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Inflation Report

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BANCO CENTRAL DO BRASIL

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Inflation Report

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Statistical conventions

...	data not available.
-	nil or non-existence of the event considered.
0 or **0.0**	less than half the final digit shown on the right.
*****	preliminary data.

Hiphen between years indicates the years covered, including the first and the last year.
A bar (/) between years (1970/1975) indicates the average of the years covered, including the first and the last year or even crop or agreement year, when mentioned in the text.

Occasional discrepancies between constituent figures and totals as well as percentage changes are due to rounding.

There are no references to sources in tables and figures originated in the Banco Central do Brasil.

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Principles for the Conduct of Monetary Policy in Brazil

Mission and objectives

The Banco Central do Brasil (BCB) primary goal is to ensure price stability. Without compromising this goal, the BCB also aims to ensure the stability and efficiency of the financial system, smooth out economic activity fluctuations, and foster full employment. The compliance with the price stability goal is achieved by means of the inflation targeting framework, with inflation targets set by the National Monetary Council (CMN).

The experience, both domestic and international, shows that the best contribution of monetary policy to sustainable economic growth, low unemployment and improvement in people's living conditions is to keep inflation low, stable and predictable.

The economic literature indicates that high and volatile inflation rates generate distortions that lead to increased risks and negatively affect investment. These distortions shorten the planning horizons of households, companies, and governments and erode business confidence. High inflation rates subtract the purchasing power of wages and transfers, with negative repercussions on households' confidence and consumption. Moreover, they produce inefficient price dispersion and reduce the informational value from prices that contributes to the efficient allocation of resources in the economy.

High and volatile inflation also has regressive distributive effects. The less favored groups of the population, which generally have more restricted access to instruments to protect them from the loss of the currency's purchasing power, benefit the most from price stability.

In short, high inflation rates reduce potential economic growth, affect job openings and income, and worsen income distribution.

Implementation

Monetary policy impacts the economy with long, variable, and uncertain lags, usually estimated to extend up to two years. As a result, there is substantial uncertainty associated with inflation projections in the relevant horizon for the conduct of monetary policy, which arises naturally from the incidence of favorable and unfavorable shocks to the economy over time. It is thus expected that, even under appropriate policy, realized inflation will fluctuate around target. The Monetary Policy Committee (Copom) should seek to conduct monetary policy so that inflation projections point to inflation converging to the target. Therefore, it is natural that monetary policy is carried out in a forward-looking way.

The inflation targeting framework in Brazil is flexible. The horizon that the BCB sees as appropriate for the return of inflation to the target depends on both the nature of the shocks that affect the economy and their persistence.

The BCB believes that a clear and transparent communication is essential for monetary policy to achieve its objectives efficiently. Thus, the BCB regularly publishes evaluations of the economic factors that determine the inflation trajectory, as well as the potential risks to this trajectory. The Copom Statements and Minutes, and the Inflation Report are key vehicles in communicating these assessments.

Inflation Report

The inflation projections are presented in scenarios that are conditional on assumptions about some economic variables. Traditionally, the assumptions refer to the paths for the exchange and Selic rates throughout the projection horizon. In addition to the baseline scenario, alternative scenarios may also be presented. It is important to stress that the scenarios presented in the Inflation Report (IR) are part of the quantitative tools used to guide Copom's monetary policy decisions and that their assumptions do not constitute and should not be seen as the Committee's forecasts for the future behavior of those variables.

The conditional inflation projections incorporate probability intervals that highlight the associated degree of uncertainty. Inflation projections depend not only on assumptions about the interest rate and the exchange rate, but also on a set of assumptions about the behavior of other variables.

Copom uses a wide range of models and scenarios, with conditioning assumptions associated with them, to guide its monetary policy decisions. By reporting some of these scenarios, the Committee seeks to enhance the transparency of monetary policy decisions, contributing to its effectiveness in controlling inflation, which is its primary objective.

Contents

Executive summary

The external environment remains adverse and continues to require caution from the emerging market economies. Uncertainties remain high regarding the easing cycle in the United States and the speed of sustained disinflation in many countries. The central banks of major economies remain committed to bringing inflation back to its targets in an environment characterized by labor market pressures.

Regarding the domestic scenario, economic activity showed strong momentum, and the labor market heated up further. GDP grew 0.8% in the first quarter, a robust and higher-than-expected pace. At the same time, unemployment declined, and wages continued to grow. These factors justified an upward revision of the 2024 GDP growth projection, from 1.9% to 2.3%. Floods in Rio Grande do Sul led to a significant drop in the state's economic activity, but there are already signs of recovery.

Inflation has fallen, but the deanchoring of inflation expectations has increased. The 12-month inflation, as measured by the Extended National Consumer Price Index (IPCA), dropped from 4.5% in February to 3.9% in May. There is also a decrease in inflation when core measures are observed and when the quarterly metric is considered. However, the decline in inflation in the last quarter was smaller than projected in the reference scenario presented in the previous Inflation Report (+0.14 p.p. surprise), with stronger rise in food prices. Amid increased uncertainties in the domestic and external scenarios, inflation expectations for 2025 and 2026, which were already above the inflation target for the period, increased from 3.5% to 3.8% and 3.6%, respectively, according to the Focus survey median.

In the reference scenario projection, inflation rises in the second quarter of 2024 and then resumes a downward trajectory, although remaining above the target. In this scenario, the four-quarter inflation, after having ended 2023 at 4.6%, falls to 4.0% in 2024, 3.4% in 2025, and 3.2% in 2026, against a 3.0% target. The inflation projections represent the Monetary Policy Committee (Copom)'s view and are conditional on a set of variables, such as the paths of the Selic rate extracted from the BCB's Focus survey and the exchange rate based on the purchasing power parity (PPP) theory. Projections in this Inflation Report use data available up to the 263rd Copom meeting, held on June 18-19, 2024.

In the comparison with the previous Inflation Report, inflation projection increased for 2024 and 2025. The upward revision was 0.5 p.p. for 2024 and 0.2 p.p. for 2025. The increased projection throughout the relevant horizon was mainly due to the stronger-than-expected economic activity, which led to a higher estimated output gap. This higher projection also reflected the increase of inflation expectations, the currency depreciation, the inertia from the increased short-term projection, and the use of a higher neutral interest rate. In turn, the increase in the real interest rate was essential to prevent a more significant increase in the projection.

The Copom informed in its more recent meeting (263rd Meeting):

Considering the evolution of the disinflationary process, the assessed scenarios, the balance of risks, and the broad array of available information, Copom decided to maintain the Selic rate at 10.5% p.a. and judges that this decision is consistent with the strategy for inflation convergence to a level around its target throughout the relevant horizon for monetary policy, which includes 2025. Without compromising its fundamental objective of ensuring price stability, this decision also implies smoothing economic fluctuations and fostering full employment.

The current context, characterized by a stage in which the disinflationary process tends to be slower, further deanchoring of inflation expectations, and a challenging global outlook, requires serenity and moderation in the conduct of monetary policy.

The Committee unanimously decided to interrupt the easing cycle, highlighting that the uncertain global scenario and the domestic scenario, marked by resilient economic activity, an increase in its own inflation projections and deanchored expectations, require greater caution. The Committee also stresses that monetary policy should continue being contractionary for sufficient time at a level that consolidates both the disinflation process and the anchoring of expectations around the targets. The Committee will remain vigilant and reminds, as usual, that potential future changes in the interest rate will be determined by the firm commitment of reaching the inflation target.

1 Economic outlook

This chapter of the Inflation Report (IR) analyzes the recent developments in the economic environment, considering both the international and domestic scenarios, as well as the outlook for the country's economy in the coming quarters. The assessment of the international scenario addresses the major advanced and emerging economies, with an emphasis on aspects that are likely to influence the Brazilian economy, especially inflation and activity indicators. The analysis of the domestic environment covers the recent evolution of economic activity, labor and credit markets, the country's public and external accounts, and finally, inflation.

1.1 External scenario

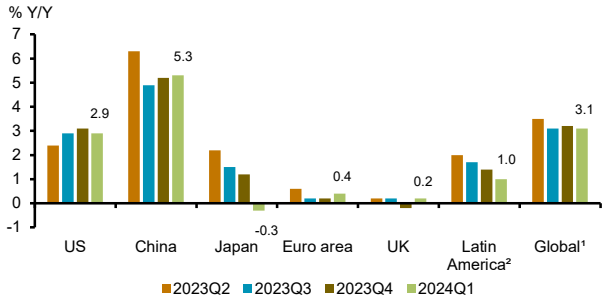
The external environment is characterized by the resilience of economic activity and the gradual continuation of the disinflation process. After losing momentum in 2024Q1, the process of convergence of inflation to targets resumed modestly in 2024Q2. The pace of normalization depends on the speed of adjustment of the sectoral and regional divergences observed after the shocks of recent years. The resilience of labor markets explains the persistence of core inflation measures, especially of the services sector component.

Longer-term inflation expectations remain anchored in advanced economies, even though core inflation is still at high levels and above the target in many countries. There is even more dispersion for emerging economies, with inflation expectations rising in several countries for both 2024 and 2025. Since the March 2024 IR, there has been continued reevaluation about the speed of the disinflation process and a reassessment of the timing and magnitude of interest rate cuts in major economies. As a result, expectations for reference interest rates in late 2025 increased, coupled with increased long-term interest rates and the postponement of the prospects for the reduction of short-term interest rates in some countries.

Inflation expectations depict different disinflation speeds across countries, implying different prospective paths for monetary policy interest rates. In this context, some of the central banks of major economies have been voicing the need for greater confidence that inflation will move back towards their targets. They continue to reaffirm their commitment to promote the convergence of inflation to targets by stressing the need to keep interest rates at restrictive levels for a long enough period to complete the final stage of the disinflation process. Other central banks, recognizing that the process of inflation convergence has advanced, have opted to cut their interest rates, despite emphasizing that it is still necessary to maintain a restrictive monetary stance.

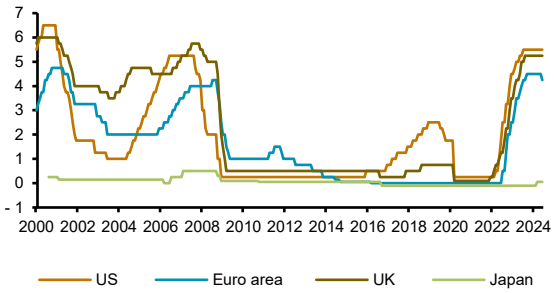
Global activity continues to show resilience notwithstanding the restrictive monetary policy. This materializes in moderate global growth while the balance between demand and supply moves toward a new equilibrium level. This re-balancing process is smooth, sustained by a strong labor market, household consumption, and real income gains. The expansion of the services sector continues to stand out, reflecting changes in the profile of household consumption and robust labor markets. International trade and industrial output remain moderate. Impacts from ongoing conflicts in Europe and in the Middle East continue to abate. Nevertheless, geopolitical tensions jeopardize the efficiency of global production chains and risk attenuating the relatively favorable contribution of goods prices to inflation.

Figure 1.1.1 – GDP growth
from 2023Q2 to 2024Q1



Sources: Bloomberg, BCB
1/ Calculated as described in the box "Projections and macroeconomic analysis model of the global economy" of the September 2022 IR.
2/ Argentina, Brazil, Chile, Colombia, Mexico, and Peru.

Figure 1.1.2 – Monetary policy rates¹
% p.a.



Source: Bloomberg
1/ Until June 12th.

U.S. economic activity remains robust, despite the projected deceleration. In 2024Q1, the U.S. GDP rose 1.3% QoQ saar, with sustained household consumption, benefited from the heated labor market and excess savings accumulated in recent years. Fixed investment has shown low expansion, to a great extent due to the effects of historically high interest rates. The persistence of low confidence levels, the cumulative reduction of household liquidity conditions since the outbreak of the Covid-19 pandemic, and the still uncertain economic environment reinforce the prospect of moderation in the U.S. activity in the coming quarters.

The labor market remains pressured, due to the slow decline of employment, but there have been signs of a gradual re-balancing between demand and supply in recent months. In 2024, an average of 248,000 jobs were created, close to the 2023 average (251,000). The unemployment rate has grown moderately since early 2023, reaching 4.0% in May 2024, still close to the historical low and below the estimate for the non-cyclical rate[1] (4.4%). Job vacancies have declined recently, suggesting a softening of the imbalance between supply and demand for workers, despite remaining at levels close to the peaks of recent cycles. The participation rate is still lower than 2019 levels, but has recovered in recent years, largely due to the inflow of immigrants and the normalization of post-pandemic economic conditions. Nominal wages continue to increase at high rates, although its effects on real wages are mitigated by still high inflation (4.1% p.a., in nominal terms, and 0.8% p.a. in real terms in May[2]).

U.S. inflation maintains its prospect of deceleration and gradual convergence to the monetary policy target, although the persistence of the services sector core has raised concerns about the pace of convergence. Inflation rate in May[3] was 3.3% p.a.. Core inflation has remained stickier, rising 3.4% in May, especially reflecting the more inertial dynamics of services prices in an environment of pressured labor market and the slow pass-through of the deceleration in the rental market to inflation. The prospect is that inflation will decline at a slow pace, converging to the target only by the end of 2026, reflecting the cumulative effect of monetary policy actions and economic activity slowdown.

The Fed acknowledges the benign scenario and has maintained a cautious stance about the next steps in monetary policy, stating its intention to keep interest rates at current levels as long as there is no confidence in the inflation convergence trajectory. The Fed funds rate has remained between 5.25% and 5.5% since July 2023. At its last meeting in June, the Federal Open Market Committee (FOMC) kept the Fed Funds rate unchanged, reaffirming the need to reassess the monetary policy stance according to the flow of incoming data. In its previous meeting, the FOMC announced the deceleration in the pace of decline of the stock of government securities and mortgage-backed securities on its balance sheet, which began in May 2022, with a planned reduction of up to USD 60 billion a month as of June.

Economic activity in the euro zone grew in 2024Q1, after a period of stagnation throughout the entire 2023. The GDP change of 0.3% QoQ saar in the euro area was the largest since the 0.5% QoQ saar of 2022Q3.

1/ According to the U.S. Congressional Budget Office (CBO).
2/ According to the "Average Hourly Earnings" indicator.
3/ According to the Consumer Price Index (CPI).

The largest contribution came from the increase in the net exports (+0.9 p.p.). Among major economies, Spain registered the highest growth (0.7% QoQ), followed by Italy (0.3% QoQ), Germany, and France (both with 0.2% QoQ). Only three out of twenty countries registered GDP stagnation or decline in 2024Q1, among them the Netherlands (-0.1% QoQ), the fifth largest economy of the bloc. After declining in the last two quarters of 2023, characterizing a technical recession, GDP in the UK increased 0.6% QoQ in 2024Q1. Like in the euro area, UK growth was also driven by net exports, followed by household consumption and government expenditures.

Inflation[4] in the euro area continued to decelerate in 2024, with a slight upward change in May, although services inflation remained high. After closing 2023 at 2.9% p.a., inflation fell to 2.4% in April, oscillating upwards in May (2.6% p.a., according to preliminary data). Nonetheless, the services component, which closed 2023 at 4.0% p.a., dropped to 3.7% p.a. in April, but returned to the previous level in May (4.1% p.a., preliminary data). The same trend was registered in the UK, where changes in services prices also declined, but less than that of prices in general. The inflation rate[5] of 4.0% p.a. in late 2023 decelerated to 2.3% p.a. in April, while services prices registered an increase of 5.9% p.a. (against 6.4% p.a. in December 2023).

In face of the disinflationary process in the euro area, the ECB announced an interest rate cut. In June, the ECB Governing Council announced a 25 bps cut in its three main interest rates, reducing the deposit rate to 3.75% p.a. (against the record level of 4.0%). The Monetary Policy statement highlighted the inflation decline of more than 2.5 p.p. in the nine months since the last interest rate increase. The ECB inflation projection for 2024 is 2.5% p.a., falling to 2.2% p.a. and 1.9% p.a. in 2025 and 2026, respectively. The expected GDP growth for 2024 stands at 0.9%. The respective current growth projections for 2025 and 2026 are 1.4% and 1.6%. In the Council's assessment, restrictive financing conditions – due to monetary policy, leading to a reduction in demand – as well as the continuation of well anchored inflation expectations over longer horizons have contributed decisively to bringing inflation back down. In the UK, the Monetary Policy Committee of the Bank of England (BoE) decided to keep the base interest rate at 5.25%, emphasizing in its statement the high services sector inflation.

Economic activity in China maintained its pace of growth in 2024Q1, as its growth drivers shift from investment in the real estate sector to investment in technology-intensive manufacturing. GDP rose 5.3% in 2024Q1, after registering 5.2% in 2023Q4, in the YoY comparison. This growth rate exceeded expectations. The IMF improved its projections for 2024. On the supply side, growth was driven by the secondary sector, mainly by manufacturing, with an increased growth rate of 6.4%, against 5.3% in 2024Q1. The tertiary sector decelerated, especially in the groups of trade, transport, lodging and food, and financial services. The adjustment process in the real estate sector proceeded, with a 5.4% decline in the value added in 2024Q1, against 2.7% in the 2024Q1.

Economic growth tends to decelerate in 2024Q2 in the YoY comparison. Monthly indicators released by the Chinese National Bureau of Statistics (NBS), relative to April and May, suggest that retail sales and services activity lost momentum. Investment in fixed assets also decelerated, mainly due to the real estate sector performance. Industrial output and exports, in contrast, remained sustained. In the labor market, the unemployment rate remained stable.

The government announced measures to support the real estate development sector. In addition to fiscal and macroprudential measures implemented in 2024Q1, the People's Bank of China (PBC) announced a financing program with subsidized rates in the amount of RMB 300 billion, channeled to local governments for the purchase of new properties from real estate companies and convert them into popular dwellings. The PBC also announced the extinction of the minimum interest rates limit and the reduction of the minimum down payment in mortgage financing contracts for the purchase of real estate by households.

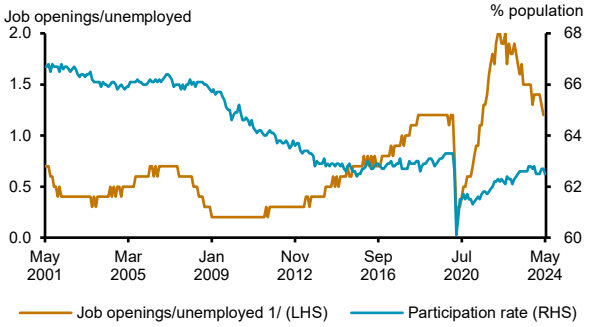
Chinese exports are undergoing a change of their recipient markets. In a global context of restructuring production chains, the raise of customs tariffs in the U.S. and the European Union could impact sales of some

4/ According to the Harmonized Index of Consumer Prices (HICP).
5/ Price changes measured by the CPI.

relevant Chinese export goods, such as steel and aluminum products, semiconductors, electric vehicles, batteries, and solar panels. These new tariffs can accelerate the process of reducing the share of advanced economies and increasing the share of emerging economies as destination of these exports.

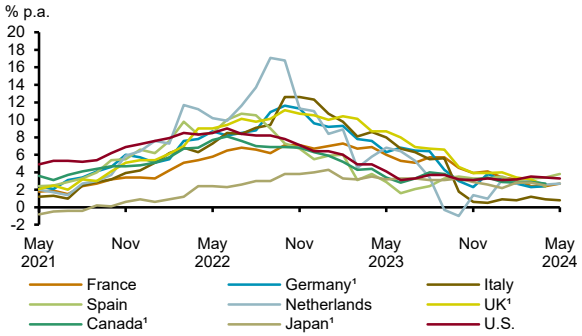
Most emerging economies registered positive GDP growth in 2024Q1, but risks remain high. Similarly, all Latin America's largest economies registered positive GDP growth in the period, except Argentina. Throughout 2024Q2, there was no significant directional change in global financial conditions, mainly reflecting more restricted movements in the medium- and long-term U.S. interest rates. Against this background, stock prices in emerging economies (EMEs) registered, in general, limited net change, despite volatility that mostly reflected local factors. The currencies in the main EMEs behaved differently in 2024Q2, although those of the Latin America's largest economies depreciated, except the Chilean peso, which reacted positively to the rise of copper prices. Overall, risks for EMEs remain high and are associated with uncertainties about the start U.S. monetary policy easing, the performance of the Chinese economy, and geopolitical factors related to ongoing military conflicts.

Figure 1.1.3 – U.S. – Job openings and participation rate



Source: Bloomberg
1/ Until April 2024.

Figure 1.1.4 – CPI – Advanced economies



Source: Bloomberg
1/ Until April 2024.

Expectations indicate inflation still above target at the end of 2024 in several EMEs and a slower pace of interest rate reduction in Latin America. Inflation rate in the main EMEs continued at uneven levels and trajectories, with some countries experiencing acceleration in consumer price indexes in recent months. Among the largest Latin America economies, some countries have lost their disinflationary impetus, with a slower deceleration pace or relatively stable inflation rates. Market analysts' expectations in each country reveal that several relevant economies are expected to end 2024 with inflation rates still above the center of their targets. A large share of central banks from EMEs are once again expected to keep their policy interest rates unchanged, with no forward guidance of cuts. In Latin America, central banks of main economies behaved differently. In the next quarters, expectations of interest rate cuts still prevail in most EMEs. However, surveys of market analysts indicate a slower pace of interest rates reduction in all main Latin American countries, except Argentina.

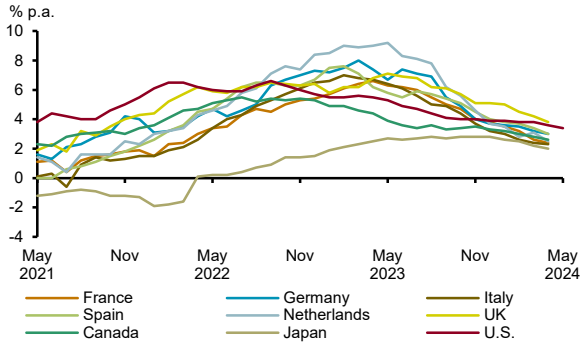
Energy commodity prices followed mixed dynamics, especially after the relief in oil prices that followed the OPEC+ decision in early June, coupled with higher gas prices in view of supply concerns, while prices of metal and agricultural commodities increased in the period. Energy commodity prices followed mixed trajectories in the period. Oil prices were negatively impacted, mainly due by the OPEC+ decision and the cooling of geopolitical tensions. Despite OPEC+ assessment that current cuts will continue until 2024Q3, the group also disclosed a timetable for gradually restoring the production that had been reduced in November 2023. This adds to the expectation of increased supply from outside OPEC+, especially the U.S., Brazil, and Canada, and from OPEC+ members that are exempt from meeting production quotas, such as Venezuela and Iran. Moreover, doubts persist about Chinese activity and global economic growth, following downward reviews to demand growth carried out by international agencies in May. Accordingly, the OPEC+'s position about the compliance of the released schedule and new decisions on voluntary cuts will be determinant for the dynamics of oil inventories in 2024. Natural gas prices presented an upward pressure coming from

international competition for liquefied natural gas, with increased demand in Asia, as well as from unexpected halts or delayed resumption of the operations by key producers, such as the U.S. and Norway. In addition to these factors, there is greater concern about the possible withdrawal of the remaining Russian supply to Europe, despite the continued recovery to comfortable levels of inventories in the continent.

As for metal commodities, dynamics associated with supply reduction, logistic difficulties, and expectation of high demand due to the role of some commodities in the energy transition, led to increased prices in the period. However, weaker Chinese PMI data in May, fall in imports of commodities, such as copper, and the continued expansion of inventories, as is the case of iron ore, prevented more significant increases.

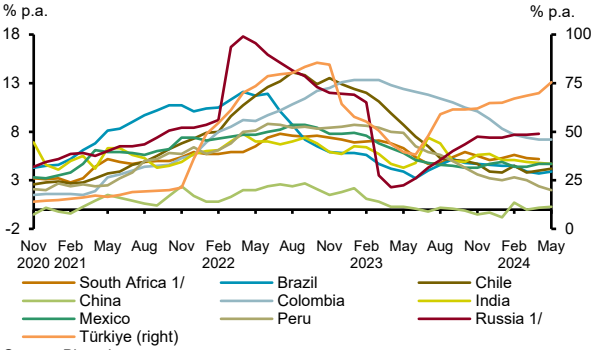
Agricultural commodities remain affected by global supply issues, such as the significant climate impacts on the prospects of production and stocks. The impact of this dynamics was seen through upward prices pressure on some commodities in the period, specifically coffee, rice, corn, and wheat. However, the climate also contributed to the forecast of higher sugar harvest in Brazil, contributing to improve the prospect for the global supply of this commodity. Among other factors, the continuity of trade restrictions coming from the war in Ukraine and tensions in the Middle East, particularly in the Red Sea, continue to increase uncertainty.

Figure 1.1.5 – CPI core – Advanced economies[1]



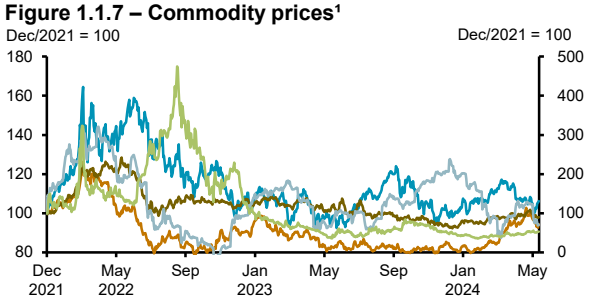
Source: Bloomberg
1/ U.S., until May 2024. Other countries until April 2024.

Figure 1.1.6 – CPI – Emerging markets



Source: Bloomberg
1/ Until April 2024.

Figure 1.1.7 – Commodity prices[1]



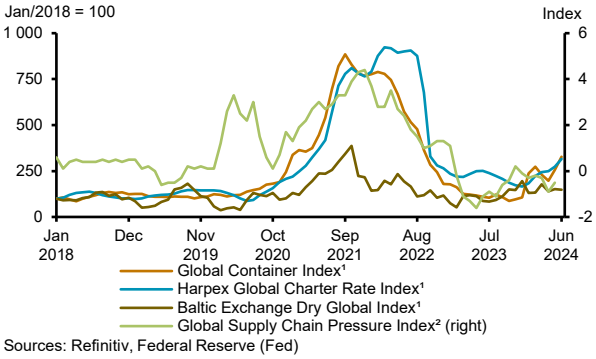
Source: Bloomberg
1/ Until June 12th.

