	.
CPI regulated items	Percentage, annual change, end of period	1.56	4.89	4.43	5.63	6.26	6.65	4.81	0.73	7.10	6.02	3.78
CPI food ^{d/}	Percentage, annual change, end of period	-0.23	5.24	13.08	6.65	0.48	1.87	5.80	4.80	17.23	1.96	2.13
CPI perishables	Percentage, annual change, end of period	-0.16	16.74	26.03	-6.63	5.84	8.88	8.66	2.49	24.42	.	.
CPI processed	Percentage, annual change, end of period	-0.24	2.54	9.62	10.74	-0.91	-0.08	5.04	5.43	15.32	.	.
Core inflation indicators ^{d/}												
CPI excluding food	Percentage, annual change, end of period	2.46	3.28	5.25	5.51	5.03	3.51	3.45	1.03	3.44	.	.
Core 15 CPI	Percentage, annual change, end of period	2.47	3.19	5.59	5.98	4.21	3.22	3.78	1.88	4.42	.	.
CPI excluding food and regulated items	Percentage, annual change, end of period	2.73	2.82	5.50	5.48	4.67	2.57	3.10	1.11	2.49	4.52	3.63
Average of all core inflation indicators	Percentage, annual change, end of period	2.55	3.10	5.45	5.66	4.64	3.10	3.44	1.34	3.45	.	.
MER	Pesos per dollar, average for period	1,869	2,001	2,746	3,053	2,951	2,957	3,282	3,691	3,747	.	.
Inflation gap in the real interest rate	Percentage, average for period	-1.0	-0.3	9.5	2.4	-1.8	-0.8	3.6	6.2	2.6	-0.0	-0.8
Economic activity												
Gross domestic product	Percentage, annual change, s.a.c.e.	5.1	4.5	3.0	2.1	1.4	2.6	3.3	-6.8	9.9	4.3	3.1
Final consumption spending	Percentage, annual change, s.a.c.e.	5.4	4.3	3.4	1.6	2.3	4.0	4.2	-3.9	13.7	.	.
Final household consumption spending	Percentage, annual change, s.a.c.e.	4.6	4.2	3.1	1.6	2.1	3.2	3.9	-5.6	14.5	.	.
Final government overhead spending	Percentage, annual change, s.a.c.e.	8.9	4.7	4.9	1.8	3.6	7.4	5.3	3.7	12.1	.	.
Gross capital formation	Percentage, annual change, s.a.c.e.	7.8	12.0	-1.2	-0.2	-3.2	1.5	3.8	-20.3	11.0	.	.
Gross fixed capital formation	Percentage, annual change, s.a.c.e.	8.5	9.2	2.8	-2.9	1.9	1.0	3.1	-20.6	9.2	.	.
Housing	Percentage, annual change, s.a.c.e.	6.4	10.4	9.5	-0.2	-1.9	-0.4	-8.4	-27.5	15.1	.	.
Other buildings and structures	Percentage, annual change, s.a.c.e.	12.3	9.6	10.2	0.0	4.6	-3.5	2.9	-28.3	-5.4	.	.
Machinery and equipment	Percentage, annual change, s.a.c.e.	4.8	9.2	-9.3	-7.9	1.4	8.6	12.3	-10.3	20.2	.	.
Cultivated biological resources	Percentage, annual change, s.a.c.e.	6.6	-1.3	2.3	13.1	0.3	-3.1	4.9	0.0	11.9	.	.
Intellectual property products	Percentage, annual change, s.a.c.e.	19.6	5.1	1.3	-12.0	1.2	1.5	1.6	-7.2	9.3	.	.
Domestic demand	Percentage, annual change, s.a.c.e.	5.9	6.0	2.4	1.2	1.1	3.5	4.1	-7.2	13.2	.	.
Exports	Percentage, annual change, s.a.c.e.	4.7	-0.3	1.7	-0.2	2.6	0.6	3.1	-18.3	12.1	.	.
Imports	Percentage, annual change, s.a.c.e.	8.5	7.8	-1.1	-3.5	1.0	5.8	7.3	-17.3	28.5	.	.
Output gap ^{f/}	Percentage	0.9	1.5	1.2	0.7	-0.3	-0.3	0.0	-6.5	-1.4	-0.4	0.0
Short-term indicators												
Real industrial production	Percentage, annual change, seasonally adjusted	-1.3	1.7	2.0	3.8	0.0	2.7	1.4	-8.2	.	.	.
Retail commerce sales excluding fuels and vehicles	Percentage, annual change, seasonally adjusted	4.6	8.4	6.3	2.0	-0.1	5.4	8.1	-1.7	.	.	.
Coffee production	Percentage, annual change in accumulated production for the period	40.6	11.5	16.8	0.4	-0.3	-4.5	8.8	-5.8	.	.	.