Despite the resilience of economic activity and the continuity of the gradual disinflation process, several risks persist in the global scenario. Regarding activity, the key risks are the lagged effects of the monetary tightening already implemented in advanced economies, their transmission to emerging economies, the loss of momentum of Chinese economic growth, and the adoption of protectionist trade or industrial policies, with impacts that are adverse to global chains or that would reduce the volume of international trade, and the worsening pricing of concerns about the prospective fiscal dynamics in the U.S. and China. Regarding price dynamics, the main risks are associated with potential upward price pressures of relevant commodities, an escalation in geopolitical conflicts, or the occurrence of climate phenomena, such as those associated with the *el Niño* to *la Niña* transition in 2024. Furthermore, a greater resilience of rent prices and wages makes it more difficult for services inflation to slow down. In the opposite direction, the main downside risks to

inflation are a quicker rebalancing between supply and demand in the labor market or a sharper economic activity slowdown, especially due to the continuation of the restrictive monetary policy stance in advanced economies for a longer-than-expected period.

In 2024, the moderation in the price levels of some relevant commodities is expected to contribute less significantly to the disinflationary process than throughout 2023. The easing of many sources of pressure in global chains has also already materialized in 2023, and there is an increase in freights on routes involving China, which means that the contribution of this factor to the disinflation process will also be less significant in 2024. On the one hand, considering the stage of the cycle, part of the effects of the interest rate rises around the world has yet to materialize. On the other hand, relevant risks related to tensions in the Middle East, the war in Ukraine, and the *El Niño*, have already largely materialized.

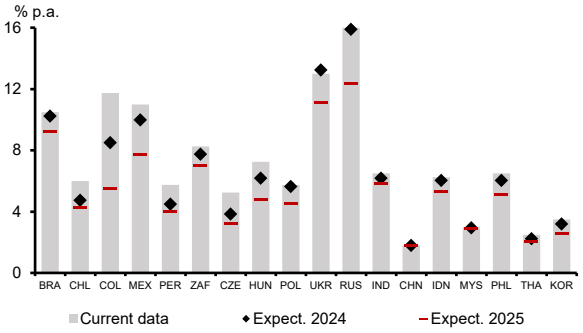
Figure 1.1.8 – Supply bottlenecks indicators



Sources: Refinitiv, Federal Reserve (Fed)

1/ Monthly averages - Until June 12th. 2/ Until May 2024.

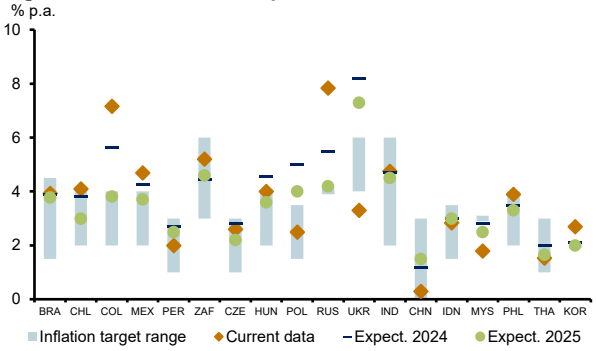
Figure 1.1.9 – Policy interest rates¹



Sources: Bloomberg and central banks' surveys

1/ Until June 12th.

Figure 1.1.10 – Inflation expectations¹



Sources: Bloomberg and central banks' surveys

1/ Until June 12th.

In short, the persistence of inflationary pressures remains the main risk for the prospective monetary policy scenario in advanced and emerging countries and to the likelihood of a soft landing for the global economy. The realignment of relative prices, the normalization of activity in the services sector, and the re-balancing of fundamentals in still tight labor markets suggest that core inflation should remain persistently high for a longer period than has been observed recently. Despite signs that the disinflation process is still taking place in several countries, inflation remains at high levels. The assessment of trends related to changes in productivity, allocation, and distribution requires additional time for the confirmation of clear evidence of their effects to be confirmed in new data sets. Against this backdrop, central banks in leading economies have reaffirmed their commitment to returning inflation to their targets, highlighting the need for maintaining interest rate at historically high levels until they are confident about the convergence of expectations towards the achievement of the last stage of the disinflationary process. Nevertheless, some central banks, understanding that the process of inflation convergence has advanced, have opted to start reducing interest rates, underscoring that it is still necessary to keep a restrictive and flexible monetary stance to evaluate new adjustments as confidence in the process consolidates.

1.2 Domestic outlook

Economic activity

The Brazilian economy expanded robustly and above expectations in 2024Q1, leading to a revision in the projection for the GDP growth in the year. The GDP growth in 2024Q1 was accompanied by significant increases in household consumption and investment, two key components of final demand, and in more cyclical sectors (Table 1.2.1). Economic activity is expected to slowdown in 2024Q2 – partly due to the negative impact of the floods in Rio Grande do Sul. In the second half of the year, economic growth should reflect, in addition to the economy's potential growth pace and the lagged effects of the decrease in the degree of monetary policy tightening that occurred over the last year – an increase in demand and production related to the recovery of lost capital and the replenishment of goods and stocks in Rio Grande do Sul.

Table 1.2.1 – Gross Domestic Product
QoQ s.a.

% change

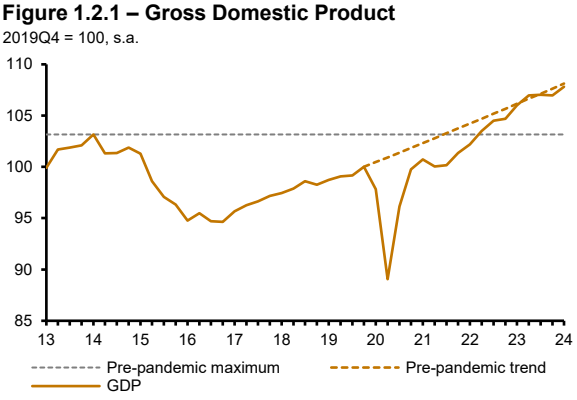
Itemization	2023				2024
	Q1	Q2	Q3	Q4	Q1
GDP at market prices	1.2	0.9	0.1	-0.1	0.8
Agriculture	16.2	-3.5	-2.7	-7.4	11.3
Industry	0.1	1.0	0.6	1.2	-0.1
Mining	4.0	2.0	0.3	4.1	-0.4
Manufacturing	-0.9	0.6	0.0	0.0	0.7
Construction	-1.1	1.8	-3.4	3.8	-0.5
Public utilities	2.1	-0.1	3.2	3.2	-1.6
Services	0.4	0.7	0.4	0.5	1.4
Trade	0.2	0.5	0.6	-1.1	3.0
Transport and storage	0.2	1.5	-1.0	-0.5	0.5
Information services	-1.8	1.1	0.8	-0.3	2.1
Financial and related services	2.9	1.2	1.2	0.4	0.0
Other services	-0.5	1.0	0.6	1.3	1.6
Real estate	0.1	0.8	1.5	0.1	1.0
Public admin., health and education	1.1	0.2	0.4	0.1	-0.1
Household consumption	0.5	1.1	1.0	-0.3	1.5
Government consumption	0.5	1.1	0.6	0.9	0.0
Gross Fixed Capital Formation	-3.2	0.5	-2.3	0.5	4.1
Exports	1.4	3.1	2.5	0.0	0.2
Imports	-4.5	4.5	-1.9	1.4	6.5

Source: IBGE

Brazilian economic growth in 2024Q1 exceeded expectations. Expansions of 0.8% compared with 2023Q4 and 2.5% compared with 2023Q1 exceeded the expectations prevailing at the time of the previous IR and were slightly above the forecasts made on the eve of the GDP release.[6] With these results, GDP reached the highest level of the time series, 7.8% above the level observed in 2019Q4 and in line with the pre-pandemic trend (Figure 1.2.1).[7] Excluding agriculture and mining – which grew strongly in 2023, unlike more cyclical sectors – GDP also remains in line with the pre-pandemic trend.

6/ According to the Focus Report, at the cut-off date of the previous IR, the median of market forecasts for the YoY GDP growth in 2024Q1 was 1.8% (considering forecasts reported in the last five working days). On the eve of the release of the GDP for 2024Q1, the median forecast for the YoY change was 2.1%.
7/ The pre-pandemic trend is defined here as the projected GDP from 2019Q4 based on the average growth from 2017 to 2019. According to this criterion, GDP for 2023Q1 is only 0.3% below trend.

Figure 1.2.1 – Gross Domestic Product

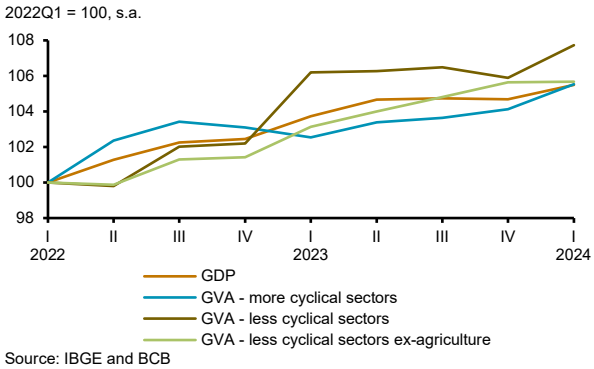


Source: IBGE

Supply-side analysis confirms the view of strong growth in 2024Q1. Among major sectors, the highest growth rate was observed in agriculture (11.3%), reflecting an increase in cattle slaughter and the seasonality of the soybeans harvest[8]. The services sector grew 1.4%, with widespread expansion across several activities. Despite a slight decline in industry, its main component, manufacturing, rose 0.7%, after remaining stable for two consecutive quarters. Considering the indirect seasonal adjustment, i.e., aggregating the seasonally adjusted GDP supply-side components, economic growth in 2024Q1 would be 1.6%, higher than the 0.8% obtained by the direct method.[9] According to this method, even excluding agriculture, which grew strongly in the quarter, an increase of 1.0% would still be observed in early 2024.

Unlike in the previous two quarters, the dynamics of more cyclical activities proved to be stronger in early 2024.[10] Considering the indirect seasonal adjustment, the more cyclical components grew 1.4% in 2024Q1, after modest expansions in 2023Q3 and 2023Q4 (Figure 1.2.2). The less cyclical sectors excluding agriculture, in turn, which grew strongly throughout 2023, remained stable in 2024Q1, with the decline in the mining sector standing out after a sequence of highs.

Figure 1.2.2 – GDP – More and less cyclical sectors



Source: IBGE and BCB

The demand-side GDP breakdown also highlights the dynamism of economic activity in 2024Q1 (Figure 1.2.3). Household consumption resumed a strong growth pace (1.5%) after surprisingly declining in 2023Q4 (-0.3%). Data from the Brazilian Institute of Geography and Statistics (IBGE) monthly surveys for industry, trade, and services suggest expansion in the consumption of both durable and non-durable goods and

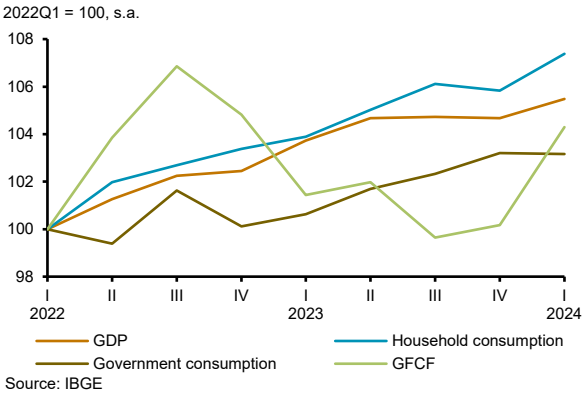
8/ Even though the estimated production of soybeans for 2024 is lower than in 2023, it remains high. As the harvest is concentrated in 2024Q1, production grew compared with 2023Q4, even after the seasonal adjustment.

9/ The lower number of working days in 2024Q1 compared with 2023Q1 (due to holidays occurring outside weekends) and the fact that 2024 is a leap year imply greater-than-usual difficulties in the seasonal and calendar adjustment. Alternative adjustment that considers a workday variable consistent with the Brazilian calendar and which does not mechanically adjusts for leap years, an approach closer to that used in the IBC-Br seasonal adjustment, indicates GDP growth of 1.6% in 2024Q1, the same value obtained by the indirect method mentioned above.

10/ Based on the sectors classification as more or less cyclical, discussed in the previous three IR. Activities classified as less cyclical are: agriculture; mining; financial activities, insurance and related services; real estate activities; and administration, defense, public health and education, and social security.

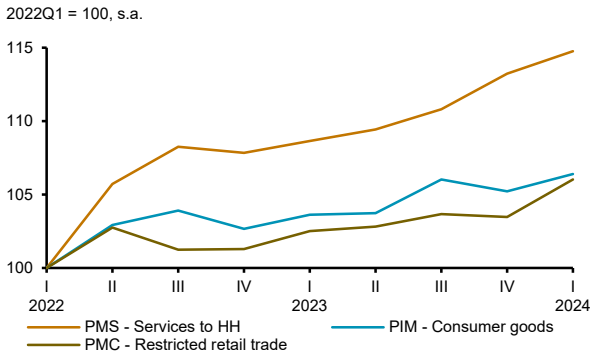
services in early 2024 (Figure 1.2.4). The rise in private consumption is linked to the trajectories of household disposable income and credit, discussed more thoroughly in the following sections of this chapter. Gross Fixed Capital Formation (GFCF), which had resumed an upward trend in 2023Q4, accelerated significantly (4.1%), with an increase in the production and importation of capital goods. This inflection of investments in late 2023 and early 2024 is consistent with the lagged effects of the decrease in the degree of monetary policy tightening over the last year. There was also an acceleration of imports, reinforcing the perception of heated domestic demand.

Figure 1.2.3 – GDP – Demand



Source: IBGE

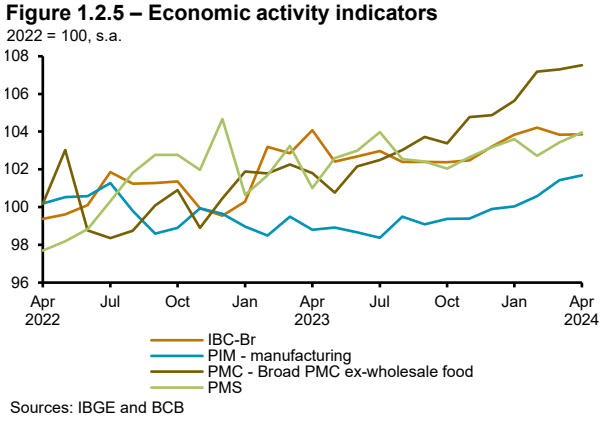
Figure 1.2.4 – Household consumption indicators



Source: IBGE

However, monthly economic activity indicators suggest, in general, an economic activity slowdown in 2024Q2, also reflecting the negative impacts of the floods in Rio Grande do Sul. After declining in March, the BCB Economic Activity Index (IBC-Br) remained stable in April, leaving a statistical carry-over close to zero for 2024Q2 (Figure 1.2.5). Also in April, industrial production declined – with a slight increase in manufacturing and a sharp decline in mining – the volume of services rose slightly while trade remained nearly stable[11]. Other coincident indicators of economic activity and business surveys revealed predominantly negative results in April and May (Table 1.2.2).

Figure 1.2.5 – Economic activity indicators



Sources: IBGE and BCB

The net effect on GDP of the tragedy in Rio Grande do Sul is difficult to predict and its consequences need to be closely monitored over the coming months. There is the negative impact that was observed more acutely in May, which will possibly still be felt for a few months. A box of this IR[12] presents timely May indicators showing the negative impacts on services, agriculture, and industry of the floods in Rio Grande do Sul. In turn, the extension of damages will require significant reconstruction efforts and exceptional purchases of capital, durable goods, and clothing, which may positively contribute to economic activity growth, especially from 2024Q3 onwards. Therefore, in aggregate terms, the disaster is expected to negatively impact economic activity in 2024Q2, but it may positively impact it in the second half of the year and throughout 2025.

11/ Monthly Survey of Trade (PMC) in the broad concept excluding wholesale specialized in food, beverages, and tobacco products.
12/ Box Initial impacts of the floods in the economic activity of Rio Grande do Sul of this IR.

Table 1.2.2 – Economic activity coincident indicators

Seasonally adjusted

% change

Itemization	2023			2024					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Q2[1]
Circulation of heavy vehicles	1.0	0.3	-0.2	-0.4	0.4	-0.5	2.9	-5.0	0.1
Corr. cardboard shipment	1.4	1.3	0.9	-0.6	2.3	-0.5	-1.5	-1.6	-1.8
Light vehicle production	-6.2	-0.5	4.9	-7.0	14.1	-9.3	3.7	-33.6	-15.6
Trucks production	15.3	-0.1	5.2	6.6	-2.1	6.0	-0.8	-6.1	-0.7
Cielo broad retail index	-0.5	1.6	0.9	1.8	-5.1	2.0	-1.4	-0.1	-1.9
IGET broad index	0.7	0.1	1.2	1.8	0.4	-0.6	-1.2	-0.9	-1.9
IGET services to HH	2.4	2.1	3.2	-6.1	-6.3	8.4	-3.0	3.1	1.6
IDAT goods[2]	-0.5	2.8	3.4	-5.0	2.3	3.3	-4.8	3.1	-0.4
IDAT services[2]	0.1	5.4	4.1	-3.7	-2.3	4.3	-0.6	-2.3	0.3

Sources: ABCR, ABPO/Empapel, Anfavea and Fenabrave

[1] Average April-May 2024/Average 2024Q1.

[2] Expanded payment methods (Cards+Pix+TED/DOC+bank slip payment flows).

As detailed in a box of this IR[13], the projection for the GDP growth in 2024 rose from 1.9% to 2.3%. In 2024Q1, economic activity dynamism was stronger than anticipated, increasing the statistical carry-over for the remainder of the year. In a scenario of still incomplete information and high uncertainty, this estimate considers a modest negative impact of the tragedy in Rio Grande do Sul on the annual GDP growth[14], with negative effects concentrated in 2024Q2 and largely offset by the reconstruction efforts in the subsequent quarters.

Labor market

Several indicators confirm that the labor market has heated up even more in recent months. The unemployment rate declined, the employment level and the labor force participation rate increased, the net creation of formal jobs rose, and real income continued to grow strongly. Moreover, the performance of several indicators was stronger than anticipated.

The unemployment rate continued to decline, reaching 7.2% in the Feb-Apr quarter (Figure 1.2.6). The current rate is the lowest since the end of 2014 and is close to the lowest in decades (6.7% in February 2014). Even if recent economic reforms, such as the labor and social security ones, have had a positive impact on structural labor market aspects, such as inclusion and formalization, the historically low level of the unemployment rate is one of the factors indicating some tightening in the labor market.

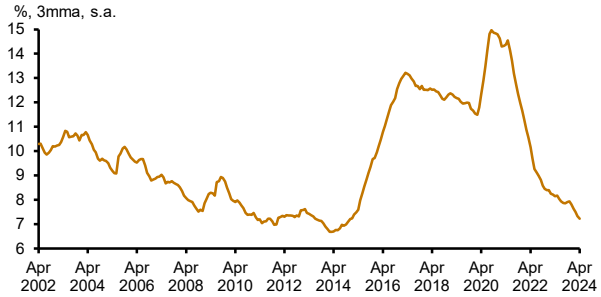
The decline in unemployment has been observed since 2021, but the recent movement contrasts with that occurred between the second half of 2022 and the first half of 2023. Previously, the unemployment rate decline largely reflected the fall in the population's participation rate in the labor market, a topic investigated in a box of this IR[15] (Figure 1.2.7). In recent months, the determining factor has been the employment expansion. The employed population grew nearly 1% for the second consecutive quarter, with increases in the number of informal and, above all, formal workers. Unlike in the second half of 2022 and the first half of 2023, the labor force increased. The increase was 0.5% in the last quarter, following a 0.8% rise in the previous one. This change in the composition of the unemployment rate trajectory is compatible with the view of a tighter labor market.

13/ Box Revision of the 2024 GDP projection of this IR.

14/ For comparison purposes, in the June 2024 Pre-Copom Questionnaire (PCQ), analysts were asked which was their estimate for the impact of the tragedy in Rio Grande do Sul on the Brazilian GDP. The median estimate was an impact of -0.2 p.p.

15/ See box Demographic changes and the recent evolution of the participation rate in the labor force of this IR.

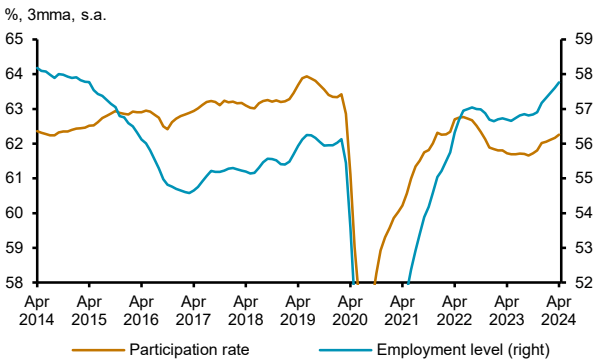
Figure 1.2.6 – Unemployment rate[1]



[1] Historical unemployment rate estimates following Alves, S. A. L. and Fasolo, A. M., "Not Just Another Mixed Frequency Paper", Banco Central do Brasil (2015), Working Paper 400.

Sources: IBGE and BCB

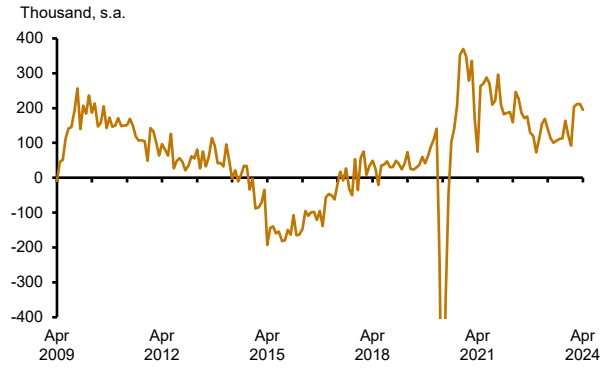
Figure 1.2.7 – Participation rate and employment level



Source: IBGE

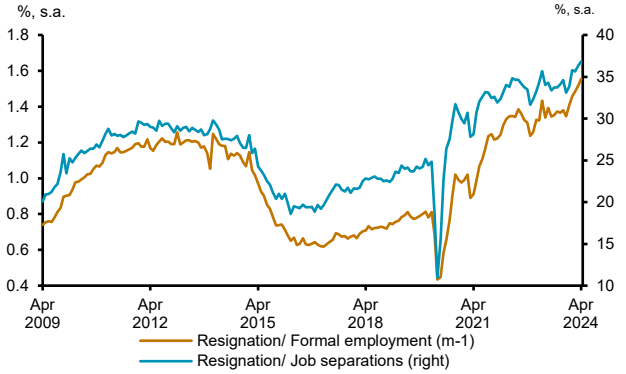
The creation of formal jobs, which was already high, increased. According to the New General Registry of Employed and Unemployed Persons (New Caged), the seasonally adjusted average monthly jobs balance was close to 200,000 in the Feb-Apr quarter (Figure 1.2.8). This level is much higher than the 139,000 observed in the Nov-Jan quarter, which already far exceeded the 2019 growth pace.[16] The acceleration in the most recent quarter compared with the previous one was widespread across economic activities and mainly came from an increase in hirings. Another indicator of the labor market tightening, the share of resignations in total job separations, remains high and increased at the margin (Figure1.2.9).

Figure 1.2.8 – Net formal job creation



Source: Ministry of Labor and Employment

Figure 1.2.9 – Resignations ratio



Source: Ministry of Labor and Employment

Growth in labor income remained strong and widespread, according to the Continuous National Household Sample Survey (PNAD Continuous). The average usual real labor income increased 1.1% in the Feb-Apr quarter, following expansions of 1.4% and 1.8% in the previous quarters (seasonally adjusted data). The gains have been distributed across types of occupation and economic activities, with few exceptions. The average real labor income is approximately 4.6% higher than the value observed in 2019 but slightly below what would be obtained by extrapolating the growth trend of the pre-pandemic period, from 2017 to 2019 (Figure 1.2.10).

Complementary indicators for assessing the dynamics of salaries also point to real gains, albeit more modest. The average real salary on hirings[17] increased 0.3% in the Feb-Apr quarter, following a 0.5% rise in the Nov-Jan quarter, according to information from the New Caged, seasonally adjusted (Figure 1.2.11). The average of nominal salary adjustments collected from Collective Bargaining Agreements (CBA)[18] was 4.8%

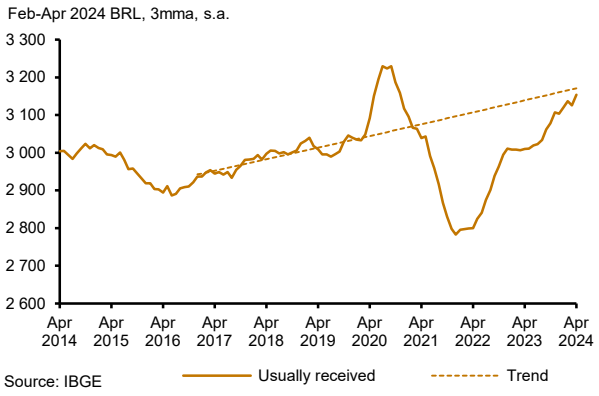
16/ As the Caged changed to the New Caged as of 2020, this comparison should be viewed with caution. Further references to the changes in Caged are available in the labor market section of the March 2021 and December 2021 IR.

17/ The average hiring salary has greater adherence to the economic cycle than the layoff salary, which is the reason why the analysis prefers this metric in the New Caged data. As Caged changed to the New Caged in 2020, data should be analyzed with caution. Further references to the changes in Caged are available in the labor market section of the March 2021 and December 2021 IR.

18/ This refers to the arithmetic average of nominal adjustments of the CBA in São Paulo and Rio de Janeiro by criterion of registration date in the Collective Labor Negotiations System (*Mediador)* of the Ministry of Labor and Employment (MLE). The agreements considered are those for which it was possible to adequately capture the percentage of adjustment agreed upon.

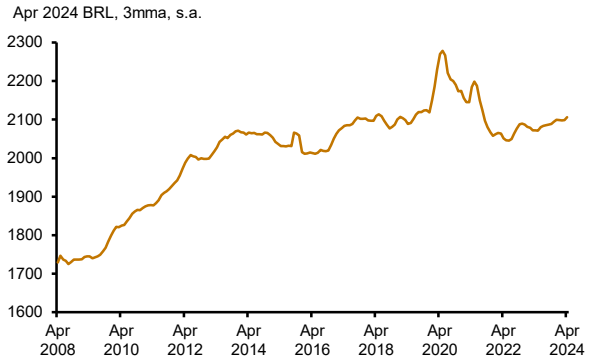
in the Mar-May quarter (Figure 1.2.12). The average real adjustment[19] fell to 0.7% in the period, compared with 0.9% in the previous three months.

Figure 1.2.10 – Real average labor income



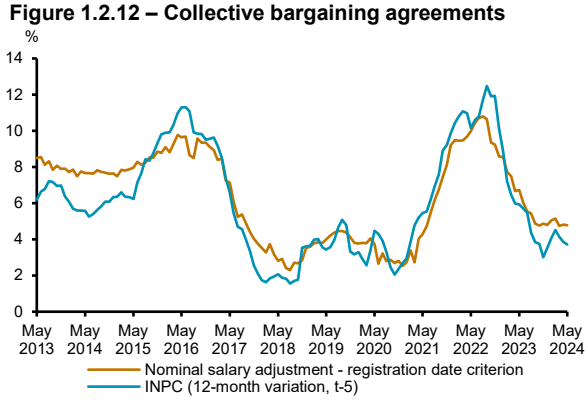
Source: IBGE

Figure 1.2.11 – Hiring salary



Source: Ministry of Labor and Employment

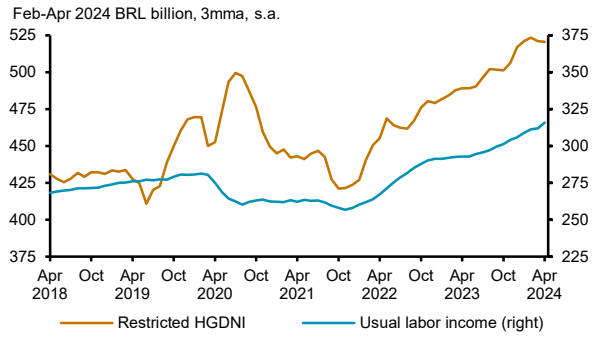
Figure 1.2.12 – Collective bargaining agreements



Sources: IBGE, MLE and BCB

The overall labor income continued to expand, reflecting the increase in occupation and average income. The seasonally adjusted Household Gross Disposable National Income (HGDNI) in the restricted concept, an indicator that incorporates other sources of income besides work, was virtually stable in the Feb-Apr quarter (Figure 1.2.13). The indicator remained stable at the margin, despite the high comparison basis which is due to the extraordinary court-ordered payments at the turn of the year and partially captured by the December 2023 indicator.[20]

Figure 1.2.13 – Restricted HGDNI and overall labor income



Sources: IBGE and BCB

19/ Based on the date of registration, the agreed adjustments have a higher correlation with the deflator used in this analysis, the 12-month National Consumer Price Index (INPC) measured five months earlier.

20/ The HGDNI series includes social security and social assistance court-ordered payments. Those related to payroll are not included, since the source of labor income information for calculating the HGDNI is the PNAD Continuous, according to the methodology available at BCB's Technical Note 55 (Portuguese only).

Credit

The credit market evolved positively in the Feb-Apr quarter, possibly impacted by the monetary policy easing that took place over the past year. Interest rates on new non-earmarked operations declined, especially in low-risk modalities. Non-earmarked credit granting continued to rise, in line with the trend observed since the second half of 2023, and financing through the domestic capital market reached a record value. Delinquency remained relatively stable, despite the unfavorable seasonality of this period.

The pass-through of the Selic rate reduction to the cost of non-earmarked credit continued (Figure 1.2.14), but this trend might change due to the recent increase in longer-term interest rates. In the corporate segment, the interest rates reduction was widespread across non-revolving modalities. In the household segment, interest rates of new credit granting of low-risk modalities declined, as opposed to the expansion in high-cost modalities. If the recent increase in the interest curve (Figure 1.2.15) persists, it might impact banking interest rates in the next months.

Figure 1.2.14 – Non-earmarked interest rates

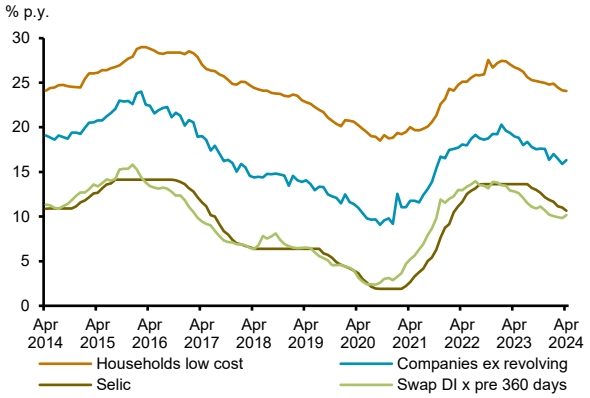
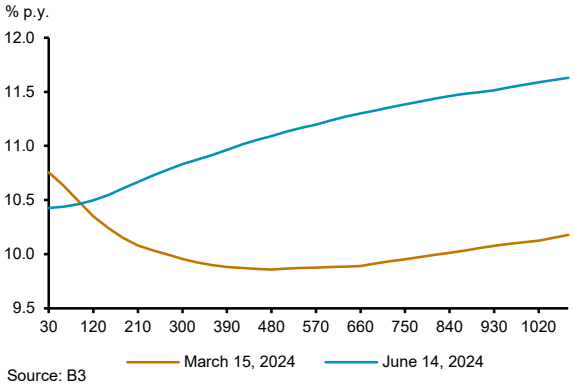


Figure 1.2.15 – Yield curve



Source: B3

Non-earmarked credit granting continued on an upward trend (Figure 1.2.16) driven by the gradual improvement in lending credit conditions.[21] In the banking market, interest rate reduction has been stimulating the borrowing of low-cost non-earmarked household credit modalities. Vehicles financing, for which the accumulated quarterly volume was in Feb-Apr the largest since August 2012 (seasonally adjusted data deflated by the IPCA), stands out. Banking corporate lending has also been growing, especially in short-term lines. The monetary policy easing also contributed to the expansion of large companies financing in the domestic capital market, through the issuance of fixed income securities. The volume of funding raised through debentures and promissory notes in the Feb-Apr quarter reached the peak of the time series started in 2010 (Figure 1.2.17).

Figure 1.2.16 – New non-earmarked credit operations

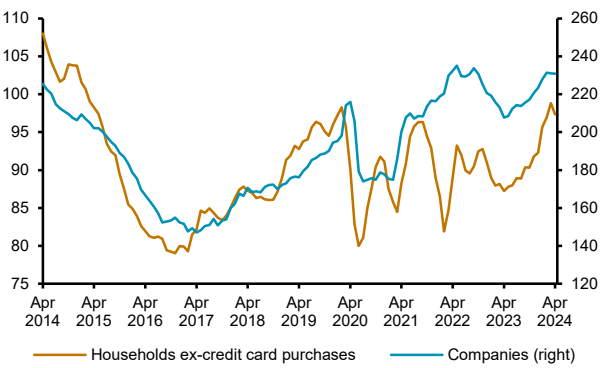
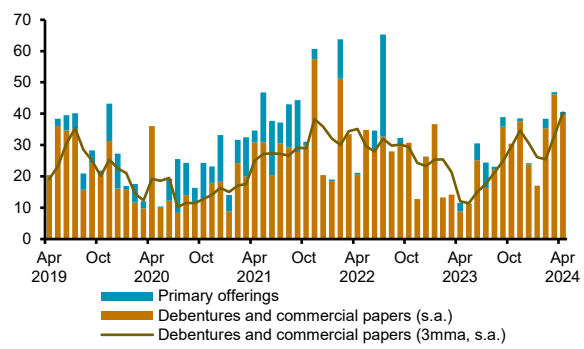


Figure 1.2.17 – Non-banking corporate financing



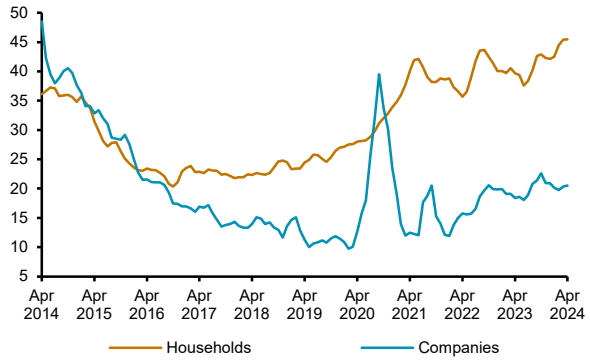
Source: BCB and Anbima

21/ The Quarterly Survey on Credit Conditions (Portuguese only) indicates that supply credit conditions have been relatively more favorable, mainly for large companies and in the household consumption segment.

Earmarked credit granting remained steady (Figure 1.2.18). In the earmarked household segment, granting reached the quarterly peak of the time series, the performance of rural and real estate financing standing out. Real estate financing resumed growth driven by operations backed by the Employment Guarantee Fund (FGTS), which offset the moderate pace of financing in the framework of the Housing Financial System (SFH), mostly linked to savings accounts. Corporate credit granting remained relatively stable. Rural credit operations, which were more concentrated from July 2023 to January 2024, declined, while the Brazilian Development Bank (BNDES) disbursements oscillated upward between February and April, remaining substantially below the volumes released from 2013 to 2014.

Figure 1.2.18 – New earmarked credit operations

BRL billion of Apr 2024, 3mma, s.a.



The growth rate of SFN credit operations accelerated in the last three months, reverting the downward trend recorded since July 2022 (Figure 1.2.19). The YoY growth rate rose from 7.7% in January to 8.7% in April, reflecting the dynamics of new credit granting. The acceleration was sharper in the non-earmarked corporate segment, due to the base-effect associated with the impact of the *Americanas* case in early 2023. The acceleration in the household credit balance, in turn, was driven by vehicles financing, in the non-earmarked segment, and by rural credit, in the earmarked segment. Considering the credit trajectory in the recent months and the up-to-date economic prospects for 2024, the projection for credit growth in 2024, detailed in a box of this IR, rose from 9.4% to 10.8%.

Lastly, the delinquency of SFN credit operations remained relatively stable from January to April, with minor oscillations (Figure 1.2.20). The 90 days past due loans in non-earmarked household operations improved slightly, despite the seasonality of this period, which tends to raise the household delinquency due to the concentration of expenses in the early months of the year. Delinquency decline in low-cost credit modalities was slightly stronger, with vehicles financing standing out, reflecting both the reduction in the balance of past due loans and the portfolio growth. Delinquency of corporate credit remained stable, with reduction in the segment of large companies and expansion in the segment of micro, small, and medium-sized enterprises (MPMEs). The recently released edition of the Quarterly Survey on Credit Conditions shows that the surveyed financial institutions evaluate that delinquency of MPMEs is expected to remain on an upward trend in the short-term, while that for the other segments should remain relatively stable.

Figure 1.2.19 – SFN outstanding credit balance

% year change

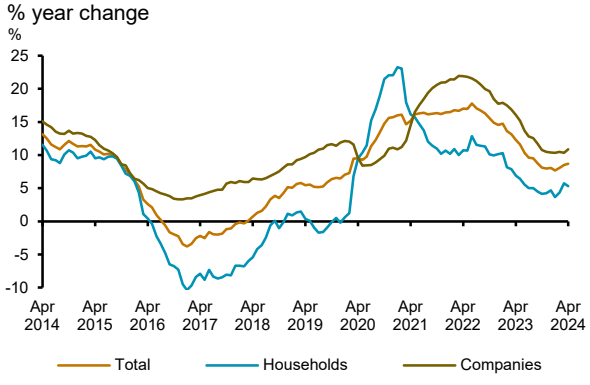
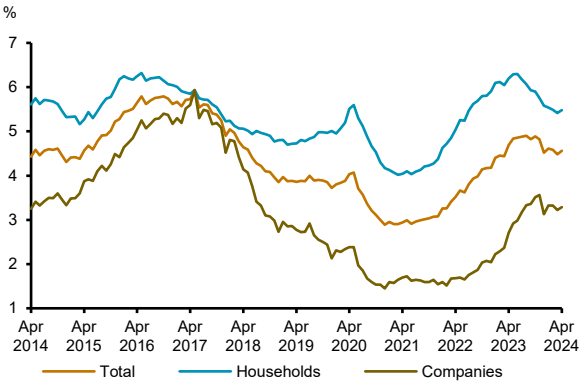


Figure 1.2.20 – Non-earmarked 90 days past due loans



Fiscal

Even though short-term fiscal results have not surprised negatively, the perception of analysts consulted by the BCB about the fiscal situation has worsened since the March 2024 IR.[22] Considering the evolution of revenues and expenses, the federal government continued to signal that it will meet the primary balance defined for 2024. Nonetheless, the change in indicative primary result targets for 2025 and 2026, the resistance for the approval of revenue recovery measures, and the tragedy in Rio Grande do Sul (RS) have led to an increase in the perception of fiscal risk among analysts.

In the first four months of 2024, the consolidated public sector registered a lower primary surplus than in the same period of 2023. This deterioration reflects changes in the schedule for court-ordered payments by the Central Government, which took place in February, in 2024, and in May, in 2023.[23] Regional governments and state-owned companies kept their balances practically stable compared with 2023 (Table 1.2.3).

Table 1.2.3 – Public sector borrowing requirements - Primary balance

Accumulated in the year until April

BRL billion

Itemization	2022	2023	2024
Central Government	-80	-47	-30
o/w Federal Government	-159	-126	-123
o/w INSS	79	79	92
Regional governments	-62	-33	-33
State-owned companies	-6	2	2
Total	-148	-79	-61

Positive values represent deficit and negative values represent surplus.

At the Central Government level, both revenues and expenses increased significantly in the first four months of the year (Table 1.2.4). Net revenues grew 8.9% in real terms when compared with the same period in 2023, reflecting the measures adopted by the government and the growth in economic activity in early 2024, with the labor market trajectory standing out. Increased collection of the Social Integration Program (PIS)/Contribution for Social Security Financing (Cofins), due to the reinstatement of taxes on fuels, and of income tax on capital earnings, due to taxes on exclusive funds, illustrate the impact of the government's efforts to recover revenues. The increase in social security inflows reflects the impact of the stronger labor market. Expenses, in turn, rose 12.6% in real terms, a higher pace than that of revenues. As already mentioned, among expenses, the impact of the change in the schedule for court-ordered payments was relevant. It is also noteworthy the increased expenses on social security benefits and Continuous Benefit Payments (BPC), reflecting the real minimum-wage increase, and health expenses to meet the minimum constitutional requirements.

The tragedy in Rio Grande do Sul is expected to pressure this year's primary balance. The federal government has already adopted several measures to help reconstruct the state and support companies and households. Some of these measures impact the primary balance, while others only affect the federal government debt.[24] Primary expenses to face this public calamity will not be considered when measuring

22/ Qualitative assessment of economic analysts (Portuguese only) captured by the Pre-Copom Questionnaire (PCQ), and in the 95th Cycle of Meetings of the BCB's Deputy Governor for Economic Policy with economists who participate in the Market Expectations System.

23/ In the first four months of 2024, court-ordered payments and judicial expenses reached BRL 41 billion, against BRL 9 billion in 2023.

24/ Main measures announced are the suspension for three years of the Rio Grande do Sul's debt payments to the federal government; additional resources to the Guarantee Operations Fund (FGO) to grant credit lines supported by the government (Pronampe, PEAC, Pronaf); establishment of the Reconstruction Aid, a single voucher of BRL 5,100.00 to households that lost their homes; anticipation of already planned expenses, including *Bolsa Família*, BPC, food acquisition program, rural development, social assistance, priority in the income tax refunds, and extra FGTS withdrawals; postponement of tax collection; and acquisition of real estate for those who lost their homes.

compliance with the primary balance target (Legislative Decree 236/2024[25]). Neither expenses nor revenues loss caused by the impacts on the economic activity have been fully calculated. According to the PCQ, the median analysts' estimate for the potential impact of this calamity on the central government primary balance is BRL 25 billion, of which BRL 20 billion would already be incorporated into the projections. Given its direct impact on the economy of Rio Grande do Sul, floods are also expected to impact the aggregated primary balance of subnational governments.

Table 1.2.4 – Central Government primary balance
Accumulated in the year until April

BRL billion - current values

	2023	2024	Real var. (%)
1. Total Revenue	791	895	8.6
1.1 - Revenues collected by the Federal Revenue Office	513	591	10.7
1.2 - Fiscal incentives	0	0	-
1.3 - Net Social Security revenues	182	201	6.3
1.4 - Revenues not collected by the Federal Revenue Office	97	103	1.5
2. Transfers by revenue sharing	152	170	7.1
3. Net revenue (1-2)	639	726	8.9
4. Total expenditure	593	695	12.6
4.1 Social Security benefits	260	293	8.2
4.2 Payroll	108	116	3.7
4.3 Other compulsory expenses	88	130	42.4
4.4 Executive branch expenses subject to financial programming	137	156	8.9
o/w *Bolsa Família* (Family Allowance) and *Auxílio Brasil* (Brazil Aid)	54	56	0.2
5. Central government primary balance - above the line (3 - 4)	47	31	-

Source: National Treasury

Considering the evolution of revenues and expenses, the federal government maintained its expectation of meeting the primary balance target for 2024. This evaluation is part of the Assessment Report of Primary Revenues and Expenses (RARD) of Mar-Apr 2024, which details the updated government's fiscal projections. The RARD indicated a worsened primary deficit projection, which rose to BRL 27.5 billion and included nearly BRL 13 billion in support measures for Rio Grande do Sul, excluded from the target. Therefore, the estimated primary deficit consistent with the target is BRL 14.5 billion, lower than the BRL 28.8 billion that defines the lower limit of the interval around the target. The report considers that government measures for revenue recovery will have an impact of nearly BRL 168 billion, which exceeds the analysts' expected impact.[26]

The government, in turn, proposed to change the primary balance targets for 2025 and 2026. The targets that had been indicated by the time of the fiscal framework presentation were 0.5% of GDP for 2025 and 1.0% of GDP for 2026. In the Budget Guidelines Bill (PLDO) for 2025, sent to Congress in April, the Executive Branch proposed to reduce them to 0.0% and 0.25% of GDP, respectively. Although the new targets predict lower deficits than those anticipated by analysts, the proposed change was not well received by them.[27]

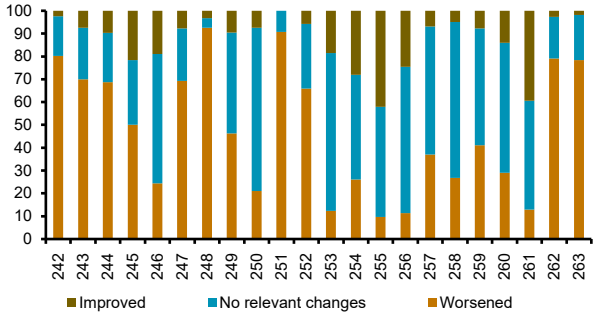
The progress of the revenue recovery measures proposed by the Executive Branch through the National Congress has proven to be more challenging. Some of the measures recently proposed by the Executive Branch were not approved by the National Congress. This is the case with the revision of the Emergency

25/ Legislative Decree (DL) 236/2024 acknowledges the state of public calamity in part of the national territory and authorizes the Federal Government not to compute exclusively those expenses authorized through extraordinary credit and tax waivers to face the public calamity and its consequences to the achievement of fiscal results.
26/ The value of BRL 168 billion in gross revenues considered by the government is roughly equivalent to BRL 120 billion in net revenues. In the June's PCQ, the median of responses to the question "Among the economic measures presented or under discussion for the recovery of revenues, which value is incorporated in your projection for the Central Government net revenues?" was BRL 86 billion. The interquartile interval ranges from BRL 70 billion to BRL 121 billion.
27/ This assessment was presented by several participants of the 95th Cycle of Meetings of the BCB's Deputy Governor for Economic Policy with economists who participate in the Market Expectations System. These meetings were held throughout 2024Q2.

Program for the Recovery of the Events Sector (Perse), the reinstatement of payroll taxes, and the limitation on the use of PIS/Cofins tax credits. As for Perse, the number of benefited sectors increased during the National Congress evaluation and, after negotiations, a cap of BRL 15 billion was defined for tax waivers until December 2026. Regarding the payroll tax exemption, the presidential veto on the postponement of the end of the benefit was overturned by the National Congress. The Federal Supreme Court (STF), evoked by the Executive Branch, determined, through a preliminary decision, that the continuity of the tax exemption will only be valid if there are compensatory fiscal measures. The Executive Branch proposed, through Provisional Measure (MP) 1,227/24, caps to the use of PIS/Cofins tax credits. The National Congress returned the MP's segments related to these caps. Until the cut-off date of this IR, negotiations for the compensation of tax reinstatements were still under discussion.

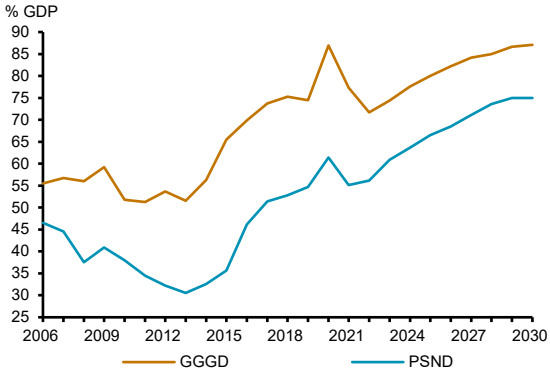
In this context, qualitative metrics indicate a worsened perception of the fiscal situation. In the May and June PCQs, the predominant assessment among analysts was that the fiscal situation had worsened. The questionnaire had not captured such negative assessments since December 2022 and February 2023, when the Transition's Proposal for Constitutional Amendment (PEC) was under discussion (Figure 1.2.21). The worsening of the projections was not so significant as that of the qualitative assessment (Table 1.2.5). In any case, according to the Focus Report projections, the debt/GDP ratio is unlikely to stabilize in this decade (Figure 1.2.22).

Figure 1.2.21 – Assessment of fiscal outlook[1]
Share of responses (%) in each PCQ



Question: How do you assess the change of the fiscal outlook since the previous Copom, considering both your baseline scenario and related risks?

Figure 1.2.22 – Debt forecasts



Forecast from 2024 on correspond to June 14, 2024 Focus.

Table 1.2.5 – PCQ: Forecast Copom 261 (Mar 24) and Copom 263 (Jun 24)

	Year	Central Gov. primary balance (BRL billion)	Regional Gov. primary balance (BRL billion)	PSND (% GDP)	GGGD (%GDP)
Copom 261	2024	-82	10	63.2	77.2
Copom 263	2024	-83	10	63.4	77.3
Copom 261	2025	-80	11	65.3	79.9
Copom 263	2025	-94	10	65.8	80.0

External accounts

The external accounts remain a positive factor in the Brazilian economy, despite a slight increase in the current account deficit in recent months. The deficit's increase especially reflected the trade balance (Figure 1.2.23) – due to worsened terms of trade and increased imports – but also more expensive freights and high international interest rates. However, the trade balance remains strong, and the net inflow of direct investment liabilities continue to exceed the current account deficit (Table 1.2.6).

Figure 1.2.23 – Current account

USD billion, 3mma, s.a.

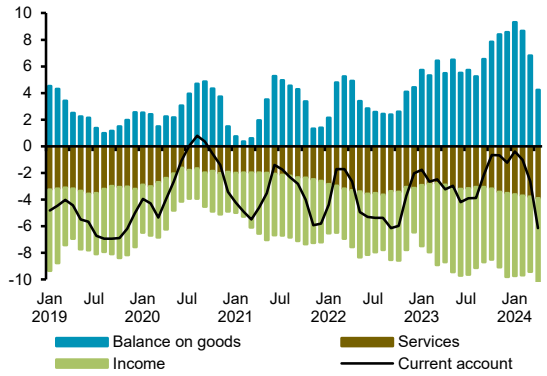


Table 1.2.6 – External accounts

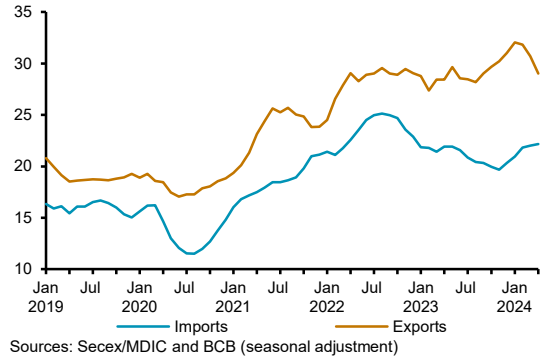
Year to date until April				USD billion
Itemization	2021	2022	2023	2024
Current account	-18	-10	-13	-17
Balance on goods	5	15	20	19
Exports	82	103	105	110
Imports	77	88	86	91
Services	-7	-12	-11	-15
of which: Travel	-0	-2	-2	-2
of which: Transport	-4	-6	-4	-5
Primary income	-18	-15	-22	-22
of which: Interests	-8	-7	-9	-9
of which: Dividends	-10	-7	-13	-13
Investment - liabilities	33	35	33	42
DI liabilities	26	31	24	27
Portfolio investments	8	-3	4	-0
Other investments[1]	-2	6	5	15

1/ Includes loans, commercial credits, deposits, and other investments

Brazil's trade balance has fallen in recent months, in line with expectations, but remains strong. There was a decrease in exports and an increase in imports (Figure 1.2.24). The decline in exports value reflected lower prices (Figure 1.2.25), especially of grains, leading to a worsening of the terms of trade. The decline in the volume of exports of manufactured goods, widespread across the products in this category, also contributed to the reduced value of exports. Nonetheless, the country continues to export large amounts of commodities, and the exported value is still much higher than that of imports. The expansion of the imported volume (Figure 1.2.26) was widespread across categories and stronger across capital goods, which is in line with the GFCF growth in 2024Q1. The expansion of imports partly reflected the end of the drought in the Amazon basin, which allowed the normalization of the region's cargo transport in early 2024.

Figure 1.2.24 – Trade balance

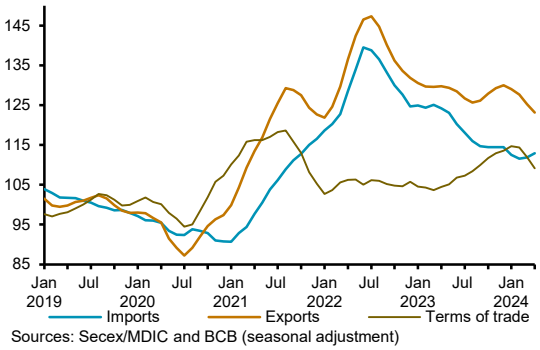
USD billion, 3mma, s.a.