Oil production	Percentage, annual change, average for period	6.6	-1.9	1.6	-11.7	-3.7	1.4	2.4	-11.8	.	.	.
Labor Market ^{g/}												
National Total												
Unemployment rate	Percentage, seasonally adjusted, average for period	9.6	9.1	8.9	9.2	9.4	9.7	10.5	15.9	13.7	11.7	.
Employment rate	Percentage, seasonally adjusted, average for period	58.0	58.4	59.0	58.5	58.4	57.8	56.6	49.8	.	.	.
Overall participation rate	Percentage, seasonally adjusted, average for period	64.2	64.2	64.7	64.5	64.4	64.0	63.3	59.2	.	.	.
Thirteen cities and metropolitan areas												
Unemployment rate	Percentage, seasonally adjusted, average for period	10.6	9.9	9.8	10.0	10.6	10.8	11.2	18.2	15.4	13.0	.
Employment rate	Percentage, seasonally adjusted, average for period	60.3	61.2	61.4	60.7	59.9	59.2	58.6	50.8	.	.	.
Overall participation rate	Percentage, seasonally adjusted, average for period	67.5	67.9	68.0	67.5	67.0	66.4	66.0	62.1	.	.	.
Balance of payments ^{h/i/}												
Current account (A+B+C)												
Current account (A+B+C)	Millions of dollars	-12,365	-19,819	-18,702	-12,587	-9,924	-14,041	-14,801	-9,568	-18,121	-16,660	.
Percentage of GDP	Percentage, nominal terms	-3.2	-5.2	-6.4	-4.5	-3.2	-4.2	-4.6	-3.5	-5.7	-4.9	.
A. Goods and Services	Millions of dollars	-3,250	-12,332	-19,004	-13,451	-8,762	-10,556	-14,146	-13,157	-20,325	-18,263	.
B. Primary income (factor income)	Millions of dollars	-14,002	-12,108	-5,450	-5,312	-8,046	-11,442	-9,710	-5,198	-8,607	-9,555	.
C. Secondary income (current account transfers)	Millions of dollars	4,887	4,622	5,752	6,177	6,883	7,957	9,055	8,788	10,812	11,158	.
Financial account (A+B+C+D)												
Financial account (A+B+C+D)	Millions of dollars	-11,740	-19,292	-18,060	-12,339	-9,625	-12,954	-13,298	-8,191	.	.	.
Percentage of GDP	Percentage, nominal terms	-3.1	-5.1	-6.2	-4.4	-3.1	-3.9	-4.1	-3.0	.	.	.
A. Foreign investment (i+ii)	Millions of dollars	-8,558	-12,270	-7,403	-9,341	-10,011	-6,172	-10,836	-5,802	.	.	.
i. Foreign in Colombia (FDI)	Millions of dollars	16,210	16,169	11,621	13,858	13,701	11,299	13,989	7,459	.	.	.
ii. Colombian abroad	Millions of dollars	7,652	3,899	4,218	4,517	3,690	5,126	3,153	1,656	.	.	.
B. Portfolio investment	Millions of dollars	-7,438	-11,565	-9,091	-4,945	-1,800	862	24	-1,792	.	.	.
C. Other investment (loans and other credits and derivatives)	Millions of dollars	-2,690	106	-1,981	1,781	1,641	-8,831	-5,820	-4,925	.	.	.
D. Reserve assets	Millions of dollars	6,946	4,437	415	165	545	1,187	3,333	4,328	.	.	.
Errors and omissions (E and O)	Millions of dollars	626	526	642	247	299	1,087	1,503	1,377	.	.	.
Interest rates												
Policy rate ^{j/}	Percentage, average for period	3.43	3.88	4.67	7.10	6.10	4.35	4.25	2.87	1.92	.	.
Policy rate expected by analysts ^{k/}	Percentage, average for period										4.58	5.25
IBR	Percentage, average for period	3.4	3.8	4.7	7.1	6.1	4.3	4.3	2.9	1.9	.	.
Commercial interest rate ^{l/}	Percentage, average for period	8.7	8.7	9.4	12.8	11.1	9.3	8.8	7.4	6.2	.	.
Consumer interest rate ^{m/}	Percentage, average for period	17.9	17.3	17.2	19.2	19.4	17.9	16.5	15.0	14.3	.	.
Mortgage rate ^{n/}	Percentage, average for period	11.1	11.1	11.0	12.4	11.6	10.6	10.4	10.1	9.1	.	.