Sources: Secex/MDIC and BCB (seasonal adjustment)

Figure 1.2.25 – Price Index

Index (2019=100), 3mma, s.a.



Sources: Secex/MDIC and BCB (seasonal adjustment)

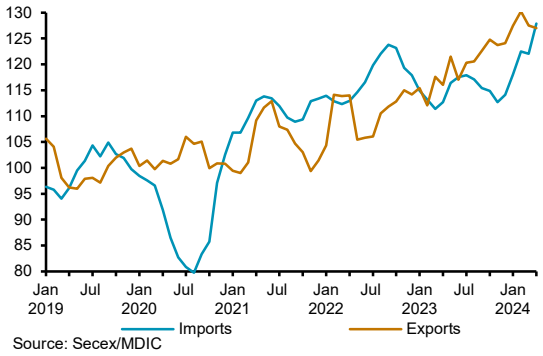
The services account deficit continued on the upward trend started in 2023 (Figure 1.2.27). The quarterly expansion was driven by expenses on intellectual property, telecommunications, and freights. Higher transport expenses reflect, in addition to the increased imported volume, the increase in transport costs related to the drought in the Panama Canal and the insecurity in the Suez Canal. Conversely, the travel deficit has surprised downwards due to higher spending by foreigners in the country.

The primary income account deficit has been relatively stable since 2023, with some upward oscillation at the margin (Figure 1.2.28). In the interest account, growing net expenses are due to the effects of the

tight monetary policy in advanced countries. As for earnings, net expenses are lower than in 2023 but have increased at the margin, as a result of the lower profitability of Brazilian companies abroad.

Figure 1.2.26 – Quantum Index

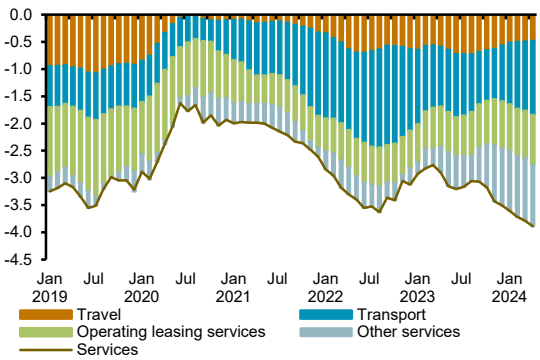
Index (2019=100), 3mma, s.a.



Source: Secex/MDIC

Figure 1.2.27 – Services

USD billion, 3mma, s.a.



Net inflow of direct investment liabilities, although oscillating downward in recent months, remains at a high level (Figure 1.2.29). A determinant factor was the decline in equity flows, of a magnitude consistent with usual fluctuations. This decline has been partially offset by increased flows of intercompany debt transactions. These flows are to a large extent associated with strategies for the management of liabilities of exporting companies that may anticipate revenues by borrowing from companies of the same conglomerate abroad.[28]

Figure 1.2.28 – Primary income

USD billion, 3mma, s.a.

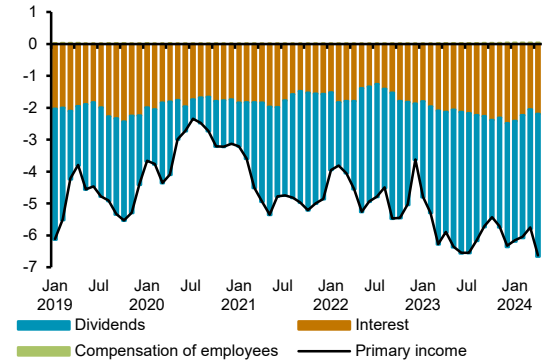
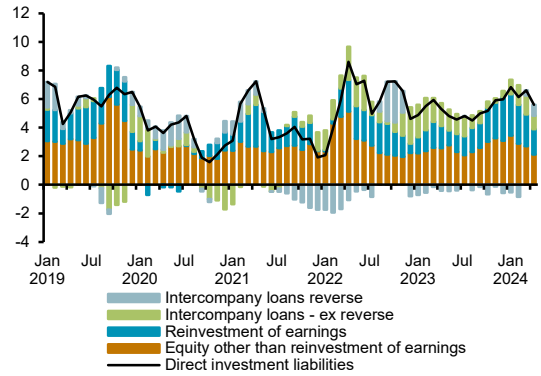


Figure 1.2.29 – Direct investment liabilities

USD billion, 3mma, s.a.



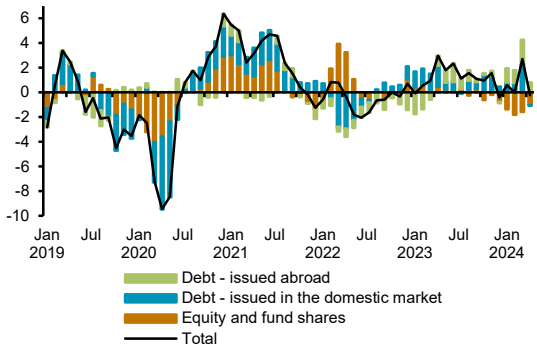
Portfolio investments registered strong outflows in April, neutralizing the favorable 2024Q1 results (Figure 1.2.30). Foreign interest in Brazilian securities was high in early 2024, consistent with the steady decline in the country's credit default swap (CDS) since mid-2022 and the positive performance of domestic economic activity. More recently, increased uncertainties in the domestic scenario and the prospect of prolonged high interest rates in advanced economies, especially in the U.S., has negatively impacted the demand for Brazilian assets.

The projected current account deficit for 2024 was revised to USD 53 billion (2.3% of GDP), still lower than the estimated net inflow of direct investment liabilities, USD 65 billion (2.9% of GDP). This revision reflects recently released data and the evolution of the prospects for economic activity and prices, particularly for commodities. Further details are available in a box of this IR.

28/ The box Exchange contracts and the current account: the foreign exchange transactions gap, of this IR, shows that issues associated with the financial management of exporting companies, such as this one, help explaining the differences observed between the value of exports and the value of the associated exchange contracts. Accordingly, the box Overview of the direct investment liabilities account and its behavior during the pandemic, of the March 2021 IR, concludes that "factors such as the financing strategy of multinational companies can be decisive to explain short-term movements of this variable".

Figure 1.2.30 – Portfolio investment - liabilities

USD billion, 3mma, s.a.



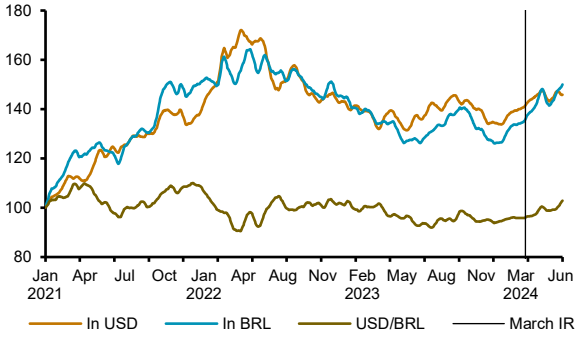
Prices

Since the previous IR, although consumer price inflation has decreased, economic analysts' inflation expectations have deteriorated. According to the Extended National Consumer Price Index (IPCA), both the headline inflation and the average of core inflation measures decreased in the Mar-May quarter. Despite the lower current inflation, the current outlook is characterized by a more adverse external environment, resilient economic activity, a tight labor market, and a perception of worsening fiscal conditions (according to the respondents to the PCQ). In this context, according to the Focus Report, despite the expectation of a higher Selic rate in 2024 and in the coming years, the deanchoring of inflation expectations has increased.

The Commodities Index – Brazil (IC-Br) rose for the second consecutive quarter.[29] The index varied by 3.2% in USD and 10.7% in BRL (Figure 1.2.31). Metal prices grew sharply during the quarter, in particular. Almost all the products in this group rose during the period (Figure 1.2.32), affected by China's aid measures to the real estate market (zinc and copper), by supply issues (aluminum, nickel, and silver), and by sanctions imposed on Russia (copper and nickel). Among energy commodities, the strong rise in natural gas prices, driven by increased demand due to above-average heat in the U.S., contributed significantly. Among agricultural prices, the rise was mainly due to wheat (drought in Russia), orange juice (crop failure in Brazil), coffee (drought in Vietnam), and cocoa (excessive rainfall in Ivory Coast).

Figure 1.2.31 – IC-Br and foreign exchange rate

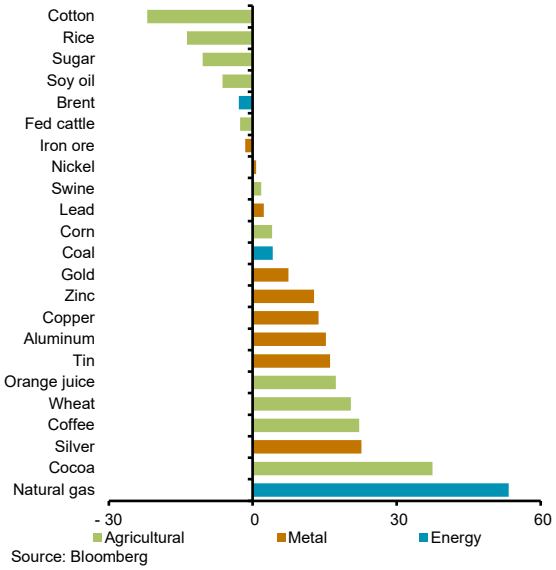
10-day moving average; Dec/31 2020 = 100



Sources: Bloomberg and BCB

Figure 1.2.32 – Change in commodity prices

% change of the 10-day moving-average in USD between previous and current IR cut-off dates

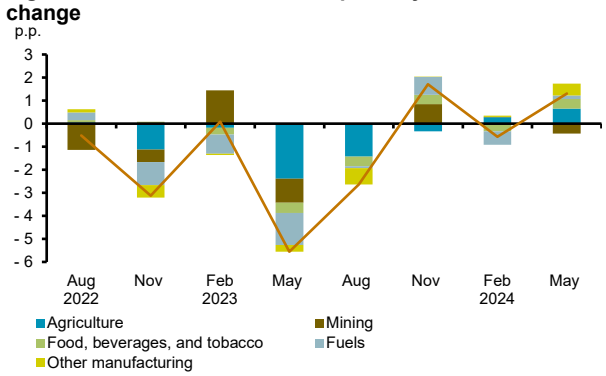


Source: Bloomberg

29/ The IC-Br and the exchange rate changes discussed in this section refer to the 10-day moving average between the respective IR closing dates.

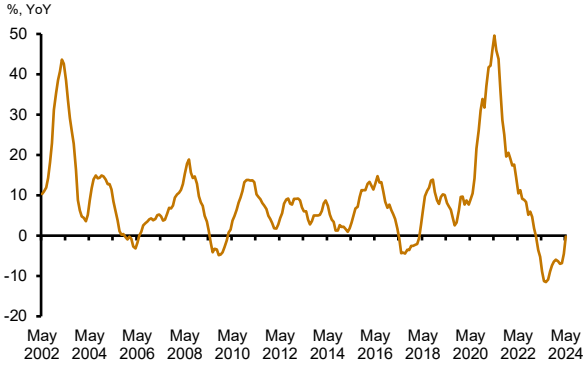
Producer prices rose again in the Mar-May quarter but still indicate a moderate inflation level of industrial consumer goods. The Broad Producer Price Index (IPA-DI) increased by 1.31% in the quarter, after a decline of 0.57% in the Dec-Feb quarter (Figure 1.2.33). In agriculture, domestic prices of soybeans and coffee followed the upward trend of international prices, while milk prices increased significantly. In manufacturing, price increases were relatively widespread, with significant contributions from the more volatile components (fuels and food). Excluding these two components, prices of the other manufacturing components, after registering deflation or stability for several months, showed a positive but moderate change, similar to the level observed in the years before the Covid-19 pandemic. In particular, the evolution of industrial goods classified as consumer goods was more benign, with a variation close to zero when excluding fuels, food, and medicines (whose prices are administered and have their annual adjustment applied in the quarter under analysis). The 12-month IPA-DI change, after being negative for more than a year, approached zero (Figure 1.2.34).

Figure 1.2.33 – Contributions to quarterly IPA-DI change



Source: FGV

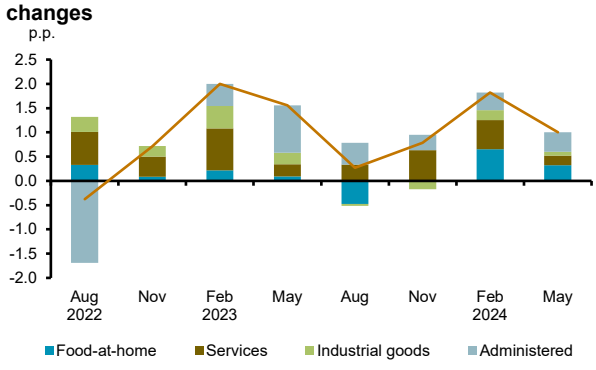
Figure 1.2.34 – IPA-DI



Source: FGV

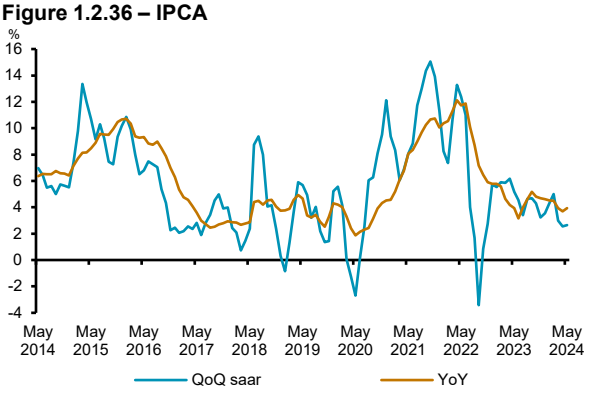
Consumer price inflation decreased in the Mar-May quarter, with a favorable composition. The IPCA deceleration from February to May can be noted by considering the quarterly change of both the observed data, from 1.82% to 1.00% (Figure 1.2.35), and the seasonally adjusted annualized data, from 5.01% to 2.64% (Figure 1.2.36). Core inflation measures[30] also declined significantly, from 4.08% to 3.03% in the seasonally adjusted annualized metric (Figure 1.2.37), indicating that inflation decrease was not limited to the more volatile items in the basket. The 12-month IPCA dropped from 4.50% in February to 3.93% in May. This movement was also observed in the average of core inflation measures, from 4.01% to 3.55%.

Figure 1.2.35 – Contributions to IPCA quarterly changes



Sources: IBGE and BCB

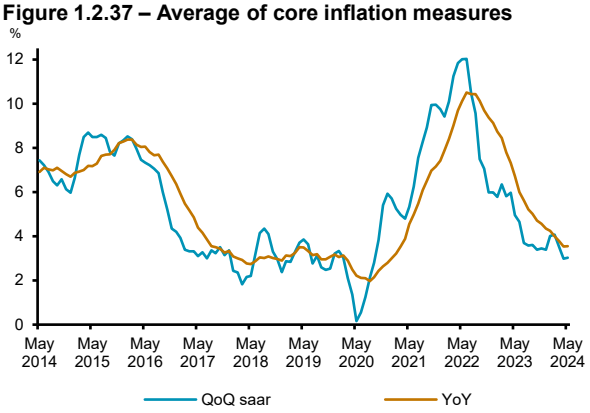
Figure 1.2.36 – IPCA



Sources: IBGE and BCB

30/ It considers cores Ex-0, Ex-3, MS, DP, and P55 discussed in the box Update of the set of core inflation measures commonly considered by the BCB for economic outlook analysis of the June 2020 IR.

Figure 1.2.37 – Average of core inflation measures

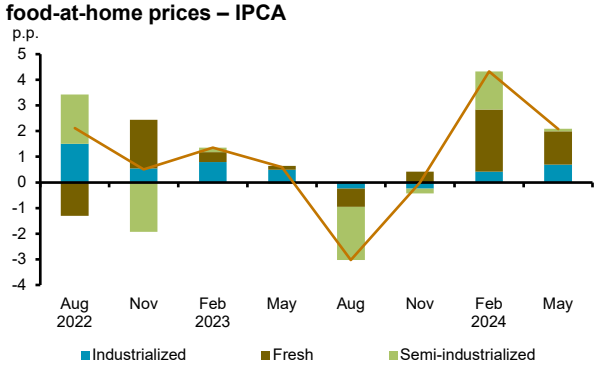


Effects of the climatic disaster in Rio Grande do Sul on prices were already observed in May, especially in the food segment. In the hard-hit metropolitan region of Porto Alegre (POA), with a 8.6% IPCA weighting,[31] the index change was 0.87%, compared with an average of 0.42% in the other areas that make up the index and 0.46% for the country as a whole. The largest differences in price change occurred in bottled gas – which rose 7.39% in POA and 0.36% in other areas – and food-at-home – 3.64% in POA and 0.34% in other areas. Among food items, the price increase of some fresh products stood out. Since these products have short production cycles, this increase is expected to be reverted more quickly. However, Rio Grande do Sul is also a major producer of rice and wheat (accounting for 70% and 40% of their respective domestic production), which have longer production cycles and whose prices increased in May.

Despite the still high change in the quarter, food prices decelerated. In the Mar-May period, prices rose by 2.07%, compared with a 4.33% increase in the period up to February (Figure 1.2.38). This improvement is mainly due to the decline in the prices of rice and beans, which had grown strongly in the previous period. Beef prices fell in the quarter and are down 8% over 12 months. Prices of fresh products also slowed down, but with still high changes for this time of the year. Milk and dairy products continued on an upward trend, already in a less favorable period for the supply of fresh milk.

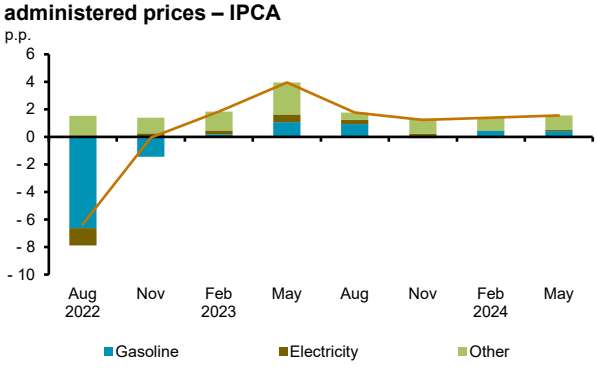
Administered prices grew at a slightly faster pace than in the previous quarter. The increase was 1.55% in the Mar-May quarter, compared with 1.39% in the Dec-Feb quarter (Figure 1.2.39). The price of gasoline, an item with a significant weight in administered prices, rose at a similar pace to the previous quarter. Highlights include the increase in pharmaceutical products, reflecting the annual adjustment of maximum prices of medicines, typical of this period, and, in the opposite direction, the smaller variation in licensing and vehicles plates. Until December, monthly changes in this sub-item were equivalent to an annual change of 21.2%, incorporating monthly changes equivalent to an annual reduction of -1.1% from January onwards.

Figure 1.2.38 – Contributions to quarterly changes in food-at-home prices – IPCA



Sources: IBGE and BCB

Figure 1.2.39 – Contributions to quarterly changes in administered prices – IPCA

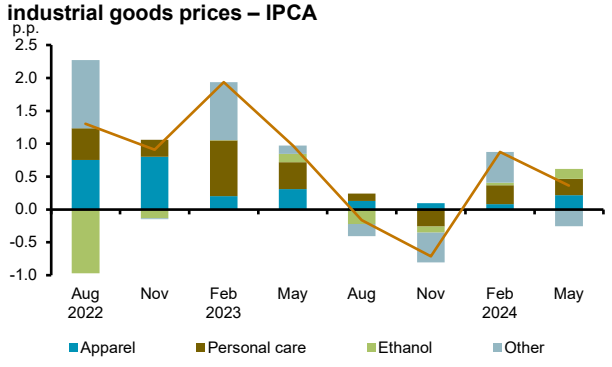


Sources: IBGE and BCB

31/ In the release of the May IPCA, the IBGE reported that despite the expansion of remote data collection in Porto Alegre from nearly 20% to 65%, it was not possible to collect some prices, such as those of vegetables. Furthermore, the calculation of the sub-item "toll" did not include places with suspended charges for the entire survey's reference period.

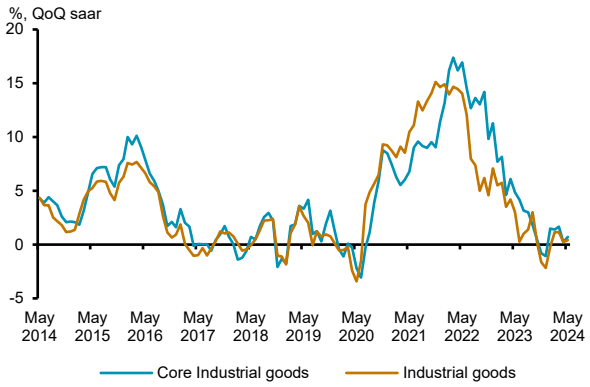
Industrial goods inflation remains contained. After a rise of 0.87% in the Dec-Feb quarter, industrial consumer goods prices increased by 0.36% in the Mar-May quarter (Figure 1.2.40). This deceleration was also observed in the seasonally adjusted series, which continues to present low quarterly variations (Figure 1.2.41). The quarterly result reflects a decline in prices of several products, notably telephones, electronics, home appliances, and furniture. There was also a lower increase in reading materials and repair items, after the stronger seasonality in early 2024 for both sub-items.

Figure 1.2.40 – Contributions to quarterly changes in industrial goods prices – IPCA



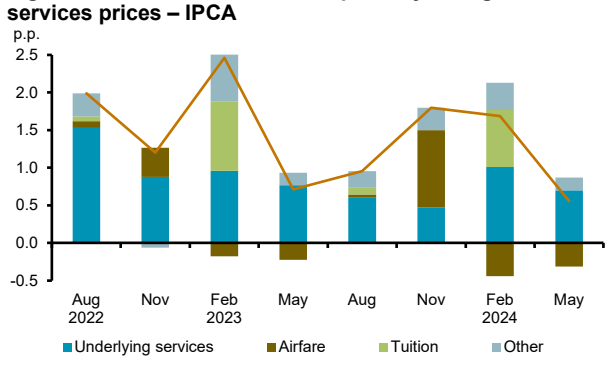
Sources: IBGE and BCB

Figure 1.2.41 – Industrial goods inflation



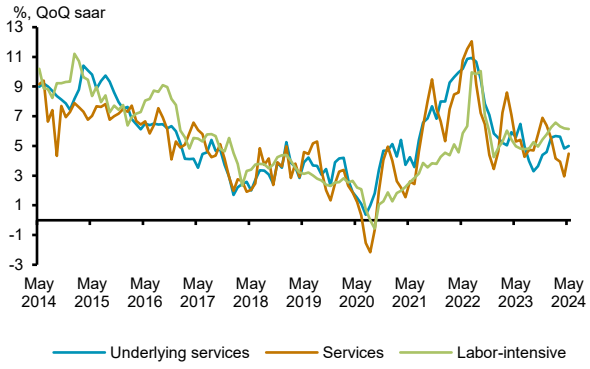
Services inflation decreased compared with the level observed in early 2024, but its underlying component remains high. The increase in services prices in the Mar-May quarter reached 0.56%, compared with 1.69% in the Dec-Feb quarter (Figure 1.2.42). Inflation decline did not only reflect the base effect associated with the accounting, in February, of the annual adjustment of school tuition fees. The underlying services inflation was also smaller, 1.19%, compared with 1.71% in the previous quarter. In seasonally adjusted and annualized terms, the underlying services inflation fell from 5.66%, in the Dec-Feb quarter, to 5.01% in the Mar-May quarter, while labor-intensive services fell from 6.57% to 6.15% (Figure 1.2.43). Despite this slowdown, these variables remain at high levels. The topic of services inflation is addressed more thoroughly in two boxes of this IR.[32]

Figure 1.2.42 – Contributions to quarterly changes in services prices – IPCA



Sources: IBGE and BCB

Figure 1.2.43 – Services inflation



The median expectation for inflation in 2024 increased from 3.79% to 3.96% since the previous IR. The analysis of disaggregated projections by segments indicates a higher increase in services and, particularly, in food-at-home (Table 1.2.7). Based on the responses to the PCQ, the revision in services prices is more related to its underlying component. In turn, the revision in food prices is consistent with the expectation of some effect from the floods in Rio Grande do Sul. According to the PCQ, the median estimated impact on this year's IPCA is 0.2 p.p.

The additional deanchoring of inflation expectations for 2025 and 2026, which were already above the inflation target for the period, is a point of attention. The median expectations for these two years, which

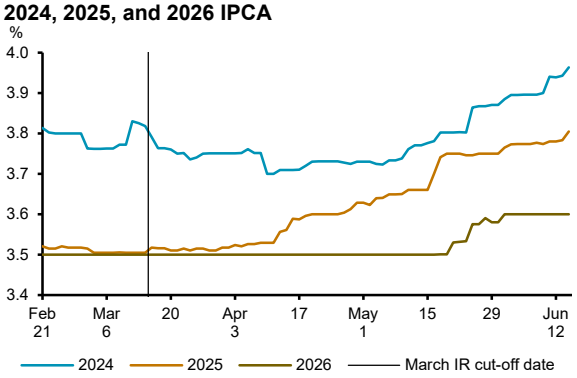
32/ See boxes Services inflation reweighted by production factors and Recent dynamics of services inflation of this IR.

had been around 3.50% since mid-2023, rose to 3.80% and 3.60%, respectively (Figure 1.2.44). This increase occurred despite expectations of a higher Selic rate throughout the entire horizon.[33] According to Copom's assessment, recorded in the minutes of its May meeting, the main reasons for this deterioration are the worsening external scenario, the recent fiscal policy announcements, and the perception of economic agents regarding the monetary authority's commitment to achieving the target over the years.[34] The deanchoring of expectations can hinder the convergence of inflation to the target, which is why the Committee emphasized that it must pursue reanchoring regardless of the causes.

Table 1.2.7 – Breakdown of the revision on the 2024 Focus survey

	Weights	Focus expectations (% p.a.)		
		Mar-15	Jun-14	Contr. to Δ (p.p.)
IPCA	**100**	**3.79**	**3.96**	**0.17**
IPCA (by aggregation)	100	3.74	4.00	0.26
Food-at-home	15	4.09	6.00	0.29
Industrial goods	23	2.21	2.08	-0.03
Services	36	4.30	4.45	0.05
Administered prices	26	4.16	3.95	-0.05
Market prices	74	3.63	4.00	0.27
Market prices (by aggreg.)	74	3.60	4.02	0.31

Figure 1.2.44 – Median market expectations (Focus) – 2024, 2025, and 2026 IPCA



33/ See Section 2.2 of this IR.

34/ The box Dispersion of inflation expectations for 2025 of the September 2023 IR provided suggestive results regarding the economic analysts' motivations to keep their inflation projections above the target at that time. The box concluded that, "In short, results suggest that there is no single factor explaining the dispersion of agents' expectations for inflation in 2025. Considering the projections of macroeconomic variables that best explain the variation of inflation expectations among economic analysts, the factors that seem to stand out are inflationary inertia, global inflation persistence, and the prospect of higher primary deficits or larger public expenses. Moreover, analysts more pessimistic with the prospective inflation project a higher trajectory for the Selic rate."

Initial impacts of the floods on the economic activity of Rio Grande do Sul

In May, the state of Rio Grande do Sul (RS) was hit by the biggest flood in its history. Heavy rainfall, mainly concentrated in the hydrographic region of the Guaíba River, caused flooding and destruction in Porto Alegre, in its metropolitan region, and in the Taquari Valley towns.

The floods affected areas of high population density and great importance to the economy of the state. Rio Grande do Sul has an estimated population of 10.9 million people, 5.3% of the Brazilian population. The state's GDP represents 6.5% of the national GDP, with a larger share in agriculture (12.7%) and manufacturing (8.4%).[1] The areas most affected by the rainfall accounts for 48.5% of the population, 53.3% of the state's GDP, 12.5% of agriculture's gross value added (GVA), 57.3%, of industries' GVA, and 61.2% of services' (excluding government services) GVA[2].

This box assesses the initial impacts of the floods in Rio Grande do Sul on economic activity based on a set of timely indicators.

Retail trade and services to households

The evolution of retail trade and services provided to households[3] is analyzed through flows of payments[4] received by companies domiciled in Rio Grande do Sul via debit card or Pix.[5]

The first exercise based on this data set seeks to measure the number of companies that interrupted activities during the floods. The receivement of a payment by a compony indicates that it continued to sell during the period.

At the start of the heavy rainfall, the number of companies that received any payment flow through debit card or Pix (Table 1, week 1) dropped 8.6%. Throughout May and early June, this number fluctuated around -4.3% compared with the base period (average of the weeks of April 17-30). It is noteworthy, however, that in the last week analyzed (June 5-11), the number of companies that received some payment via debit card or Pix exceeded that for the base period, suggesting a relatively quick recovery in sales across most sectors.

The sectoral breakdown suggests that activities with a higher share of companies with no payment flow are in the sectors of lodging, restaurants, drugstores, bookstores, and vehicles. The flows were also analyzed considering the companies' number of employees, but there was no relevant heterogeneity under this data breakdown.

1/ According to the IBGE's 2022 Population Census and the 2021 National Accounts.
2/ Considering the 78 municipalities included in the state of calamity by Decree 57,628 of May 21, 2024.
3/ The exercise considered companies classified under the National Classification of Economic Activities (CNAE) codes covered by the Monthly Survey of Trade (PMC) and the Monthly Survey of Services (PMS) from IBGE (Portuguese only).
4/ For the sake of simplicity, this box uses the terms "payment" [received by companies] and "flows received" without differentiation, although not every flow received by companies corresponds to payments for sales or provision of services. Data may contain operations not related to payments.
5/ The flows received by various means of payment have already been used on other occasions by the BCB to measure the state of the economy. (i) Box Indicators to monitor the domestic economic outlook during the pandemic of the June 2020 IR; (ii) Box Emergency aid and debit card purchases of the September 2020 IR; (iii) Box Closure of companies in the pandemic of the December 2020 IR, and (iv) Section 2.2 "Covid-19 stress test" of the Financial Stability Report of October 2020. In this analysis, flows from credit cards or bank payment slips will not be considered, as they may reflect purchases from previous months, thus impairing the assessment of the impact of May floods. Data excludes Pix received from financial institutions and Pix between accounts of the same company or its subsidiaries.

Table 1 – Number of companies receiving payments via debit card or Pix

% change from the base period[1]

Sector	Week 1 May 1-7	Week 2 May 8-14	Week 3 May 15-21	Week 4 May 22-28	Week 5 May 29 - Jun 4	Week 6 Jun 5-11	Average Weeks 1-6
Total	-8.6	-4.9	-4.9	-6.4	-3.7	2.6	-4.3
Fuel	-0.5	-1.8	-1.8	-2.4	-2.0	-0.6	-1.5
Supermarkets and Related Businesses	-4.2	-5.5	-6.1	-6.1	-4.1	-1.9	-4.7
Textiles, Apparel and Footwear	-11.3	-0.7	0.6	-3.1	-0.3	5.7	-1.5
Furniture and Household Appliances	-10.6	-1.5	1.5	-0.7	-0.2	9.7	-0.3
Drugstores	-9.3	-6.4	-7.6	-8.3	-7.7	-4.6	-7.3
Office, IT, and Communication Equipment	-9.7	-3.1	-2.4	-4.5	-3.8	6.1	-2.9
Books, Newspapers, Magazines, and Stationery	-6.3	-9.5	-6.5	-7.1	-5.5	-1.5	-6.1
Other Personal and Household Items	-9.6	-5.1	-5.2	-6.1	-4.1	1.9	-4.7
Vehicles, Motorcycles, Parts, and Accessories	-13.0	-6.4	-4.4	-5.8	-4.7	1.8	-5.4
Wholesale and Retail of Construction Materials	-9.9	-6.0	-2.9	-4.7	-3.4	2.0	-4.1
Wholesale of Food, Beverages, and Tobacco	-8.4	-4.6	-3.8	-4.0	-4.8	-0.6	-4.4
Lodging	-11.0	-14.5	-15.2	-14.9	-9.8	-4.3	-11.6
Food Services	-11.9	-9.6	-10.9	-9.9	-5.7	-3.4	-8.6
Sports Activities	-5.1	5.8	-1.7	-8.2	-4.3	13.0	-0.1
Personal and Non-Continuing Education Services	-4.0	-0.5	-2.2	-8.1	-1.1	19.9	0.7

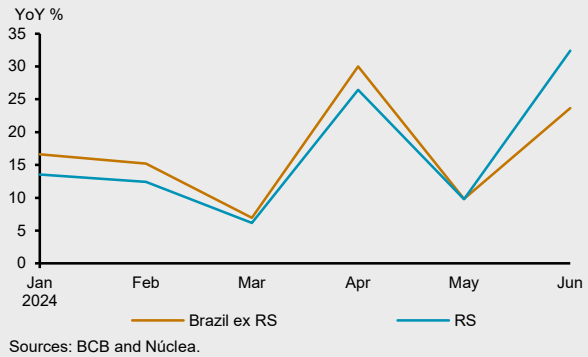
Sources: BC (Pix) and Núclea (debit card)

Note: [1] Base period = Average of April's 17-23 and 24-30 weeks.

The second exercise measured the amounts received by companies in retail trade[6] and services provided to households. In general terms, flows received by companies in these sectors in Rio Grande do Sul grew at similar rates to the rest of Brazil in the Jan-Apr 2024 period. In May, when analyzed together, companies of the retail trade and household services segments in that state and in the rest of the country continued to show similar YoY changes (Figure 1). However, the composition varied. The slowdown in payment flows in the segment of services to households in May was higher in Rio Grande do Sul (Figure 2). The opposite occurred in the segment of retail trade (Figure 3), largely influenced by supermarket sales (Figure 4). This suggests that the priority of households in the state was the consumption of basic goods in that month. Moreover, in early June[7] it is already possible to observe significant increases in payments received by the "furniture and household appliances" and "construction materials" sectors in that state, indicating that households are channeling resources to the refurbishing of their homes (Figures 5 and 6).

Figure 1 – Flows received via debit card or Pix

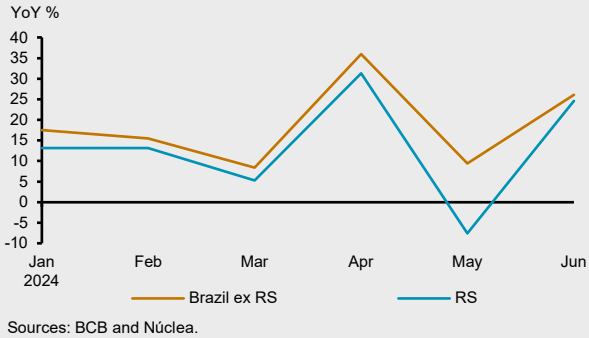
Retail trade and services provided to households



Sources: BCB and Núclea.

Figure 2 – Flows received via debit card or Pix

Services rendered to households

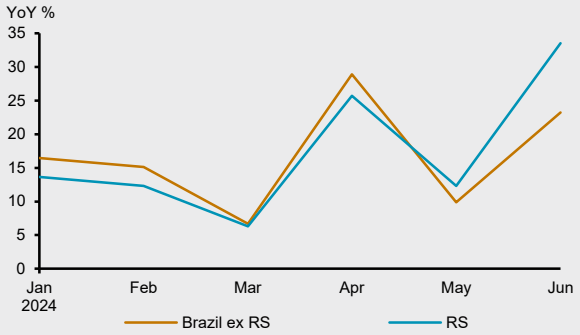


Sources: BCB and Núclea.

6/ Restricted retail trade segments, as classified by the Monthly Survey of Trade (PMC).

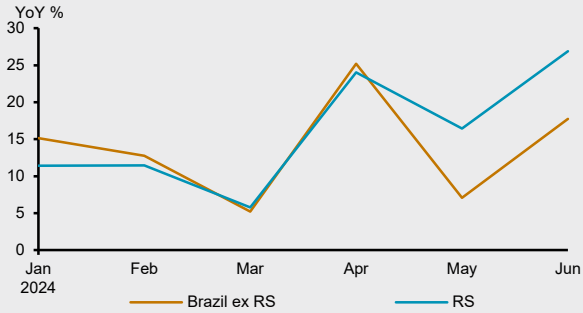
7/ For June, variation in flows received up to June 13 compared with the same period in the previous year.

Figure 3 – Flows received via debit card or Pix
Retail trade



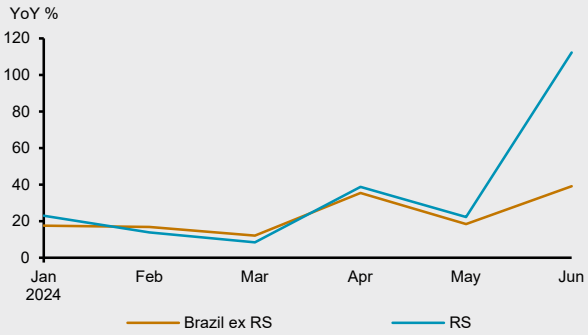
Sources: BCB and Núclea.

Figure 4 – Flows received via debit card or Pix
Supermarkets



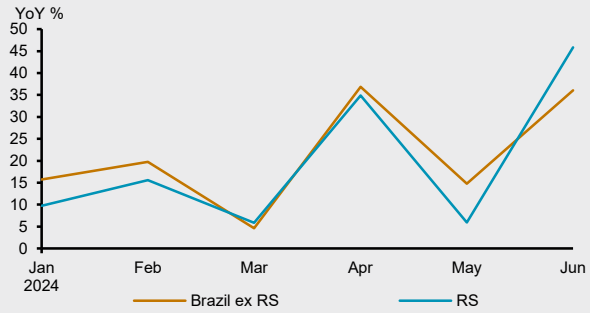
Sources: BCB and Núclea.

Figure 5 – Flows received via debit card or Pix
Furniture and appliance retail companies



Sources: BCB and Núclea.

Figure 6 – Flows received via debit card or Pix
Wholesale and retail of construction materials

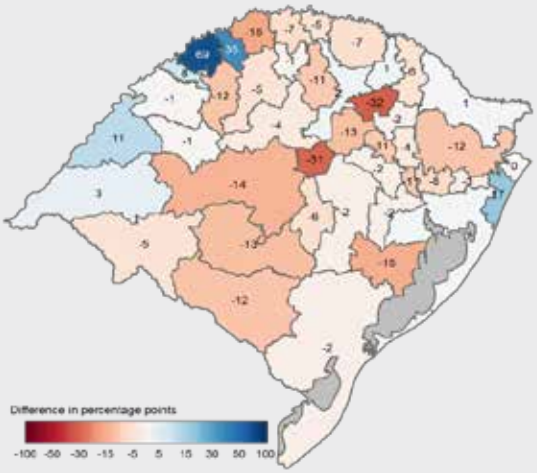


Sources: BCB and Núclea.

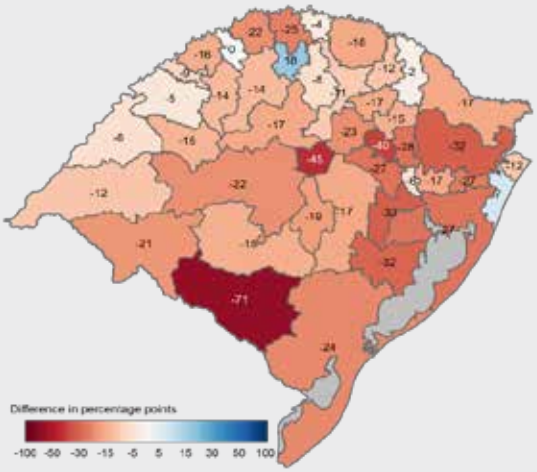
The impact of the floods was highly heterogeneous in the state (Map1).[8] Although, as expected, greater impacts were observed in the areas most affected by the floods, they were not restricted to them. The phenomenon affected much of the state's infrastructure, which was reflected in spillovers to other regions.

Map 1 – May 2024 change in the YoY growth rate of flows received by companies – by immediate region
Difference between May 2024 YoY rate and the average Jan-Apr 2024 YoY rate.

(a) Restricted retail trade



(b) Services rendered to households



Sources: BCB (Pix) and Núclea (debit card).

8/ The IBGE's concept of "immediate region", which replaced the concept of micro-regions, was used. Clique here for further information on this regional division (Portuguese only).

Industry

Data on issuance of invoices compiled by the Secretary of Finance (SEFAZ/RS) of Rio Grande do Sul shows that, in the first fortnight of May, the state's industrial sales dropped 29.8% against the same period of 2023, in real terms (Table 2).[9] The impact receded throughout the month, so that, in the period from May 1 to June 11, the decline was 12.7%. By sector, the segments that mostly contributed to this fall were metal-mechanical, agribusiness, and agricultural inputs.

SEFAZ/RS also reveals a reduction in the number of companies that issued invoices. In the first half of the month, the most critical period, there was a decline of 37% against the same period in April. In the 28-day period up to June 9, the number of companies that issued invoices was still 8% lower than in the same period in April.[10]

Table 2 – Sales of industries in RS

Industrial sector	May 1 - June 11			Biweekly change (% YoY)		
	BRL million	% YoY change	Contribution (p.p.)	May 1-14	May 15-28	May 29 - Jun 11
Total	50,457	-12.7	-12.7	-29.8	-8.5	-1.7
Metal-mechanical	12,969	-21.5	-6.1	-45.3	-8.5	-13.3
Agribusiness	11,446	-9.5	-2.1	-13.2	-10.7	-4.9
Fuel	4,526	-6.0	-0.5	-14.2	-8.2	2.8
Agricultural inputs	2,233	-32.7	-1.9	-56.8	-30.3	-13.5
Leather and footwear	2,028	-12.3	-0.5	-33.5	-8.4	3.9
Food	1,828	-4.1	-0.1	-20.4	3.8	3.9
Tobacco	1,748	10.3	0.3	29.9	12.1	-6.0
Plastics	1,607	-8.1	-0.2	-24.7	-2.1	0.4
Beverage	1,475	1.7	0.0	-23.8	10.2	18.5
Furniture	1,453	9.6	0.2	-14.9	17.8	23.7
Electrical and electronic	1,205	0.4	0.0	-29.3	11.0	14.7
Chemical	1,188	-10.5	-0.2	-36.7	-2.3	3.7
Wood, cement and glass	1,035	-11.8	-0.2	-34.7	-12.5	10.1
Paper	813	13.0	0.2	-28.0	-8.4	73.6
Textiles and clothing	786	-12.1	-0.2	-37.0	-3.7	4.9
Tires and rubber	679	-15.3	-0.2	-38.3	-12.4	3.1
Other industries	3,436	-15.0	-1.0	-39.0	-22.1	16.6

Sources: Prepared by BCB with data from the Secretary of Finance of the state of Rio Grande do Sul
Note: 1/ Data deflated by D-ICMS (24% IPCA + 74% IGP-DI).

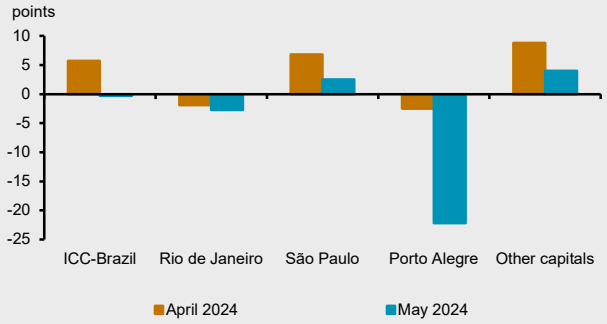
Consumer and business confidence

Surveys of consumers and business also reflected the impacts of floods. According to IBRE/FGV data[11], consumer confidence in Porto Alegre fell 22.2 points in May compared with April, a much stronger fall than the one observed in the national average (Figure 7). CNI and FIERGS data for industry[12] show a 6.4 points decline in industrial business confidence in Rio Grande do Sul in May, while the national index rose 0.4 point (Figure 8). The drop in industrial business confidence in the state was lower than that observed during the pandemic but slightly higher than that in the truck drivers' strike in 2018.

9/ Data may reflect other economic or seasonal factors in addition to the impacts of flooding.
10/ This percentage refers to the NF-e invoice, i.e., it does not include sales to final consumers. Source: Economic-Tax Bulletin, 3rd edition and 4th edition (Portuguese only).
11/ Consumer Confidence Index (ICC).
12/ Industrial Entrepeneur Confidence Index (ICEI).

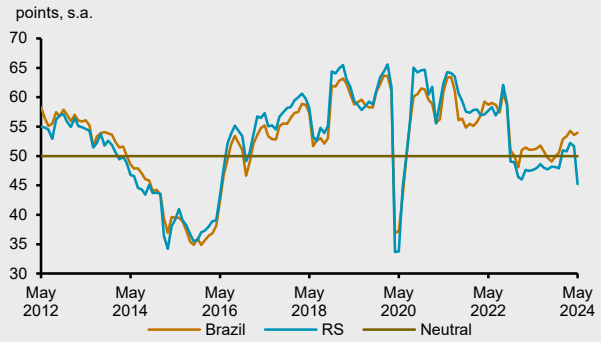
Figure 7 – Consumer Confidence Index

Difference compared to the same month in 2023



Source: Macro Bulletin June 2024, 156 - FGV

Figure 8 – Industrial Business Confidence Index



Sources: CNI and FIERGS

Agriculture

Rio Grande do Sul is an important agricultural producer, accounting for 12.7% of the national grains production. The state concentrates, in particular, 70% of the domestic production of rice and 40% of wheat.[13]

The projection for the harvest of grains in the state was revised downward after the floods (Table 3). In May, the IBGE reduced by 5.4% the estimated harvest of grains in the state, while Conab reduced by 4.2% the projection for the grain production in this year's harvest. Nonetheless, the IBGE and Conab still project a two digit growth for the state's harvest of grains (+38.5 and +36.4%, respectively).

The IBGE reduced its projection for soybeans, corn, and rice in the state by 6.7%, 6.6%, and 1.6%, respectively, while Conab's reductions were more moderate (5.8%, 4.2%, and 2.6%). Emater/RS, in turn, estimates a more negative impact of the floods on the productivity of these crops, with respective declines in production of 11.4%, 6.8%, and 8.7%.[14]

Table 3 – Agricultural production

May 2024 forecasts

Region and crop	IBGE-LSPA estimated production			Conab estimated production		
	Crop 2023 million tons	% change of current forecast compared with: 2023	April's forecast	Crop 22/23 million tons	% change of current forecast compared with: Crop 22/23	April's forecast
Brazil						
Grains	296.8	-5.9	-0.9	297.5	-7.0	0.7
Soybean	146.7	-3.5	-1.1	147.4	-4.7	-0.2
Corn	114.5	-12.7	-1.1	114.1	-13.5	2.2
Rice	10.5	2.3	0.3	10.4	3.6	-0.9
Wheat	9.6	23.8	-2.5	9.1	12.0	-0.2
State of Rio Grande do Sul						
Grains	37.6	38.5	-5.4	37.6	36.4	-4.2
Soybean	20.3	59.8	-6.7	20.2	55.1	-5.8
Corn	4.7	18.1	-6.6	4.9	31.7	-4.2
Rice	7.3	2.6	-1.6	7.1	2.1	-2.6
Wheat	4.2	61.0	-6.4	4.2	44.5	0.0

Sources: IBGE and Conab

13/ See Radiografia da Agropecuária Gaúcha 2023, of the Agriculture, Livestock, Sustainable Production, and Irrigation of the Rio Grande do Sul (Portuguese only).
14/ Relatório Conjuntural of June 13, 2024, from Emater/RS (Portuguese only).

In winter crops – which include wheat – the excessive rainfall flooded areas that had already been sowed, caused erosion in the cultivated areas, and delayed the sowing and harvest schedule. The IBGE expects a production of wheat 6.4% lower than in the previous estimate. Conab, in turn, has kept its projection unchanged. As these crops were not harvested yet, the next surveys of these institutions may provide a relevant updating.

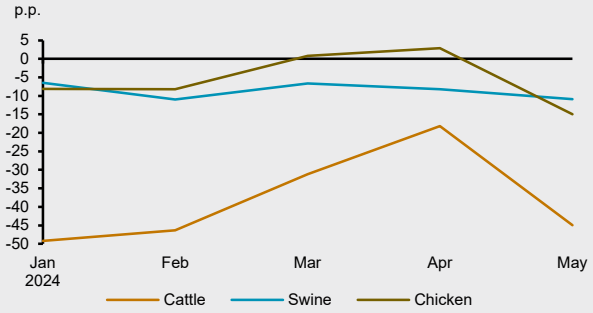
In addition to the impact on the grain crops, the floods also negatively affected the production of fruits and vegetables. Impacts on their prices were already felt in the May's IPCA. Emater/RS reports, for example, the poor quality of harvested potatoes and the loss of fertility in some orchards (due to erosion) or the increased occurrence of pests.[15] Most of these impacts, however, are likely to be felt in the short-term only.

Livestock

Rio Grande do Sul concentrates 4.1%, 11.9%, and 17.1% of Brazil's cattle, chicken, and swine slaughtering, respectively. Data from the Federal Inspection System (SIF)[16] suggest that, even before the floods, slaughters in the state were declining for all meat categories[17], with worse performance than in the other country's regions. In May, this decline was stronger and the gap in relation to Brazil widened. It should be noted, however, that the impact on livestock is not expected to be restricted to May. There was loss of livestock, destruction of machinery and structures, as well as difficulties in feeding the animals during the most critical period[18]. As a result, the production of meat, eggs, and milk might still be marginally affected in the following months.

Figure 9 – Interannual evolution of slaughters

Difference between RS and the rest of Brazil



Sources: SIF and BCB. Data can be reviewed by respondents

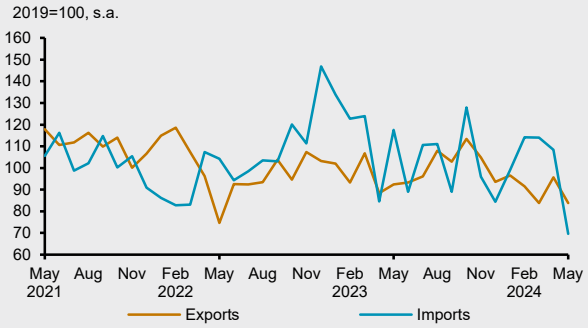
Foreign trade

Floods in Rio Grande do Sul also affected the state's logistics infrastructure. Roads were blocked, the Salgado Filho International Airport in Porto Alegre was closed[19], while port terminals were operating below capacity.

15/ *Ibid.*
16/ Data available at MAPA - Ministério da Agricultura, Pecuária e Abastecimento (Portuguese only). Data are updated daily and can be revised by the respondents themselves (slaughtering companies). The number of animals slaughtered under federal SIF inspection accounts for 36.7% of cattle, 93% of swine, and 97% of chickens slaughtered according to the IBGE figures.
17/ The IBGE'S Quarterly Survey of Animal Slaughter also showed a YoY decline in the state's figures in 2024Q1 for all types of meat.
18/ The National Confederation of Municipalities estimated in its Report of June 14, 2024 (Portuguese only), that the floods caused losses of BRL 372.1 million to farmers.
19/ Salgado Filho International Airport was particularly affected, but it only accounts for around 1% of the state's trade flow. Therefore, its prolonged closure is expected to have a limited effect on the state's trade balance.

This was reflected in foreign trade reduction. The largest impact was on imports, whose quantum index reached the lowest value since May 2020, in the context of the pandemic (Figure 10). This decline may reflect both the direct impact on the interruption of logistics in the region and a possible reduction in certain types of orders. For exports, in turn, the decline was relatively small, compatible with ordinary changes in this category, indicating a limited impact.