Note: values in bold represent a projection or assumption.

SACE: seasonally adjusted and corrected for calendar effects.

a/ quarterly data in bold correspond to an assumption based on the annual projection of each variable.

b/ Calculated for the largest trade partners (excluding Venezuela) by non-traditional dollar exports from Colombia.

c/ Calculations by Banco de la República based on its new classification; excludes the division of the CPI for food and non-alcoholic drinks. See González, E.; Hernández, R.; Caicedo, E.; Martínez-Cortés, N.; Grajales, A.; Romero, J. (2020). "Nueva clasificación del Banrep de la canasta del IPC and 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 based on its new classification; equal to the division of the CPI for food and non-alcoholic drinks produced by DANE (does not include sub-categories corresponding to food away from home). See González, E.; Hernández, R.; Caicedo, E.; Martínez-Cortés, N.; Grajales, A.; Romero, J. (2020). "Nueva clasificación del Banrep de la canasta del IPC and 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>.

e/ Calculations by Banco de la República based on its new classification. See González, E.; Hernández, R.; Caicedo, E.; Martínez-Cortés, N.; Grajales, A.; Romero, J. (2020). "Nueva clasificación del Banrep de la canasta del IPC and revisión de las medidas de inflación básica en Colombia," Borradores de Economía, no. 122, Banco de la República, disponible en: <https://investiga.banrep.gov.co/es/be-1122>.

f/ The historical estimate for the gap is calculated as the difference between observed and potential (trend) GDP resulting from the 4G monetary policy model; forecast is calculated as the difference between the technical staff's GDP estimate and potential (trend) GDP from the 4G model.

g/ Corresponds to the seasonally adjusted moving quarter.

h/ The results presented herein follow the recommendations of the sixth balance of payments manual proposed by the International Monetary Fund (IMF). See additional information and methodological changes at: <http://www.banrep.gov.co/balanza-pagos>.

i/ Results for 2019, 2020, and 2021 are preliminary.

j/ Corresponds to the quarterly average monetary policy rate calculated with the working days of the series.

k/ These projections are calculated as the average rate that would be active in each year according to the median of the analyst response to the Central Bank's monthly economic analyst survey from January 2022.

l/ Weighted average by rate amounts for ordinary, treasury, and preferential credit.

m/ Excludes credits granted through credit cards.

n/ Weighted average per interest rate amounts for disbursements in pesos and UVR for non-social housing credit.