Figure 10 – Rio Grande do Sul's foreign trade
Quantum index



Sources: MDIC and BCB

Conclusion

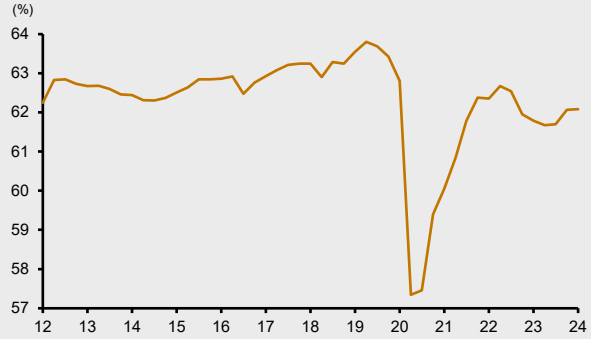
This box presented the evolution of a set of indicators related to the economic activity in Rio Grande do Sul during the floods that occurred last May. These indicators allow a more timely assessment of the impact of this tragedy on the state's economy than is possible by considering the traditional indicators used in conjuncture analysis. Evidence indicates a sharp local activity decline in May, with high heterogeneity across sectors and segments, and signs of ongoing recovery. The May's BCB Regional Economic Activity Index for Rio Grande do Sul (IBCR-RS), to be released in July, will soon provide an initial assessment of the decline in the state's economy in aggregate terms.[20]

20/ IBCR-RS may be found in the Time Series Management System (SGS), with the codes 25401 (not seasonally adjusted) and 25404 (seasonally adjusted). Methodological informations about the IBCR may be found in metadata available in the SGS itself or in the box Atualização dos indicadores usados no cálculo do Índice de Atividade Econômica Regional (IBCR), released in the February 2022 Regional Bulletin (Portuguese only).

Demographic changes and the recent evolution of the labor force participation rate

The labor force participation rate[1] in Brazil followed a preponderantly growing trend from 2012 to 2019, the period leading up to the Covid-19 pandemic. With the outbreak of the health crisis, the labor force participation rate declined abruptly until 2020Q2, recovering gradually in the subsequent period. The rate fell again for four consecutive quarters since 2022Q2, and then resumed an upward trajectory until 2024Q1, when it reached the level of 62.1%, still 1.3 p.p. below that observed in 2019Q4.[2]

Figure 1 – Participation rate



Source: IBGE

Therefore, four years after the outbreak of the pandemic, the participation rate in Brazil has not yet returned to the level of late 2019. Early retirement due to the fear of Covid and successive expansions of government transfers to the lower-income population are mentioned as possible causes for individuals to exit the labor force.[3] However, there is another factor, not often mentioned, that helps to explain the only partial recovery of the participation rate: demographic evolution, which has increased the percentage of individuals in older age groups, where the participation rate is lower.

This box assesses the importance of demographic changes to the recent evolution of the participation rate by decomposing its variation into intra-group and composition effects. The box also presents forecasts for the composition effects in the next years and makes a brief comparison between the evolution of the participation rate in Brazil with that of a 'group of selected countries in the post-pandemic period.[4]

The decomposition was calculated according to the following equation:

$$\Delta TP_t = (TP_t - TP_{t-1}) = \underbrace{\sum_i f_{i,t-1}\Delta TP_{i,t}}_{\text{Intra-group effect}} + \underbrace{\sum_i (TP_{i,t-1} - TP_{t-1})\Delta f_{i,t}}_{\text{Composition effect}}$$

1/ Ratio of the labor force to the working age population.
2/ According to data from the Continuous National Household Sample Survey (PNAD Continuous) seasonally adjusted by the indirect method. By this method, the working age population was divided into groups (described later) and, for each group, the labor force and total population time series were seasonally adjusted. The ratio of the sum of the labor force series to the sum of the population series – all of them seasonally adjusted – resulted in the aggregated seasonally adjusted participation rate.
3/ See, for instance, the papers "Transferências de renda, taxa de participação e distribuição de renda", of November 2023, and "Transferências reduzem taxa de participação, mas efeito se concentra em mulheres e jovens", of March 2024, published in the IBRE's blog (Portuguese only).
4/ As the Brazilian Institute of Geography and Statistics (IBGE) has not yet incorporated the Censo 2022 results in its population projections and in the PNAD Continuous weighting structure, the findings presented in this box are subject to changes. However, no qualitatively relevant changes are expected in its conclusions.

considering the division of the population into 32 groups by gender/age[5]. In this equation, the index i represents the groups of gender/age, the index t represents quarters, TP is the aggregated participation rate, TP_i is the participation rate of group i and f_i is the fraction of the group i in the working age population.

The intra-group effect represents the parcel of the change in the aggregated participation rate due to changes in the participation rates of the several groups into which the working age population was divided. The higher the change in the participation rate in one group and the higher its fraction in the working age population, the higher will be its contribution to the change in the aggregated participation rate. As for the composition effect, it expresses the parcel of change in the participation rate due to changes in the population distribution among the groups. When a group with an above-average participation rate becomes relatively greater, the aggregated participation rate increases.

Table 1 – Brazilian participation rate evolution

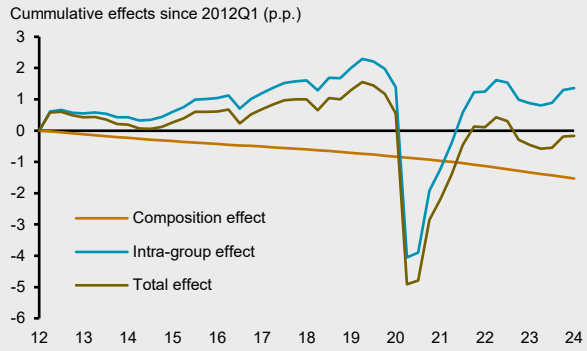
	Period 1 (2012Q1 to 2019Q4)	Period 2 (2019Q4 to 2024Q1)	Total period (2012Q1 to 2024Q1)
Participation rate - end of period (%)			
Total	63.4	62.1	62.1
Men	73.3	72.2	72.2
Women	54.2	52.6	52.6
Participation rate variation (p.p.)			
Total	1.2	-1.3	-0.2
Men	-0.8	-1.1	-2.0
Women	3.1	-1.5	1.6
Intra-group effect (p.p.)			
Total	2.0	-0.6	1.4
Men contribution	-0.2	-0.3	-0.5
Women contribution	2.2	-0.3	1.9
Composition effect (p.p.)			
Total	-0.8	-0.7	-1.5
Men contribution	-0.2	-0.3	-0.5
Women contribution	-0.6	-0.5	-1.1
Participation rate variation - annualized average (p.p.)			
Total	0.15	-0.32	-0.01
Men	-0.11	-0.26	-0.16
Women	0.40	-0.36	0.13
Intra-group effect - annualized average (p.p.)			
Total	0.26	-0.14	0.11
Men contribution	-0.03	-0.07	-0.04
Women contribution	0.28	-0.08	0.15
Composition effect - annualized average (p.p.)			
Total	-0.10	-0.17	-0.13
Men contribution	-0.03	-0.06	-0.04
Women contribution	-0.08	-0.11	-0.09

Sources: IBGE and BCB

Table 1 shows the decomposition of the change in the participation rate for two periods: (1) from 2012Q1 to 2019Q4 (pre-pandemic) and (2) from 2019Q4 to 2024Q1 (post-pandemic). Figure 2 shows the intra-group and composition effects accumulated from quarter to quarter since the start of the PNAD Continuous series.

5/ The working age population of the PNAD Continuous was divided into 32 groups by gender/age. Gender (2): Men or women; Age, in years (16): 14 to 19, 20 to 24, 25 to 29, 30 to 34, 35 to 39, 40 to 44, 45 to 49, 50 to 54, 55 to 59, 60 to 64, 65 to 69, 70 to 74, 75 to 79, 80 to 84, 85 to 89, and 90 or above.

Figure 2 – Decomp. of the participation rate var.



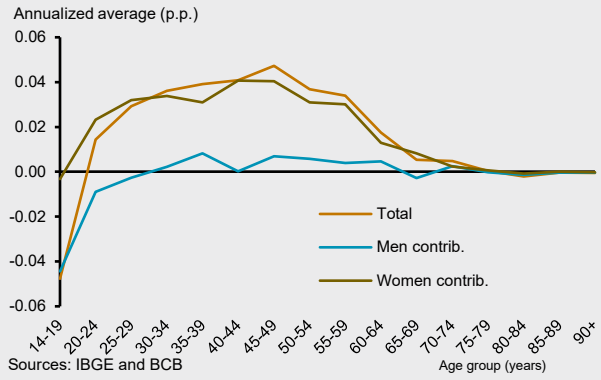
Sources: IBGE and BCB

The intra-group effect was preponderantly positive in the first period, contributing with 2.0 p.p. to the increase in the participation rate in the pre-pandemic period. Since then, this effect accumulated a decline of 0.6 p.p. The composition effect, in turn, was negative in the entire period, contributing with -0.8 p.p. to the change in the participation rate in the first period and with -0.7 p.p. in the second period. Therefore, nearly half of the 1.3% decline in the participation rate observed since 2019Q4 was due to changes in the population composition. It is also noteworthy that the magnitude of the composition effects grew throughout the years. Its average contribution to the change in the participation rate was -0.10 p.p. per year in the first period and -0.17 p.p. in the second one.

The differences in the evolution of the participation rate in the pre- and post-pandemic periods become even more evident when the contribution of each group to the intra-group and composition effects is observed.

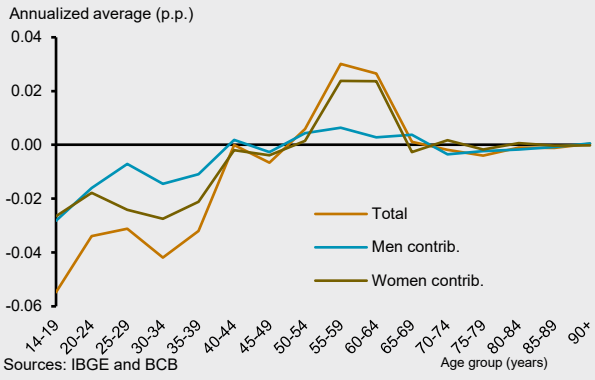
The intra-group effect was positive for almost all age groups in the pre-pandemic period and was primarily due to the increase in the women's participation rate in the 20 to 69 age groups. Men's contribution was slightly negative, influenced by the decline in the participation rate of young people of the 14 to 19 age group[6]. In the post-pandemic period, a clear reversal of the women's contribution to the intra-group effect was observed, which became negative to almost all age groups. This inflection might be related to both the consequences of the pandemic (the need to take care of children and elderly people during the health crisis might have been stronger for women, especially younger ones, with lasting effects on their participation rate) and the expansion of social benefits. However, there were some exceptions, especially in the 55 to 64 age group, for which women's contribution continued positive, reflecting new increases in the participation rate, possibly associated with the social security reform. Men's contribution to the intra-group effect was also negative in the post-pandemic period and slightly stronger than in the previous period, in terms of annualized average.

Figure 3 – Intra-group effect (2012Q1 to 2019Q4)



Sources: IBGE and BCB

Figure 4 – Intra-group effect (2019Q4 to 2024Q1)

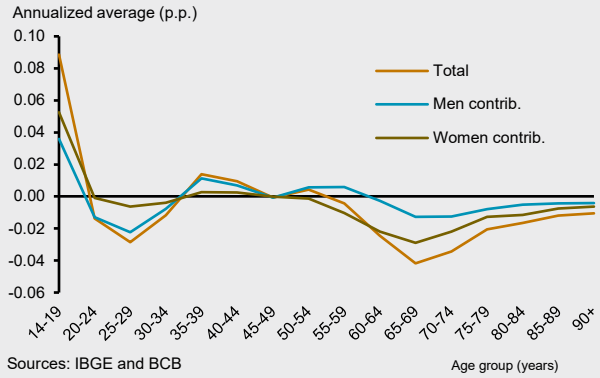


Sources: IBGE and BCB

6/ The increase in average education levels in this age range since the beggining of the PNAD Continuous time series suggests that the decline in the participation rate might be related to the exclusive commitment of young individuals to study, which may benefit the quality of the labor force and even the participation rate later on.

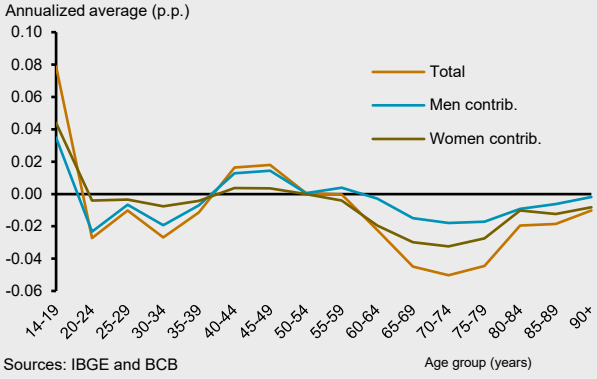
Even though the distribution of the composition effect by age range was similar in both periods, as shown by annualized average data, the aggregated negative effect was stronger in the second one. This phenomenon can be explained by the deepening of the demographic transition, as the participation rate is lower in older age groups, which has grown in relation to the total population. This can be seen by the negative contribution of the composition effects in the age ranges above 60, especially among women. The contribution of the young people of the 14 to 19 age group to the composition effect, in turn, was positive. The participation rate of this group is also low, but its fraction in the working age population has declined.

Figure 5 – Composition effect (2012Q1 to 2019Q4)



Sources: IBGE and BCB

Figure 6 – Composition effect (2019Q4 to 2024Q1)

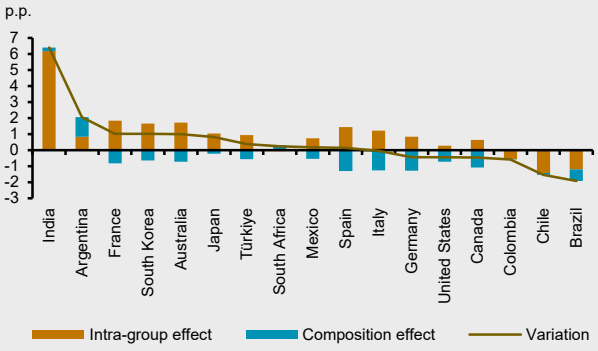


Sources: IBGE and BCB

Prospectively, the demographic effect on the participation rate is expected to continue gaining relevance. Considering the IBGE's population projections[7], the contributions of changes in the demographic composition to the participation rate variation are estimated at -0.24 p.p. per year from 2024 to 2028, and -0.31 p.p. per year in the subsequent five years. This means that, in a period of ten years, changes in the population composition are expected to contribute with -2.8 p.p. to the change in the participation rate. The combination of lower expansion of the working age population, demographic evolution that hinders the increase in the participation rate, and unemployment rate at historically low levels tend to reduce the pace of expansion of employed population.[8]

Some factors may offset this effect. Among them, the continuity of the process of increasing education of the working age population, as the participation rate tends to be higher in groups with higher education levels;[9] the resumption of the expansion of women's participation in the labor market; and the increase of the participation rate of older age groups, as a consequence of the social security reform and gradual expansion of life expectation.

Figure 7 – Participation rate variation from 2019 to 2023



Source: BCB (with ILO data)

7/ Simple population projections by gender and age (Portuguese only) – updated on December 9, 2020 (https://www.ibge.gov.br/estatisticas/sociais/populacao/9109-projecao-da-populacao.html).

8/ The box Sectoral analysis of GDP and labor productivity, of the December 2023 IR, highlights that most of the economic growth in the recent years reflected the expansion of employment. This contribution tends to slow down.

9/ The repetition of the exercise involving the decomposition of the change in the participation rate into intra-group and composition effects by dividing the population by groups of years of schooling shows that increase in schooling has given a relevant positive contribution to the participation rate.

Lastly, the comparison with some selected countries, using annual data until 2023 and the working age population divided into eight groups by gender/age range[10], shows that Brazil is one of the few countries for which the cumulative intra-group effect has been negative in the post-pandemic period. The exercise also reveals that the composition effect was negative for most of the countries, indicating that difficulties imposed by the demographic transition to the increase in the participation rate, with impacts on the expansion of employment, are a widespread phenomenon.

The labor force participation rate in early 2024 (62.1%) is below the historical average (62.9%)[11]. Nonetheless, one of the main findings of this study is that this is partly a result from the demographic trend that leads to a slow and persistent reduction in the participation rate, a phenomenon that is expected to deepen over the next years. Excluding the composition effect analyzed in this study, the participation rate in 2024Q1 would be 63.6%, against a historical average of 63.3%.[12] This composition effect, however, has no relevant explanatory power for the higher frequency fluctuations in the participation rate. Examples of oscillations of this type are the decline observed from mid-2022 to 2023, possibly associated with the expansion of social benefits, and the recent increase since late 2023, which could be associated with a stronger labor market.

10/ Source: International Labor Organization (ILO) data available at https://ilostat.ilo.org. Gender grouping: men or women. Age ranges (years): 15 to 24, 25 to 54, 55 to 64 and 65 or above.
11/ Average from 2012Q1 to 2019Q4.
12/ As in Figure 2, the initial value, in 2012Q1, is supposed to be the same.

Revision of the 2024 GDP projection

The central projection for the Gross Domestic Product (GDP) growth in 2024 rose from 1.9% to 2.3%. The revision was heavily affected by positive surprises in 2024Q1, notably in taxes, in the more cyclical supply components, in household consumption, and in the Gross Fixed Capital Formation (GFCF). The projection also incorporates monthly indicators available for 2024Q2, which generally point to economic activity slowdown[1], including the impact of the floods in Rio Grande do Sul (RS). Efforts to rebuild that state are expected to contribute positively to GDP growth in the second half of the year, adding to the delayed impact of the reduction in the degree of monetary tightening that occurred over the last year.

Qualitatively, the current forecast is similar to those presented in the two previous IR. The outlook remains that growth will be more homogeneous across sectors this year compared to the previous year, with greater contribution from sectors more sensitive to the economic cycle; that GFCF will resume growth this year, supported by the reduction in the degree of monetary tightening that occurred over the past year; and that the external sector will have a negative contribution. In general, the revision reinforced these aspects. However, given the 2024Q1 data and the labor market dynamics, household consumption growth is expected to be higher than in 2023, even with the slowdown in the expansion of social benefits.

It is estimated, with a high degree of uncertainty, a modest impact of the climate tragedy in Rio Grande do Sul on the annual growth of the national GDP. The negative effects are expected to be largely concentrated in 2024Q2 and offset by the reconstruction efforts and the extraordinary purchase of capital goods, durable goods, and clothing, which are anticipated to occur mainly in the second half of the year. In sectoral terms, however, there should be significant heterogeneity. The net impact of the floods on the result for 2024 tends to be negative in some sectors, such as agriculture and "other services" (which includes services provided to households, such as accommodation and food-away-from-home and leisure activities) and positive for construction and production of some types of goods that might have been lost.

From the output perspective, the higher annual GDP growth projection compared with that of the previous IR reflects increased projections for industry and services and reduced growth estimate for agriculture.

The projection for the annual change in agriculture fell from -1.0% to -2.0%, mainly reflecting the worsened forecasts from the Brazilian Institute of Geography and Statistics' (IBGE) for the agricultural harvest, especially of soybeans and corn.[2] Part of the loss in agriculture is due to the damage to crops in Rio Grande do Sul caused by the May's rainfall.

In industry, the projection was raised from 2.2% to 2.7%. The drop in estimates for "utilities" and mining, under the influence of negative surprises in 2024Q1, was outweighed by higher forecasts for manufacturing and construction. Manufacturing should benefit from the prospect of higher growth in household consumption and the GFCF, while construction is expected to be further stimulated by efforts to repair the damage caused by rainfall in Rio Grande do Sul.

1/ Difficulties associated with seasonal and calendar adjustments, due to the lower number of working days in 2024Q1 and the fact that 2024 is a leap year, mentioned in the Economic activity section of this IR, may attenuate the perception of GDP growth slowdown in 2024Q2. The official adjustment tends to produce lower variation in 2024Q1 and higher in 2024Q2 than the alternative adjustment, which considers working days according to the national calendar and does not make a mechanical adjustment for leap years, mentioned in that section.

2/ The forecast presented in the Systematic Agricultural Survey (LSPA-IBGE) for the change in the 2024 grain harvest compared with 2023 dropped from -4.7% to -5.9% since the March 2024 IR. Forecasts for the annual change in the harvests of soybeans and corn decreased from -1.8% to -3.5% and from -10.8% to -12.7%, respectively.

The growth projection for the services sector increased from 2.0% to 2.4%. The main contributions to this rise came from more favorable forecasts for trade and "other services", heavily influenced by the prospect of stronger growth in household consumption. In the opposite direction, it stands out the reduction in the projection for "financial intermediation and related services". This sector, which grew strongly in 2023, performed below expectations in 2024Q1.

Considering the classification of economic activities in terms of their sensitiveness to the economic cycle[3], the projection for the group of more cyclical activities increased while that for the group of less cyclical activities declined. Estimates for the annual change in Gross Value Added (GVA) rose from 2.1% to 3.1% for more cyclical and fell from 1.6% to 0.9% for less cyclical activities. Excluding agriculture from the latter group, the projection fell from 2.1% to 1.5%.

Regarding the domestic components of aggregate demand, a relevant increase was observed in the growth estimates for household consumption and the GFCF. The estimated annual growth for household consumption rose from 2.3% to 3.5%, reflecting the strong and higher-than-expected rise in 2024Q1 and the greater dynamism in the labor market. For the GFCF, the revision was from 1.5% to 4.5%. The turnaround in investments in the end of 2023 and early 2024 is consistent with the delayed effects of the reduction in the degree of monetary policy tightening over the past year, but it was stronger than anticipated, leaving a higher statistical carry-over for the year. Moreover, the devastation in Rio Grande do Sul will require significant reconstruction efforts and exceptional purchases of capital goods, which should contribute to further expansion of the GFCF.

Exports are expected to increase 0.5% in 2024, the same projection made in the previous IR. Lower projection for shipments of primary goods, due to less favorable forecasts for mining and agricultural production, was offset by higher forecast for other components, including exports of services. For imports, the growth forecast rose from 3.0% to 6.0%. This revision reflects the higher-than-expected result in 2024Q1, largely due to a surprise in the imports of services, and the upward revisions in the projections for manufacturing, household consumption, and the GFCF.

Given the revised estimates for the aggregate demand components, the respective contributions of domestic demand and the external sector to the GDP growth in 2024 are 3.2% and -0.9%.

Table 1 – Gross Domestic Product
Accumulated in the year

% growth

Itemization	2023	2024[1]	
		Previous	Current
Agriculture	15.1	-1.0	-2.0
Industry	1.6	2.2	2.7
Mining	8.7	3.0	2.0
Manufacturing	-1.3	1.7	2.7
Construction	-0.5	2.5	3.5
Public utilities	6.5	3.5	3.0
Services	2.4	2.0	2.4
Trade	0.6	1.9	3.5
Transport and storage	2.6	1.8	1.2
Information services	2.6	1.8	4.1
Financial and related services	6.6	2.4	0.6
Other services	2.8	2.3	3.4
Real estate	3.0	2.4	2.6
Public admin., health and education	1.1	1.5	1.1
More cyclical components	1.2	2.1	3.1
Less cyclical components	5.5	1.6	0.9
Value added at basic prices	3.0	1.9	2.2
Taxes on products	2.1	1.8	3.4
GDP at market prices	**2.9**	**1.9**	**2.3**
Household consumption	3.1	2.3	3.5
Government consumption	1.7	1.9	1.8
Gross Fixed Capital Formation	-3.0	1.5	4.5
Exports	9.1	0.5	0.5
Imports	-1.2	3.0	6.0

Sources: IBGE and BCB
1/ Estimated.

3/ Classification also used in the "Economic activity" section. Activities classified as less cyclical: agriculture; mining; financial activities, insurance and related services; real estate activities; administration, defense, public health and education, and social security. Other activities are considered more cyclical.

Projection for credit growth in 2024

The nominal growth projection for the credit balance in the National Financial System (SFN) in 2024 has increased from 9.4%, as published in the previous IR, to 10.8% (Table 1). The evolution of credit for the remainder of 2024 is expected to be driven by a combination of credit programs created to address the effects of the extreme climatic event in Rio Grande do Sul (RS) along with economic activity, which has proven to be more resilient than previously expected.

The projection for the earmarked corporate segment was revised from 9.0% to 15.0%, reflecting the credit lines created to assist companies, entrepreneurs, and rural producers affected by the climatic events in Rio Grande do Sul. The Federal Government made contributions to the Guarantee Operations Fund (FGO) and the Guarantee Investment Fund (FGI) to enable up to BRL 34 billion in new financing from the National Program for the Support of Micro and Small Businesses (Pronampe) and up to BRL 5 billion in new operations under the Emergency Global Credit Program for Access to Credit (FGI PEAC). Furthermore, the Federal Government authorized the use of BRL 15 billion from the financial surplus of the Social Fund as a source of resources for direct or indirect BNDES loans.

In the non-earmarked credit portfolio, the revision for the balance of households stands out, increasing from 10.0% to 11.5%. The increase in expected growth for the year reflects the positive surprise in the data released and the expectation of higher household consumption.

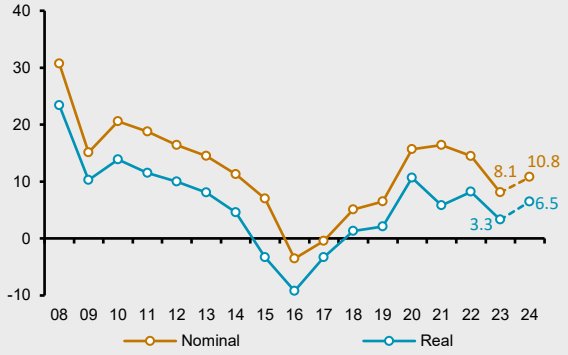
Table 1 – Credit outstanding balance

12-month % change

	Occurred			Proj. 2024	
	2022	2023	Apr 2024	Previous	Current
Total	14.5	8.1	8.7	9.4	10.8
Non-earmarked	14.9	5.5	6.2	8.9	10.0
Households	17.5	8.2	8.9	10.0	11.5
Corporations	11.9	2.1	2.6	7.5	8.0
Earmarked	14.0	11.9	12.4	10.0	12.0
Households	18.0	13.1	13.4	10.5	10.5
Corporations	6.9	9.6	10.4	9.0	15.0
Total Households	17.7	10.4	10.9	10.2	11.0
Total Corporations	10.1	4.7	5.3	8.0	10.5

Figure 1 – Total credit outstanding balance

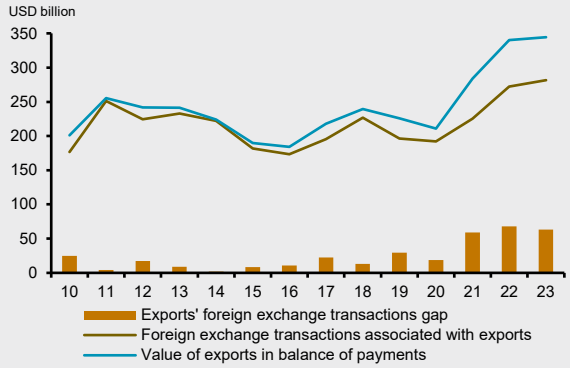
% year change



Exchange contracts and the current account: the foreign exchange transactions gap

Brazilian exports of goods have hit successive records in recent years, growing 63% from 2020 to 2023 to USD 344 billion. The value of the foreign exchange (FX) contracts associated with exports, however, has grown less significantly over the same period (46%), totaling USD 281 billion in 2023. This means that there was a difference of USD 63 billion between the value of Brazilian exports registered in the balance of payments and the value of FX contracts related with exports, in 2023. This difference, hereinafter referred to as "export's foreign exchange transactions gap", has grown recently (Figure 1).

Figure 1 – Exports and foreign exchange transactions



The foreign exchange gap mainly occurs because exporters do not need to internalize export revenues, being allowed to constitute active investment positions abroad.[1] Funds can also be used for payment obligations in foreign currencies, such as imports, services, amortizations of debt abroad, distribution of earnings or payment of interests. Moreover, even if funds are internalized, it may happen at a different time. More specifically, it is common practice to anticipate export revenues on goods to be shipped later.

This box analyses the export exchange gap considering these different possibilities. The analysis is complemented by the box Exporters' accounts abroad, also of this IR.

Advances of export revenues

It is fairly common for exporters to advance export revenues. From 2010 to 2023, 42% of the total value of FX transactions associated with exports corresponded to advances of funds through debt instruments such as the Payment in Advance (PAE) and the Advances on Export Contracts (ACC).

These operations dissociate the foreign exchange flow from the custom's registration of goods. Firstly, an exchange contract is signed without the effective export of goods, which contributes to a lower foreign

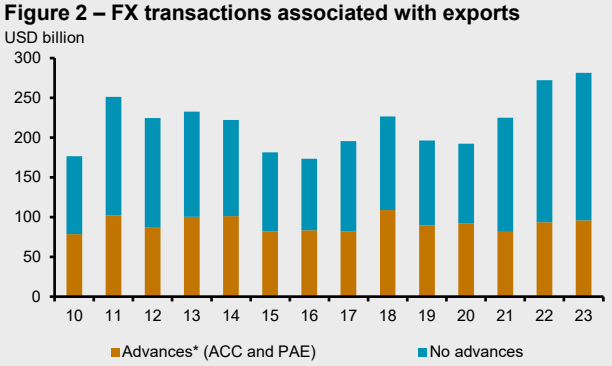
1/ In 2006, Provisional Measure 315, converted into Law 11,371, authorized exporters to maintain export revenues abroad, eliminating the mandatory full foreign exchange coverage of exports. In regulating this legislation, the National Monetary Council (CMN) established in that year a cap of 30% for maintaining export revenues abroad. In 2008, this percentage was raised to 100%. In 2021, Law 14,286 consolidated and deepened measures to simplify foreign exchange issues.

exchange transactions gap. Secondly, goods are exported without a new exchange contract, contributing positively to the FX transactions gap. Even though, in each period, the aggregate effect of negative and positive contributions is to some extent offset, changes in the dynamics of these operations may modify the exports' FX transactions gap level. In 2023, for instance, funding with term above 360 days under PAE totaled USD 21 billion, largely outweighed by amortizations (in the modality of delivery of goods) of USD 31 billion, resulting in a net contribution of USD 10 billion to the FX transactions gap in the year.

In fact, despite the recent increase in the exported value, the value of advanced revenues on exchange contracts remained stable (Figure 2). Therefore, the ratio of advanced value to exported value dropped from 44% in 2020 to less than 30%, implying, during a transition period, higher export's FX transactions gap.

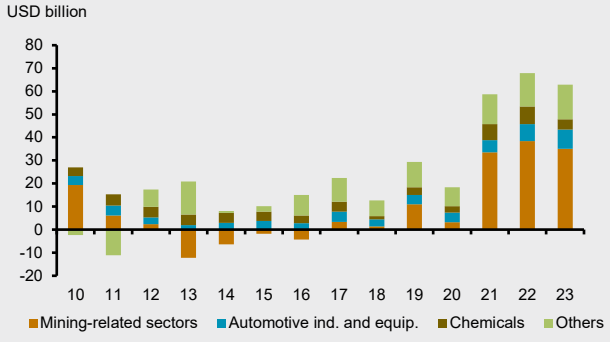
Advances of revenues on export operations are particularly observed in mining-related sectors.[2] In 2023, these sectors accounted for 56% of the exports' FX transactions gap (Figure 3), despite representing only 33% of total exports.

Figure 2 – FX transactions associated with exports



* With foreign currency exchange contract

Figure 3 – Exports' FX transactions gap - by sector



Sources: BCB and Secex

The foreign exchange transactions gap in other balance of payment accounts

The exports' FX transactions gap cannot be analyzed separately from the foreign exchange transactions gap in other accounts. In fact, as already mentioned, exporters may use export revenues to make payments related to other balance of payment accounts. CBE data show that, in fact, a large share of these revenues was used to make payments abroad.

In particular, an exporter that purchases inputs abroad may use non-internalized export revenues to pay for these inputs, avoiding both export and import exchange contracts and thus reducing transaction costs. This means that foreign exchange transactions gaps of exports and imports may be related. In fact, the imports' FX transactions gap has also grown substantially from 2020 to 2023, from USD 9 billion to USD 31 billion (Figure 4). While imports increased USD 86 billion, the value of import-related foreign exchange transactions grew by USD 63 billion. The trade foreign exchange transactions gap (Figure 5), which aggregates the FX transactions gaps of exports and imports, is substantially lower than the exports' FX transactions gap.

Similarly, the current account's FX transactions gap may be defined by aggregating, to the trade FX transactions gap, the gaps in the services and income accounts.[3] In 2023, for instance, the current account's FX transactions

2/ Mining-related sectors include the metallic minerals extraction, oil and natural gas extraction, manufacturing of oil-related products, and metallurgy.

3/ The calculation of the foreign exchange transactions gap for the services and income accounts does not include the sub-accounts that are not typically subject to the settlement of exchange operations, such as reinvestment of earnings and interest payment on securities traded in the domestic market. The foreign exchange transactions gap of these accounts is negative, with lower outflows of funds through exchange contracts than the respective deficits registered in the balance of payments.

gap was only USD 4 billion (Figure 6), much lower than the USD 63 billion export's FX transactions gap, suggesting that a large share of export revenues (in foreign currency) was reversed to payments of obligations also in foreign currency. In the first four months of 2024, in turn, the accumulated exchange gap was negative at USD 18 billion, with USD 5 billion inflows through exchange contracts contrasting with an indicative of USD 13 billion outflows under the current account metric. Therefore, since 2021, the current account's FX transactions gap has been close to zero, with an increased trade's FX transactions gap being offset, to a large extent, by the others foreign exchange transactions gaps.

Figure 4 – Imports and foreign exchange transactions

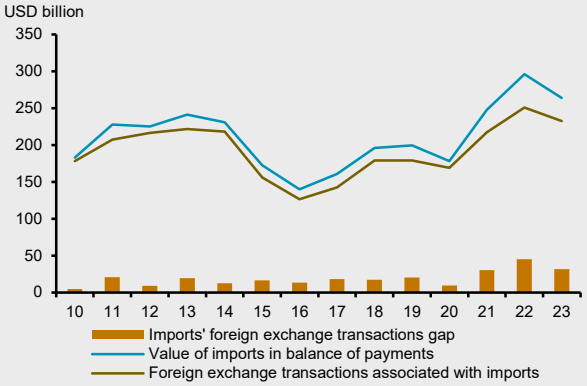


Figure 5 – Trade balance and FX transactions

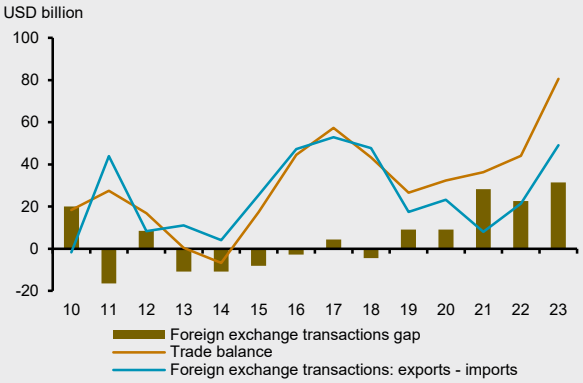
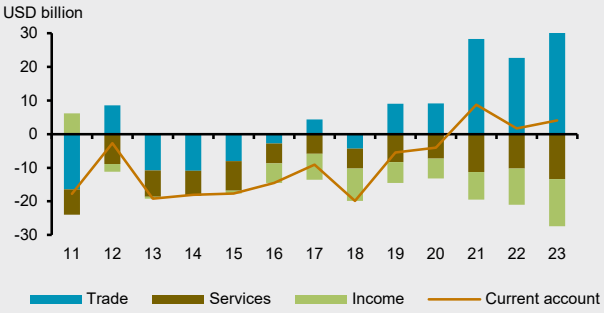


Figure 6 – Current account's* FX transactions gap



* Compatible with current accounts of balance of payments that may generate foreign exchange transactions. It computes foreign exchange transactions related to trade and only parts of services and income of financial foreign exchange transactions.

Conclusion

The expansion of the export's foreign exchange transactions gap has attracted attention from economic analysts. Nevertheless, to analyze this dynamics and its implications, it is important to bear in mind the several ways to use export revenues earned and not internalized. This box shows that the current account's foreign exchange transactions gap, a wider approach to the country's inflows and outflows of funds vis-a-vis their potential, is much smaller than that of exports. The recent trajectory of this gap, coupled with the analysis of CBE data, does not suggest the accumulation by exporters of substantial funds abroad that could be potentially internalized in the future.

Exporters' accounts abroad

This box discloses a table containing annual data of balances and transactions in deposit accounts abroad held by exporters resident in Brazil. The purpose of this release is to expand the set of information available to the analysis of statistics on exports and imports of goods in the balance of payments' current account, and on payments and receipts expressed in foreign exchange contracts in the trade segment. This new table comprises data from 2019 onwards and will be disclosed on a yearly basis as part of the tables of the Brazilian Assets Abroad (CBE) survey results (Portuguese only).

The CBE survey is the main data source for statistics on foreign assets that make up the International Investment Position (IIP), including deposit accounts abroad held by Brazilian residents (exporters and non-exporters). The CBE declaration is mandatory for Brazilian residents – individuals and companies – that held more than USD 1 million in assets abroad in the last day of each year-base. The CBE identifies, in the universe of its respondents, exporters who received directly in an account abroad USD 10 million or more throughout the year, related to export revenues. The survey collects around 25 thousand declarations every year, of which nearly 350 containing information regarding exporters' accounts abroad.

In addition to the balance of these accounts abroad, the table also shows the transactions that explain their change, specifying account inflows by export revenue received directly abroad (without foreign exchange contracts) and outflows related to payments of goods or services, among other expenses.[1]

The table reveals that, since 2019, exporters have regularly received part of their export revenues abroad. However, these resources received abroad have not been accumulated, since exporters also use almost all their export revenues not internalized to pay for expenses abroad, such as imports of goods and services, among others. The table shows that annual accumulation of funds was less than USD 2 billion from 2019 to 2022, exceeding USD 4 billion in 2023, according to preliminary estimates.

Credit operations linked to international trade (prepayments and subsequent payments for exports and imports) and payments or receipts related to imports and exports naturally bring about mismatches between exports and imports in the current account (change of ownership between resident and non-residents, also known as physical or shipped exports and imports). It is common the existence of the Payment in Advance (PAE) related to long-term operations, such as ten years, increasing the differences between the financial settlement (foreign exchange contracts) and the shipment of goods (physical delivery). The complementary share in the explanation of this mismatch is associated with operations settled directly abroad, as detailed in the table. The box Exchange contracts and the current account: the foreign exchange transactions gap of this IR quantifies and analyzes these effects.

This box showed that, despite the high values of gross flows transacted directly abroad, the end-of-period balance of exporters' accounts abroad is low. Therefore, there is no evidence of the existence of high stocks of foreign currency held by exporters abroad that could potentially increase the foreign exchange market supply.

1/ Law 11,371, of 2006, resulting from the conversion of Provisional Measure 315, permitted exporters to maintain in financial institutions abroad funds in foreign currency relative to the revenues of Brazilian exports of goods and services. Initially, it was permitted to receive up to 30% of export revenues abroad, a percentage that was increased to 100% in 2008 (Resolution CMN 3,568). This permission, maintained by Law 14,286, of 2021, has made export foreign exchange contracts a subset of total exports.

Table 1 – Exporters' accounts abroad[1]

USD million

	2019	2020	2021	2022	2023[3]
Accumulation of funds abroad by exporters (B) - (A)	**- 379**	**1 039**	**1 914**	**1 667**	**4 500**
Initial balance of accounts abroad (A)	**4 595**	**4 216**	**5 255**	**7 169**	**8 835**
Net export revenues received abroad	36 788	34 314	45 602	59 233	64 269
Expenses paid via an account abroad[2]	37 167	33 275	43 688	57 567	59 769
Payment for import of goods	16 018	12 329	18 953	30 306	36 366
Payment for import of services	6 982	5 173	5 889	7 221	10 980
Others (earnings, direct investment, debt service, reimbursements, etc.)	14 167	15 773	18 845	20 039	12 423
Final balance of accounts abroad (B)	**4 216**	**5 255**	**7 169**	**8 835**	**13 335**
Memo:					
Net export revenues received abroad	36 788	34 314	45 602	59 233	64 269
Gross export revenues received abroad (+)	90 495	106 119	107 780	146 130	148 693
Internalizations of export revenues made in the same year (-)	53 707	71 805	62 178	86 897	84 424

Source: CBE, including respondents that received annual export revenues of USD 10 million or more in accounts abroad.
1/ Top exporters.
2/ Internalizations made in the same year already deducted.
3/ Preliminary data, CBE respondents under validation.

Projections for the external accounts in 2024

Table 1 – Projections for the external accounts

USD billion

Itemization	2023	2024	2024 Forecast	
	Year	Jan - Apr	Previous	Current
Current account	-31	-17	-48	-53
Balance on goods	81	19	59	59
Exports	344	110	330	335
Imports	264	91	271	276
Services	-38	-15	-40	-43
of which: Travel	-8	-2	-12	-9
of which: Transport	-13	-5	-14	-14
Primary income	-75	-22	-68	-71
of which: Interests	-28	-9	-29	-29
of which: Dividends	-47	-13	-39	-42
Investment - liabilities	96	42	80	75
DI liabilities	64	27	70	65
Portfolio investments	12	0	10	0
Other investments[1]	20	15	0	10

[1] Includes loans, commercial credits, deposits, and other investments

This box presents the revised projections for the external accounts of the Brazilian economy for 2024. The scenario is still favorable, characterized by a moderate current account deficit, although higher-than-expected in the previous IR; high trade balance surplus; and net inflow of direct investment liabilities above the current account deficit.

The revised projection for the current account deficit is USD 53 billion, 2.3% of the GDP (Table 1). This upward revision from the previous projection of USD 48 billion deficit reflects larger net expenses on the services and primary income accounts. The projected trade balance surplus was kept unchanged, with expansions of the same magnitude for exports and imports.

For exports, the revision mainly reflects the larger volume of oil sales. This commodity is expected to outweigh soybeans in 2024 as the main export item, a trend that can last longer if oil production projections, such as those from the Energy Research Company (EPE)[1], materializes. The projected value for soybeans exports was also slightly increased. The expected volume decline, associated with losses due to the floods in Rio Grande do Sul, is relatively small and was offset by the prospect of lower decline in the average prices in 2024 compared with 2023, given the prices trend observed since the March 2024 IR.

The new projection for imports incorporates the widespread increase in international purchases of capital goods, consistent with the positive revision of growth expectations for Gross Fixed Capital Formation (GFCF). The projection also includes a higher volume of imports of durable consumption goods, with the imports of electric cars from China standing out. Even with the establishment of tariffs, such imports are expected to give a relevant contribution for the year's import results.

For the services account, the larger projected deficit reflects increased expenses on technology services and intellectual property. This factor more than offset the lower deficit projected in the travel account, which reflects lower-than-expected net expenses.

The larger deficit projected in the primary income account is due to lower profitability of direct investment assets. Net interest expenses have been according to expectations while projected interest remained unchanged, even in face of expectations that interest rates in the U.S. will remain high for longer.

In the financial account, net inflows of direct investment liabilities were revised slightly downward, to USD 65 billion, or 2.9% of GDP. This revision incorporates the recent downward trend of these inflows, particularly

1/ See EPE projection for oil and natural gas production, released in January 2023 (Portuguese only).

regarding equity capital, which had a good performance in early 2024. For portfolio investments, neutrality is now expected, instead of a positive net inflow concentrated in securities, as expected in the previous IR. In addition to incorporating strong outflows by foreigners in April, the projection considers a higher degree of uncertainty in both external and domestic scenarios.

Figure 1 – Current account

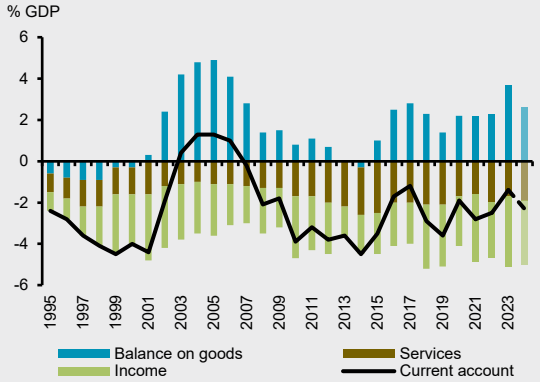
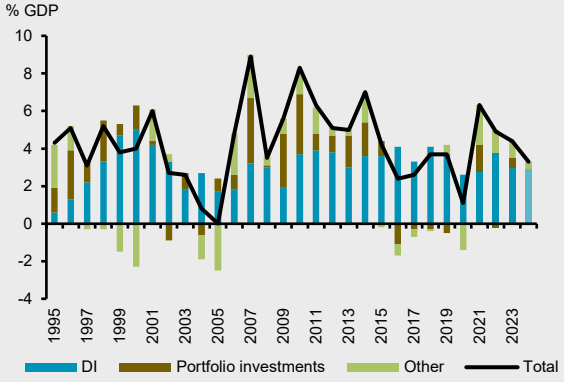


Figure 2 – Investment – liabilities



Recent dynamics of services inflation

Despite remaining above the target, consumer inflation in Brazil dropped sharply from mid-2022 to May 2024, the latest month with available data for the Extended National Consumer Price Index (IPCA) and its core inflation measures (Figure 1)[1]. An analysis of the two less volatile IPCA segments[2] – industrial goods and services – shows that disinflation was widespread, but stronger across industrial goods (Figure 2). Furthermore, the more recent industrial prices rate change is similar to that of 2018 and 2019, when the IPCA change was around the inflation target. However, services inflation remains higher than in the period immediately before the pandemic.

Figure 1 – IPCA and average of core inflation measures
%, YoY

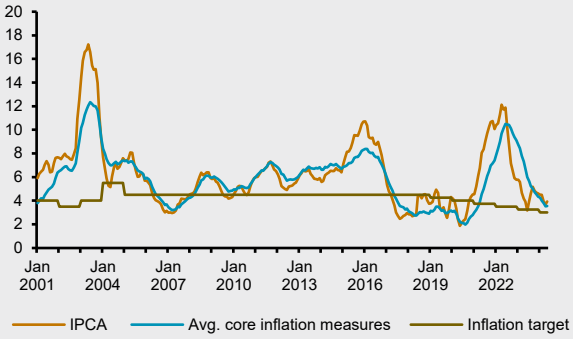
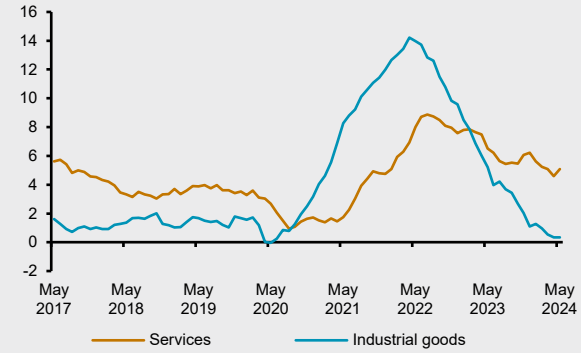


Figure 2 – Inflation of industrial goods and services
%, YoY



Although the inflation target is based on the IPCA[3], the BCB closely monitors services inflation due to its importance in the process of inflation convergence to targets. Services inflation differs substantially from other components because it is not directly affected by exchange rate and commodity price changes, presents greater inertia than other components, and, as it is more sensitive to the output gap, reacts significantly and with delays to the monetary policy.[4] In this context, the BCB presents in this box some key measures that have been monitored to improve the understanding of the recent evolution of consumer services inflation.

Figures 3 to 6 present various measures of services inflation, considering the 12-month change. Figure 3 shows services inflation (accounting for 35.5% of the IPCA weighting[5]) and two alternative metrics that can be understood as estimates of its core[6]: the underlying services inflation[7] (21.0% of the IPCA weighting) and

1/ Figure 1 shows the average of five different core inflation measures discussed in the box Update of the set of core inflation measures commonly considered by the BC for economic outlook analysis of the June 2020 IR.
2/ The IPCA segmentation commonly used in the IR is considered. The index is divided into administered prices and market prices, with the latter being subdivided into prices of food-at-home, industrial goods, and services. The most recent reference on this classification is the box IPCA weighting structure updates and repercussions in its classifications of the December 2019 IR. In this classification of the IPCA into four segments, administered and food prices are considered more volatile. It should be noted that these are the parts of the IPCA excluded from the core by exclusion EX-0, which may be consulted in the box mentioned in the previous footnote.
3/ Further information available at the BCB's Inflation Targets homepage.
4/ See box Updating of small-scale semi-structural models, of this IR.
5/ All the mentioned weighting refer to January 2024.
6/ The core inflation measures aim to mitigate transitory impacts on price behavior, providing a clearer view of the inflationary process. See box Update of the set of core inflation measures commonly considered by the BC for economic outlook analysis of the June 2020 IR.
7/ The terms "underlying inflation" and "core inflation" represent the same concept, defined in the previous footnote. In particular, the underlying services inflation shown in Figure 3 is the more frequently used by the BCB and was presented in the box Services sector inflation of the September 2016 IR. In summary, this measure reflects services inflation after excluding tourism (including airfare and hotels), domestic workers, tuition, and communication.

the services inflation excluding airfares[8] (34.6% of the IPCA weighting). All three measures peaked between 2022Q2 and 2022Q3 and have generally decreased since then, albeit with fluctuations. Underlying services inflation, in particular, fell below 5% in November 2023 and has since oscillated between 4.7% and 5%. In contrast, services inflation rose in late 2023 but – as shown in Figure 3 – this movement was largely due to rising airfare prices, which decreased in the subsequent months. Services inflation excluding only airfare shows a smoother decline over time. However, as shown in Figure A1 in the Appendix, this measure has been stable in recent quarters when considering seasonally adjusted quarterly variations. It is also noted that all three services inflation measures remain at a higher level than observed in 2019.

Figure 3 – Services inflation
%, YoY

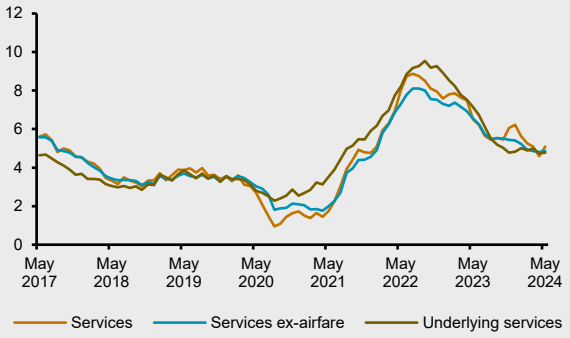


Figure 4 – Services inflation
%, YoY

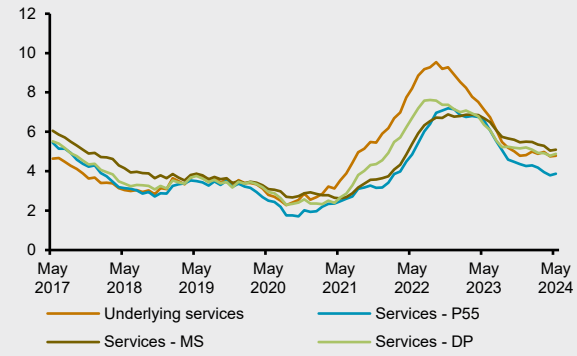


Figure 4 presents, in addition to underlying services inflation, three other core services inflation measures: double weighting core (DP), smoothed trimmed means core (MS), and Percentile 55 core (P55).[9] Despite some divergence in 2021 and 2022[10], changes in all these measures (both in 12 months and quarterly) are similar and reinforce the use of the traditional underlying inflation metric. The main conclusions obtained in Figure 3 are also observed in Figure 4, i.e., despite the disinflation observed since mid-2022, services inflation remains above the 2019 level.

Figure 5 presents – besides services inflation and services inflation excluding airfares – inflation for services more sensitive to inertia (18.3% of the IPCA weighting) and to economic slack (19.1% of the IPCA weighting), according to the methodology presented in a previous IR.[11] These last two series confirm the widespread services disinflation throughout 2022 and 2023. Considering seasonally adjusted quarterly changes (Figure A3, in the appendix), these indicators show some stability in recent quarters.