Annex 2 (continued)

Main Macroeconomic Forecast Variables

	2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Exogenous variables								
External ^{a/}								
Trade partners GDP ^{b/}	Percentage, annual change, seasonally adjusted							
Oil price (Benchmark Brent)	2.2	3.4	3.1	2.9	2.3	3.4	1.0	0.8
Federal funds (Fed) effective interest rate	55	51	52	61	67	75	76	69
Credit default swaps at 5 years for Colombia	0.70	0.95	1.15	1.20	1.45	1.74	1.92	2.22
	144	130	127	113	99	113	110	132
Domestic								
Colombia real neutral interest rate	Percentage, average for period							
Potential (trend) GDP	Percentage, annual change							
Endogenous variables								
Prices								
CPI Total	Percentage, annual change, end of period							
CPI excluding food ^{d/}	4.69	3.99	3.97	4.09	3.14	3.20	3.23	3.18
CPI tradables	5.55	5.40	4.86	5.03	3.97	3.73	3.67	3.51
CPI non-tradables	5.69	4.28	3.46	3.24	1.67	1.39	1.39	1.40
CPI regulated items	5.87	5.55	5.02	5.38	4.09	3.79	3.60	3.13
CPI food ^{d/}	4.71	6.33	6.10	6.26	6.28	6.21	6.35	6.65
CPI perishables	1.46	-1.21	0.59	0.48	-0.06	1.11	1.47	1.87
CPI processed	-13.09	-14.72	-0.32	5.84	7.13	8.47	9.51	8.88
Core inflation indicators ^{d/}	6.28	3.29	0.84	-0.91	-2.01	-0.91	-0.72	-0.08
CPI excluding food	Percentage, annual change, end of period							
Core 15 CPI	5.63	5.16	4.49	4.21	3.45	3.24	3.19	3.22
CPI excluding food and regulated items	5.81	5.13	4.50	4.67	3.28	2.99	2.87	2.57
Average of all core inflation indicators	5.66	5.23	4.62	4.64	3.57	3.32	3.24	3.10
MER	Pesos per dollar, average for period							
Inflation gap in the real interest rate	2,924	2,920	2,975	2,986	2,860	2,839	2,961	3,160
	-3.1	-3.2	-0.7	-0.2	-3.4	-3.8	-0.4	4.5
Economic activity								
Gross domestic product	Percentage, annual change, s.a.c.e.							
Final consumption spending	1.3	1.5	1.3	1.3	2.3	2.1	2.8	3.0
Final household consumption spending	2.2	2.1	2.6	2.3	3.6	4.2	4.0	4.1
Final government overhead spending	1.7	2.4	2.4	1.7	3.3	3.4	3.2	3.1
Gross capital formation	3.9	2.4	3.5	4.9	6.7	7.4	7.8	7.6
Gross fixed capital formation	0.3	-2.0	-4.5	-6.7	-5.1	1.7	0.6	9.3
Housing	-0.4	1.9	5.9	0.3	-0.4	2.0	1.2	1.2
Other buildings and structures	3.8	2.0	-1.7	-11.2	-7.9	-1.2	5.5	3.2
Machinery and equipment	-3.5	5.9	11.2	5.3	-6.5	-1.1	-5.9	-0.5
Cultivated biological resources	-5.1	-1.5	8.0	4.5	12.6	13.7	7.2	1.9
Intellectual property products	18.7	0.9	-10.8	-4.8	-9.0	-8.1	4.1	1.5
Domestic demand	-3.2	1.9	3.7	2.6	2.5	2.4	0.7	0.5
Exports	1.1	1.3	1.3	0.8	1.6	3.6	3.5	5.1
Imports	4.2	5.5	3.0	-2.1	-1.5	-1.9	-1.0	7.0
Output gap ^{f/}	3.6	1.4	-0.7	-0.2	0.3	5.4	7.1	10.6
Short-term indicators	0.4	0.2	-0.1	-0.3	-0.4	-0.4	-0.4	-0.3
Real industrial production	Percentage, annual change, seasonally adjusted							
Retail commerce sales excluding fuels and vehicles	-0.9	-0.5	1.0	0.3	2.2	2.8	3.4	2.4
Coffee production	0.1	-0.3	-0.1	-0.3	4.7	5.5	5.3	6.2
Oil production	Percentage, annual change, average for period							
	13.0	-17.2	17.1	-10.1	-5.8	13.1	-13.8	-6.6
	-11.6	-5.2	1.5	1.9	0.7	1.2	1.1	2.6
Labor Market^{g/}								
National Total								
Unemployment rate	Percentage, seasonally adjusted, average for period							
Employment rate	9.4	9.1	9.4	9.6	9.4	9.4	9.6	10.3
Overall participation rate	58.4	58.9	58.3	57.9	57.8	58.2	58.1	57.0
Thirteen cities and metropolitan areas	64.5	64.8	64.3	64.0	63.8	64.3	64.3	63.6
Unemployment rate	Percentage, seasonally adjusted, average for period							
Employment rate	10.4	10.5	10.9	10.6	10.7	10.5	10.5	11.3
Overall participation rate	60.3	60.3	59.7	59.2	59.2	59.8	59.5	58.4
	67.3	67.3	67.0	66.3	66.3	66.8	66.5	65.8
Balance of payments ^{h/i/}								
Current account (A+B+C)								
Percentage of GDP	Millions of dollars							
A. Goods and Services	-3,490	-2,426	-2,561	-1,449	-3,023	-3,471	-3,406	-4,141
B. Primary income (factor income)	-4.7	-3.2	-3.3	-1.7	-3.7	-4.2	-4.0	-4.9
C. Secondary income (current account transfers)	-2,730	-2,551	-2,326	-1,154	-1,840	-2,557	-2,672	-3,487
Financial account (A+B+C+D)	-2,286	-1,558	-1,993	-2,208	-2,922	-2,784	-2,769	-2,967
Percentage of GDP	1,527	1,684	1,759	1,914	1,739	1,870	2,035	2,313
A. Foreign investment (i-ii)	-2,986	-2,625	-2,379	-1,635	-2,876	-2,719	-3,487	-3,872
i. Foreign in Colombia (FDI)	-4.0	-3.5	-3.0	-2.0	-3.5	-3.3	-4.1	-4.6
ii. Colombian abroad	-1,743	-1,217	-4,112	-2,939	-910	-2,273	-615	-2,611
B. Portfolio investment	2,459	2,492	4,957	3,293	1,982	3,773	2,704	2,839
C. Other investment (loans and other credits and derivatives)	716	1,275	845	854	1,072	1,500	330	2,224
D. Reserve assets	182	-2,178	-424	620	1,715	350	482	-1,684
Errors and omissions (E and O)	-1,518	617	2,031	512	-3,817	-945	-1,763	-2,305
	93	154	126	173	137	150	169	732
	503	-199	181	-186	146	752	-81	270
Interest rates								
Policy rate ^{j/}	Percentage, average for period							
Policy rate expected by analysts ^{k/}	7.38	6.56	5.48	4.99	4.58	4.33	4.25	4.25
IBR	Percentage, average for period							
Commercial interest rate ^{l/}	7.4	6.6	5.5	5.0	4.6	4.3	4.3	4.3
Consumer interest rate ^{m/}	12.8	11.6	10.6	10.0	9.4	9.4	9.3	9.0
Mortgage rate ^{n/}	20.1	19.7	19.0	18.7	18.7	17.9	18.0	17.3
	12.5	12.3	11.3	10.9	10.8	10.6	10.5	10.4

Note: values in bold represent a projection or assumption.

SACE: seasonally adjusted and corrected for calendar effects.

a/ quarterly data in bold correspond to an assumption based on the annual projection of each variable.

b/ Calculated for the largest trade partners (excluding Venezuela) by non-traditional dollar exports from Colombia.

c/ Calculations by Banco de la República based on its new classification; excludes the division of the CPI for food and non-alcoholic drinks. See González, E.; Hernández, R.; Caicedo, E.; Martínez-Cortés, N.; Grajales, A.; Romero, J. (2020). "Nueva clasificación del Banrep de la canasta del IPC and 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 based on its new classification; equal to the division of the CPI for food and non-alcoholic drinks produced by DANE (does not include sub-categories corresponding to food away from home). See González, E.; Hernández, R.; Caicedo, E.; Martínez-Cortés, N.; Grajales, A.; Romero, J. (2020). "Nueva clasificación del Banrep de la canasta del IPC and 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>.

e/ Calculations by Banco de la República based on its new classification. See González, E.; Hernández, R.; Caicedo, E.; Martínez-Cortés, N.; Grajales, A.; Romero, J. (2020). "Nueva clasificación del Banrep de la canasta del IPC and revisión de las medidas de inflación básica en Colombia", Borradores de Economía, no. 122, Banco de la República, disponible en: <https://investiga.banrep.gov.co/es/be-1122>.

f/ The historical estimate for the gap is calculated as the difference between observed and potential (trend) GDP resulting from the 4G monetary policy model; forecast is calculated as the difference between the technical staff's GDP estimate and potential (trend) GDP from the 4G model.

g/ Corresponds to the seasonally adjusted moving quarter.

h/ The results presented herein follow the recommendations of the sixth balance of payments manual proposed by the International Monetary Fund (IMF). See additional information and methodological changes at: <http://www.banrep.gov.co/balanza-pagos>.

i/ Results for 2019, 2020, and 2021 are preliminary.

j/ Corresponds to the quarterly average monetary policy rate calculated with the working days of the series.

k/ These projections are calculated as the average rate that would be active in each year according to the median of the analyst response to the Central Bank's monthly economic analyst survey from January 2022.

l/ Weighted average by rate amounts for ordinary, treasury, and preferential credit.

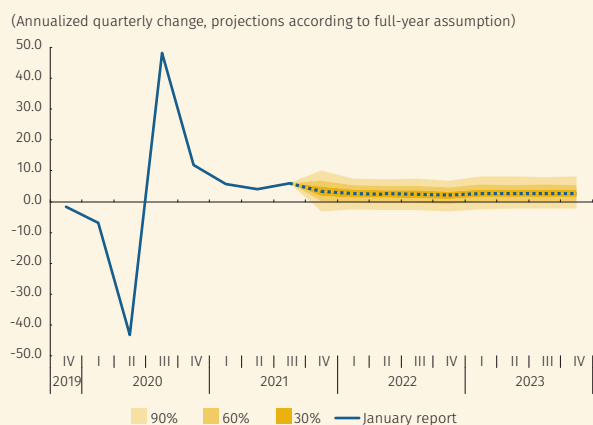
m/ Excludes credits granted through credit cards.

n/ Weighted average per interest rate amounts for disbursements in pesos and UVR for non-social housing credit.

	2019				2020				2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Exogenous variables																				
External ^{a/}																				
Trade partners GDP ^{b/}	Percentage, annual change, seasonally adjusted																			
Oil price (Benchmark Brent)	1.1	3.0	1.7	-2.1	-7.2	-44.4	50.4	12.4	5.7	4.7	5.7	3.5	2.7	2.6	2.5	2.1	2.7	2.7	2.7	2.7
Federal funds (Fed) effective interest rate	64	68	62	62	51	33	43	45	61	69	73	80	76	74	73	72	72	71	70	70
Credit default swaps at 5 years for Colombia	2.40	2.40	2.19	1.64	1.26	0.06	0.09	0.09	0.08	0.07	0.09	0.08	0.17	0.41	0.64	0.92	1.16	1.42	1.63	1.79
	121	104	90	83	125	206	132	104	110	131	143	185	198	198	186	186	186	186	186	186
Domestic																				
Colombia real neutral interest rate	Percentage, average for period																			
Potential (trend) GDP	Percentage, annual change																			
Endogenous variables																				
Prices																				
CPI Total	Percentage, annual change, end of period																			
CPI excluding food ^{d/}	3.21	3.43	3.82	3.80	3.86	2.19	1.97	1.61	1.51	3.63	4.51	5.62	6.23	5.60	4.99	4.33	3.97	3.78	3.55	3.43
CPI tradables	3.27	3.22	3.37	3.45	3.26	1.40	1.57	1.03	1.06	2.70	3.03	3.44	-	-	-	-	-	-	-	-
CPI non-tradables	1.09	1.60	1.83	2.18	2.41	0.73	1.15	0.63	1.05	2.57	2.97	3.31	-	-	-	-	-	-	-	-
CPI regulated items	3.01	3.10	3.37	3.45	3.22	2.00	1.86	1.29	0.89	1.61	2.01	2.18	-	-	-	-	-	-	-	-
CPI food ^{d/}	6.33	5.24	5.03	4.81	4.27	0.44	1.19	0.73	1.52	5.93	5.94	7.10	7.07	7.05	6.64	6.02	5.43	4.54	4.08	3.78
CPI perishables	3.24	4.96	6.49	5.80	7.19	6.55	4.13	4.80	3.92	8.52	12.40	17.23	15.88	9.17	6.39	1.96	1.36	2.55	2.16	2.13
CPI processed	9.98	15.46	17.50	8.66	9.79	2.52	-3.42	2.49	1.58	8.69	14.82	24.42	-	-	-	-	-	-	-	-
Core inflation indicators ^{d/}	1.43	2.18	3.57	5.04	6.46	7.75	6.40	5.43	4.60	8.47	11.74	15.32	-	-	-	-	-	-	-	-
CPI excluding food	Percentage, annual change, end of period																			
Core 15 CPI	3.27	3.22	3.37	3.45	3.26	1.40	1.57	1.03	1.06	2.70	3.03	3.44	-	-	-	-	-	-	-	-
CPI excluding food and regulated items	3.24	3.34	3.66	3.78	3.64	2.17	2.33	1.88	1.67	3.36	3.79	4.42	-	-	-	-	-	-	-	-
Average of all core inflation indicators	2.41	2.65	2.92	3.10	2.99	1.65	1.67	1.11	0.94	1.87	2.28	2.49	3.67	4.30	4.16	4.52	4.28	3.86	3.73	3.63
MER	Pesos per dollar, average for period																			
Inflation gap in the real interest rate	3,135	3,242	3,337	3,413	3,532	3,850	3,731	3,661	3,556	3,696	3,847	3,880	-	-	-	-	-	-	-	-
	2.2	3.4	4.1	4.9	5.1	11.1	6.1	2.8	-0.9	2.9	4.4	4.0	1.1	-0.2	-0.4	-0.6	-0.7	-1.0		

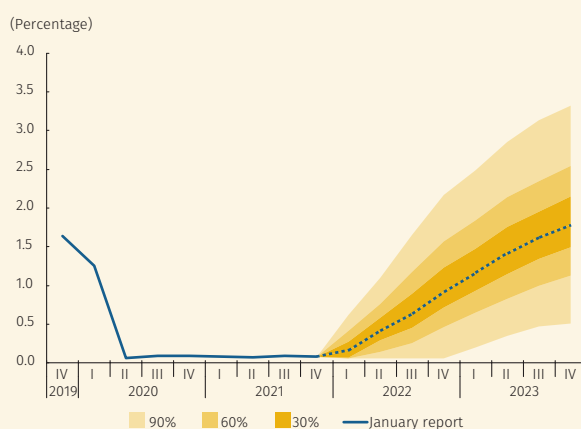
Annex 3 Predictive Densities for other relevant Variables of the Macroeconomic Outlook

Graph A3.1
Trade Partners' Real GDP^{a/}



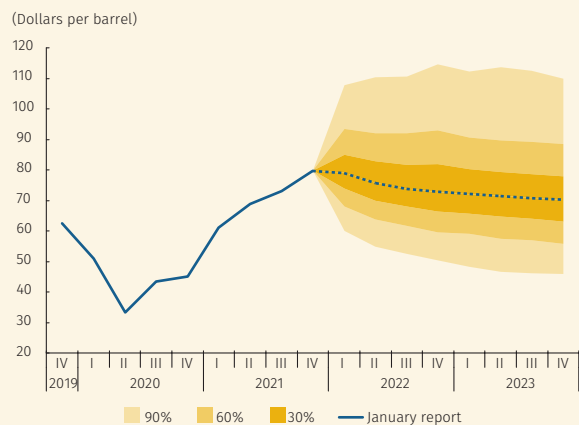
a/ The graph presents the probability distribution and its most likely trajectory on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode).
Sources: Bloomberg, statistics offices and central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

Graph A3.3
Assumed U.S. Federal Reserve quarterly interest rate^{a/}



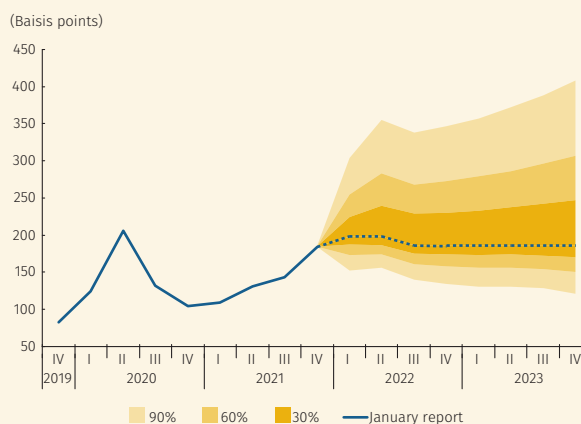
a/ The graph presents the probability distribution and its most likely trajectory on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode).
Sources: Federal Reserve of St. Louis; calculations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

Graph A3.2
Assumed quarterly oil price^{a/}



a/ The graph presents 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).
Sources: Bloomberg; calculations and projections by Banco de la República.

Graph A3.4
Assumed quarterly risk premium for Colombia (CDS)^{a/, b/}

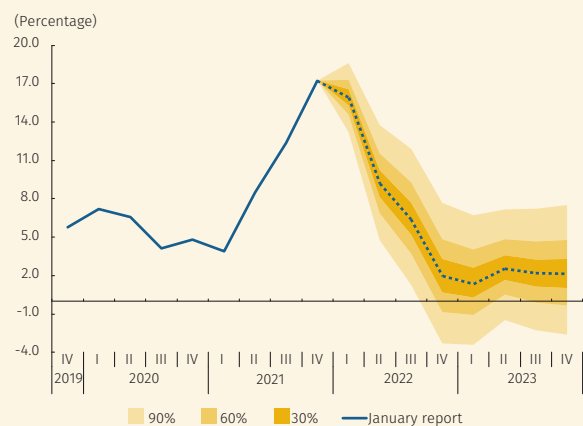


a/ Five-year credit default swaps
b/ The graph presents the probability distribution and its most likely trajectory on an eight-quarter forecast horizon. Densities characterize the balance of potential risks with areas of 30%, 60% and 90% probability around the central forecast (mode), using a combination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

Annex 3 (continued)

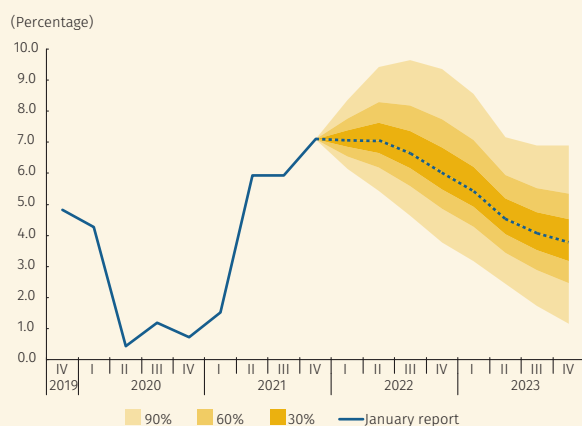
Predictive Densities for other relevant Variables of the Macroeconomic Outlook

Graph A3.5
CPI for foods ^{a/}
(Annual change; end-of-period)



a/The graph presents 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: DANE; calculations and projections by *Banco de la República*.

Graph A3.6
CPI for regulated items ^{a/}
(Annual change; end-of-period)



a/The graph presents 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: DANE; calculations and projections by *Banco de la República*.

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