Labor-intensive services[12] (accounting for 6.1% of the IPCA) stand out in Figure 6. The increase in this group was smaller from 2021, peaking in 2023 (delayed against the other series) and the series shows slight increases more recently. When domestic workers and home-repair related services – which are not part of the underlying services inflation[13] – are excluded from labor-intensive services, the resulting series (whose items account for 2.8% of the IPCA weighting) shows a 12-month change of over 7% and has been increasing moderately for a few months. Therefore, these indicators suggest greater caution with services disinflation, which is

8/ The change in the airfare item has been quite volatile since the pandemic.
9/ The three statistical core measures (those not obtained by excluding a fixed set of items) discussed in the box Update of the set of core inflation measures commonly considered by the BC for economic outlook analysis were applied only to the IPCA services segment, rather than to the entire index. The P55 core measure minimizes, on average, the bias relative to the IPCA inflation. For this exercise, the 55th percentile was chosen as the core services inflation measure for easiness of communication and symmetry with the headline core inflation measure. However, it has not been tested yet which percentile minimizes the bias relative to services inflation.
10/ A large part of this divergence can be explained by the 50% increase in voluntary vehicle insurance from July 2021 to December 2022.
11/ See box Analysis of the services inflation considering slack and inertia of the December 2022 IR. Note that these classifications (sensitive to slack and inertia) do not include the airfare item and the same sub-item can belong to both groups.
12/ Labor-intensive services include home-repair services, physicians, dentists, physiotherapists, psychologists, seamstresses, manicurists, hairdressers, and domestic workers. See box *Segmentação da inflação de serviços* of the December 2013 IR (Portuguese only).
13/ As discussed in the box Services sector inflation of the September 2016 IR, these items are excluded from the underlying services inflation due to methodological changes in their time series.

particularly relevant in the current outlook in which the unemployment rate is at a low level by historical standards and real salaries show strong recovery. However, it is worth noting that these measures of services inflation are based on a very small share of IPCA items and are therefore more susceptible to idiosyncratic fluctuations than the other metrics discussed previously. Therefore, the box Services inflation reweighted by production factors of this IR presents a measure of services inflation that reweights its sub-items according to the weight of labor compensation in the production of each service.

Figure 5 – Services inflation
%, YoY

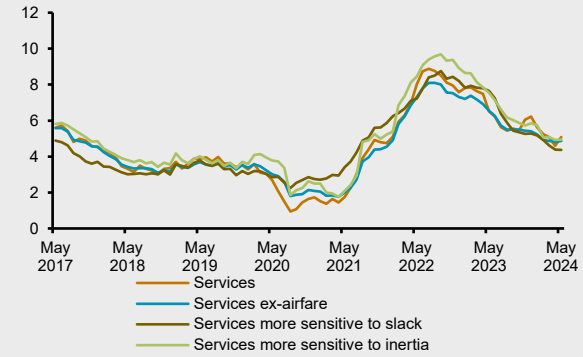
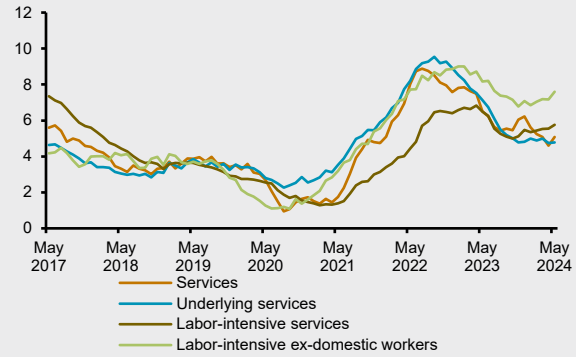


Figure 6 – Services inflation
%, YoY



Figures A1 to A4, in the appendix, present the same variables as in Figures 3 to 6 but show saar quarterly inflation from May 2022 to May 2024. Overall, these Figures show that services disinflation was stronger in the first half of the time window, while, in the last twelve months, a slower decrease or stabilization is observed. Figure 7 provides a synthetic visualization of the information in Figures A1 to A3 (thus excluding Figure A4, which contains labor-intensive services inflation). It can be viewed that annualized quarterly inflation, as well as 12-month inflation, is around 5%, a higher level than in the years immediately before the pandemic for most of the series presented here. Figure 8 illustrates this convergence between 12-month and annualized quarterly inflation using the series of services inflation excluding airfares (this series was chosen because it is less volatile than aggregated services inflation and has the highest IPCA weighting among the measures discussed in this box).

Figure 7 – Services inflation
%, QoQ saar

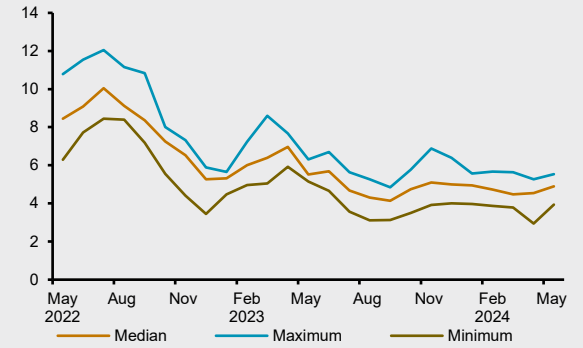
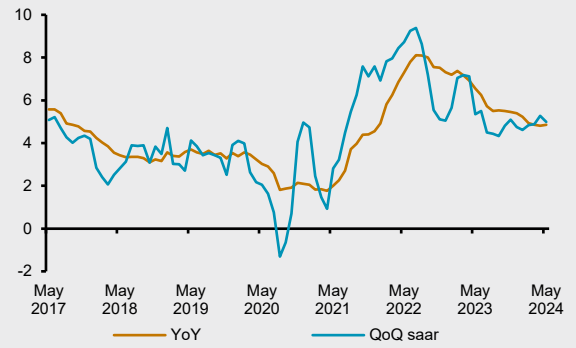


Figure 8 – Services ex-airfare
%



In summary, after analyzing various measures, the conclusion is that services inflation has decreased since its peak in 2022, but the pace of this disinflation is slowing down. This evidence supports the assessment presented in recent Copom minutes that a relevant share of services disinflation resulted from spillovers from disinflation observed in food and industrial goods, and that the strengthening of the disinflationary process, now in its second stage, will be more closely related to the labor market and aggregate demand scenario.

Figure A1 – Services inflation
%, QoQ saar

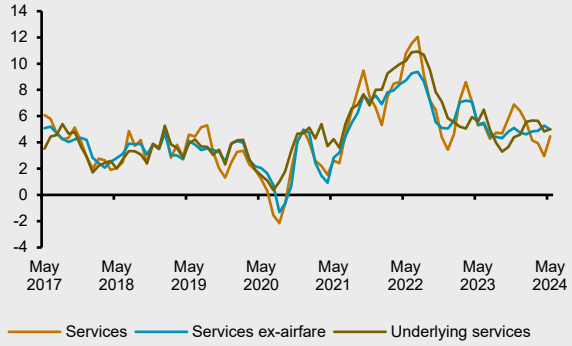


Figure A2 – Services inflation
%, QoQ saar

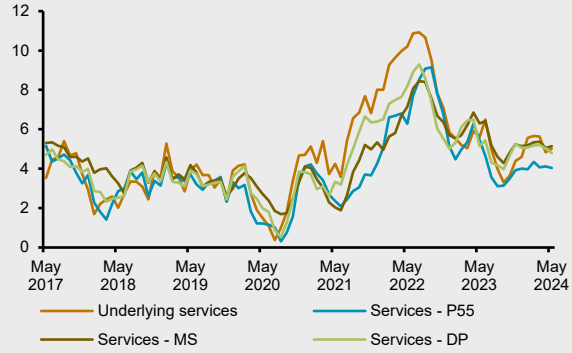


Figure A3 – Services inflation
%, QoQ saar

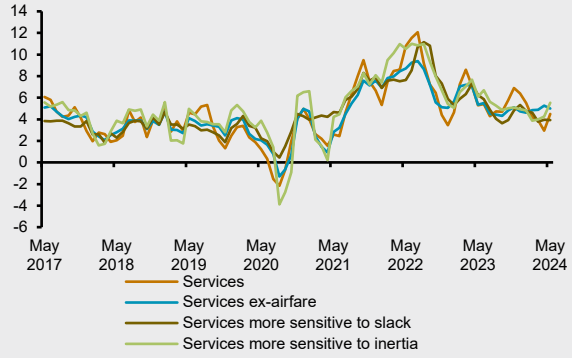
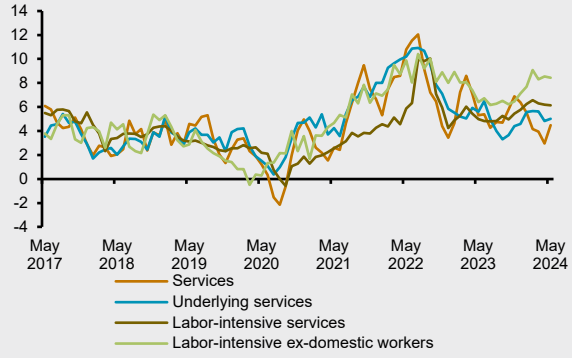


Figure A4 – Services inflation
%, QoQ saar



Services inflation reweighted by production factors

The evolution of services inflation and labor market in recent years has led to greater interest in analyzing the prices of more labor-intensive services. A measure for this component of services inflation was originally defined in a box of the December 2013 IR[1], including "items that more intensively reflect the evolution of labor costs" (Portuguese only). Although this measure has proven to be useful for an analysis of the economic outlook,[2] it has the limitation of aggregating a reduced set of the Extended National Consumer Price Index (IPCA) sub-items that account for only 6% of the index's weighting (compared with 35% for all services).

In this box, another measure for the labor-intensive component of services inflation is proposed, which incorporates a broader set of sub-items from the IPCA services basket. The methodology allows to build measures that reflect not only the intensity in the use of labor, but also the intensity in the use of capital and inputs (intermediate consumption of goods). It identifies the relevance of labor compensation, capital compensation, and the cost of inputs in the formation of prices of each sub-item of services in the IPCA and uses this information to build inflation measures that reflect the relative importance of each of these factors.

Methodology

The relevance of each factor (labor, capital, inputs) was estimated based on information from the Tables of Resources and Uses (TRU) of the National Accounts, by economic activity. For each activity and each year, the weight (relevance) of each factor was obtained as indicated below.

$$\text{Weight of labor} = \frac{\text{Labor Compensation} + \text{Gross Mixed Income}}{\text{Production value}}$$

$$\text{Weight of capital} = \frac{\text{Gross Operating Surplus}}{\text{Production value}}$$

$$\text{Weight of inputs} = \frac{\text{Intermediate consumption}}{\text{Production value}}$$

In the above equations, the production value excludes taxes and production subsidies. Thus, the weights of labor, capital, and inputs add up to 100% in each activity. The weight of inputs, in turn, is subdivided into food, goods, and other inputs, according to the classification of TRU products. This classification is shown in Table A1 in the appendix.

1/ See box *Segmentação da Inflação de Serviços*, of the December 2013 IR (Portuguese only).
2/ The box Recent dynamics of services inflation of this IR, discusses the evolution of services inflation using various measures of services inflation, including this measure of labor-intensive services.

The final weights for each activity are given by the arithmetic average of the weights obtained for that activity from 2010 to 2019. The 10-year average is used to minimize the effect of cyclical variations on the estimate, particularly in the return on capital.

After calculating the weights of each factor for each economic activity in the TRU, a correspondence was defined between these activities and the sub-items of the services IPCA.[3] Only the sub-item "airfare" was not considered, due to its volatility.[4] Each sub-item of the IPCA was typically associated with one TRU activity.[5] However, in many cases, the same activity was associated with more than one sub-item of the IPCA. The level of detail in the TRU does not allow the relative weights of each factor among the IPCA sub-items to be precisely differentiated, a limitation of the approach proposed in this box.[6,7]

Table A2 in the appendix shows the correspondence adopted in this box and indicates the weights of each productive factor for the main sub-items of the services IPCA. According to the table, the IPCA sub-item "Domestic worker", for example, is entirely associated with the labor factor, while the sub-item "Residential rent" is almost entirely associated with the capital factor.

Once the weight of each factor $f \in$ {labor, capital, IC food, IC goods, IC other} has been defined for each sub-item i of the services IPCA, the weights of the sub-items are reweighted

$$\widetilde{w}_{i,f,t} = \frac{w_{i,t} \cdot \text{weight}_{i,f}}{\sum_j \left(w_{j,t} \cdot \text{weight}_{j,f}\right)}$$

and sub-indexes of services inflation (ex-airfare) are constructed for each of the factors f:

$$\pi_{f,t} = \sum_i \widetilde{w}_{i,f,t} \cdot \pi_{i,t}$$

In the equations above, $\pi_{f,t}$ is the services inflation sub-index reweighted by the relevance of factor f, $\pi_{i,t}$ is the monthly variation of sub-item i of the IPCA, $w_{i,t}$ is the original weight of sub-item i and $\text{weight}_{i,f}$ is the relevance of factor f in sub-item i, according to the methodology defined above.

The sub-index reweighted by the labor factor assigns greater weight to sub-items such as domestic worker and education services and lower weight to sub-items such as residential rent and communication services, compared with the usual IPCA weights, as shown in table A3 in the appendix. The sub-index reweighted by intermediate consumption of food products has its weight almost entirely concentrated in the "Food-away-from-home" subgroup, as expected. In turn, the sub-index reweighted by intermediate consumption of goods attributes greater weight to vehicle insurance and vehicle repairs. Finally, the sub-index reweighted by the capital factor assigns relatively greater weight to residential rent, communication services, and banking services.

3/ In this box, the IPCA sub-items comprised in the services segment may differ from the classification historically used by the BCB. For weighting structures prior to 2020, the box uses a classification that attempts to approximate the classification used for the current structure. The subgroup "Food-away-from-home" is a relevant case. Until 2012, the subgroup was classified in the industrial goods segment, while, in this box, it is retroactively classified in the services segment. For the change in the classification of this subgroup, see box *Atualizações das estruturas de ponderação do IPCA e do INPC* of the December 2011 IR.

4/ The following analysis will focus on services inflation ex-airfare.

5/ An exception is the treatment given to the sub-item "voluntary vehicle insurance", which considered the average of two activities. Further details in the appendix.

6/ In addition to existing more sub-items in the IPCA compared with the number of TRU activities, the classifications adopted are not equivalent, which prevents a perfect mapping. For example, the TRU activity "Associative organizations and other personal services" was associated with several components of the IPCA, including "Condominium", "Repairs and maintenance" and "Hairdressing and similar" (Table A2 in the appendix).

7/ An alternative to using TRU data to identify the relative importance of the components is to use data from the Annual Services Survey (PAS), also from IBGE. This alternative offers a greater level of detail on economic activities. However, the more detailed information is restricted to the sample of formal companies with 20 or more employees, which may not represent the universe of companies, particularly in segments with the predominance of smaller companies and a higher informality level. The PAS also does not cover all services activities, such as, for example, medical services. Table A4 in the appendix compares, for some selected sub-items, weights derived from the TRU and the PAS for the labor factor. Despite differences in some sub-items, the weights derived from the PAS are similar to those obtained through the TRU.

The five sub-indexes make up a partition of services inflation ex-airfare, to the extent that the latter can be written as a weighted average of the sub-indexes. Table 1 presents the weight of each of the sub-indexes for May 2024.[8]

Table 1 – Weights in May 2024

	Weight
Services ex-airfare	34.8
Sub-indexes:	
Labor	14.6
IC - Food	2.5
IC - Goods	2.4
IC - Others	8.6
Capital	6.8

Sources: IBGE and BCB

Results

Figures 1 to 4 show the 12-month change of the sub-indexes reweighted by the factors labor, capital, intermediate consumption of food products, and intermediate consumption of goods, comparing them with the services inflation ex-airfare.[9]

Figure 1 – Labor sub-index
%, YoY

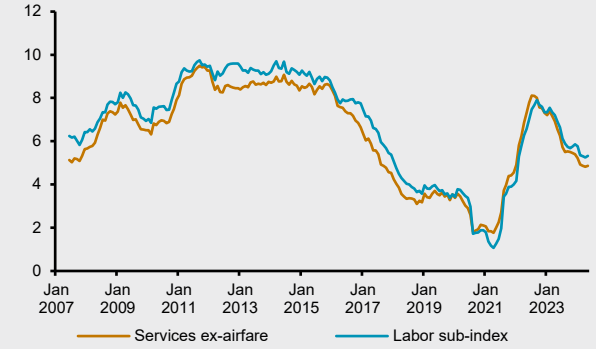


Figure 2 – IC-Food sub-index
%, YoY

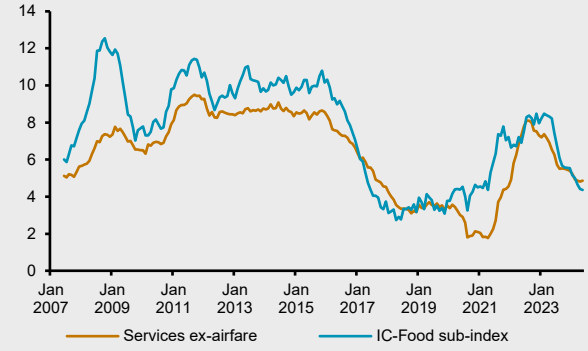


Figure 3 – IC-Goods sub-index
%, YoY

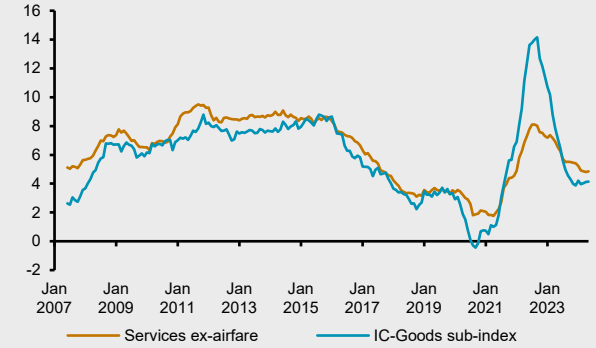
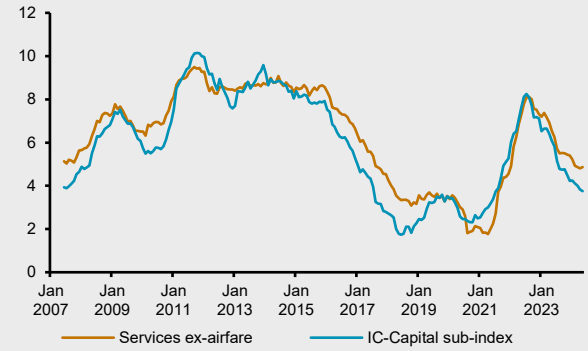


Figure 4 – IC-Capital sub-index
%, YoY



Analysis of the post-pandemic period reveals that these four components of services inflation rose until 2022 or early 2023. The rise occurred earlier in the component reweighted by food consumption and more sharply in the component reweighted by goods consumption, reflecting the pressure exerted by supply shocks and

8/ The sub-index presented in this box, compared with the labor-intensive services indicator defined in the 2013 box, has a higher weight and is the result of the weighted average of a larger number of service sub-items, which tends to reduce the measurement noise inherent in each individual sub-item.
9/ The figures relating to the sub-index reweighted by the intermediate consumption of other products are presented in the appendix (Figures A1 and A2).

logistical bottlenecks. More recently, all measures point to a disinflationary process, albeit less intense in the case of the component reweighted by the labor factor. Of the four sub-indexes, this is the only one with 12-month change exceeding that of services ex-airfare.

However, the correct interpretation of such data should take into account that components may have different long-term trends. The figures suggest that this is indeed the case. In particular, services inflation reweighted by the labor factor registered higher levels than services inflation ex-airfare from 2007 to 2019. The opposite applies to services inflation reweighted by the consumption of goods, which presented a relatively lower average level in the period. Table 2 shows the historical averages for the five services inflation sub-indexes and the recent annual variations. It is worth noting that the current difference between inflation reweighted by the labor factor and services inflation ex-airfare is similar to the difference observed from 2007 to 2019.

Table 2 – YoY inflation (%) – Services and sub-indexes

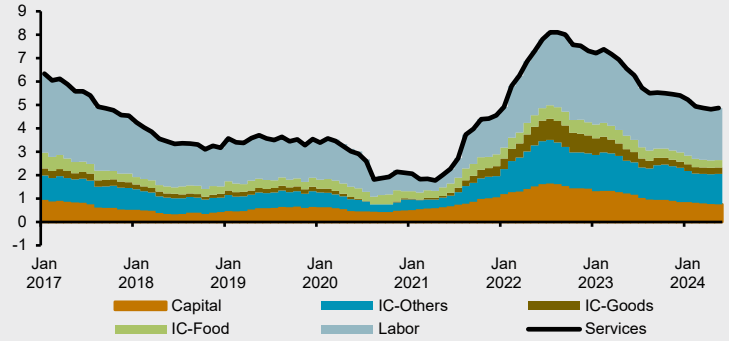
								Annual averages		
	2018	2019	2020	2021	2022	2023	2024 May	7-19	18-19	20-23
Services ex-airfare	3.2	3.5	2.1	4.6	7.3	5.4	4.9	6.8	3.4	4.8
Sub-indexes:										
Labor	3.6	3.5	1.9	4.0	7.3	5.8	5.3	7.4	3.6	4.8
IC - Food	3.2	3.8	4.5	7.2	8.0	5.5	4.4	8.0	3.5	6.3
IC - Goods	2.7	3.3	0.8	6.6	11.4	3.9	4.2	6.1	3.0	5.7
IC - Others	3.2	3.5	1.8	3.7	6.1	6.0	5.3	5.7	3.3	4.4
Capital	2.3	3.5	2.5	5.3	7.1	4.2	3.8	6.3	2.9	4.8
Labor intensive[1]	3.3	2.9	1.5	3.2	6.4	5.5	5.8	8.2	3.1	4.1

Sources: IBGE and BCB

[1] Measure defined in box "*Segmentação da Inflação de Serviços*" of the December 2013 IR.

Figure 5 shows the contribution of each of the five sub-indexes to services inflation ex-airfare in twelve months. All sub-indexes contribute to the pattern of rising and then falling services inflation throughout the pandemic. The sub-index associated with the intensity of labor use is generally the one that contributes the most to services inflation, reflecting its weight.

Figure 5 – Services ex-airfare and sub-indexes
% and p.p., YoY



Figures 6 to 9 show the variation over three months, annualized and seasonally adjusted, for the four highlighted measures.[10] The quarterly variation is naturally more volatile, but it may anticipate relevant movements. In general, quarterly changes show trajectories similar to those of 12-month changes, although in some cases with some stabilization or slight increase in recent quarters. In particular, services inflation reweighted by labor shows a stronger variation than the aggregation of services ex-airfare recently (Figure 6).

10/ The seasonal adjustment in this box uses data from 2012 onwards.

Figure 6 – Labor sub-index
%, QoQ saar

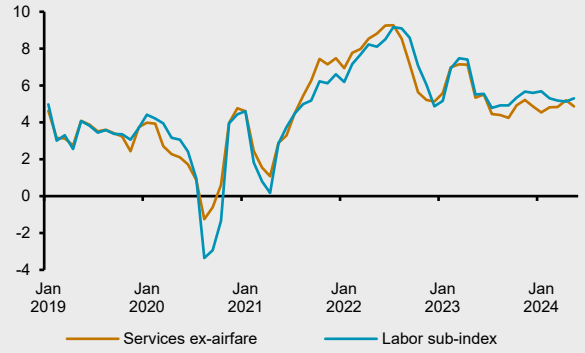


Figure 7 – IC-Food sub-index
%, QoQ saar

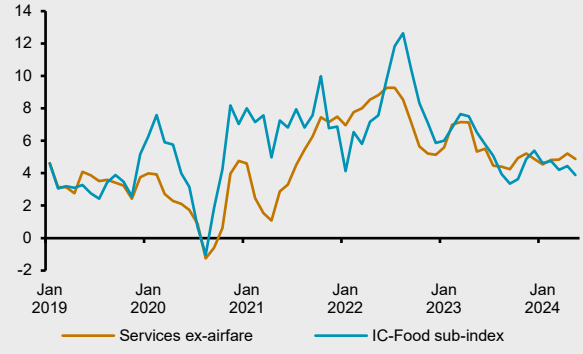


Figure 8 – IC-Goods sub-index
%, QoQ saar

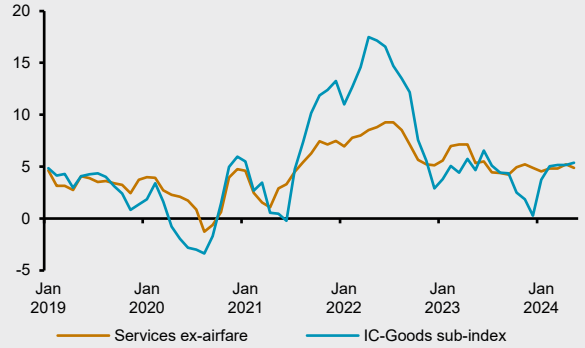
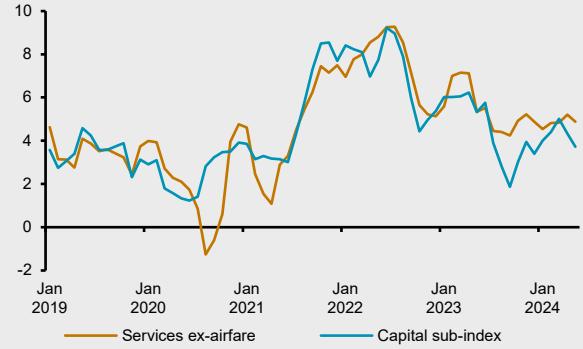
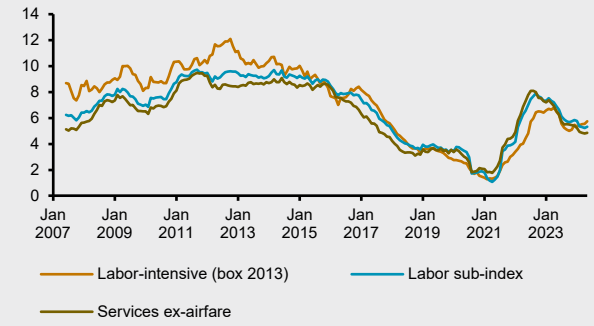


Figure 9 – Capital sub-index
%, QoQ saar



Finally, Figure 10 compares the two measures of services inflation linked to the labor factor. Considering the 12-month change, the measure presented in this box shows decline over the last few quarters, while "labor-intensive services"[11], the traditional exclusion metric, shows a moderate increase. However, it is notable that both measures are above general services inflation (ex-airfare).

Figure 10 – Services ex-airfare and labor-intensive-based indexes
%, YoY



Conclusion

This box constructs measures of services inflation that emphasize differences in the intensity of use of labor and other production factors in each sub-item of the services sector. Compared with the general services inflation ex-airfare, the measure reweighted by the intensity of labor used, as well as the previous measure of "labor-intensive services", shows higher variation in recent quarters. This trend may, to some extent, reflect the recent dynamics of the labor market. Moreover, the metrics presented in this box are part of a set of different measures of services inflation monitored by the BCB. As discussed in the box Recent dynamics of services inflation of this IR, most of these measures suggest a decrease in the pace of disinflation in this segment in recent quarters.

11/ See box *Segmentação da inflação de serviços* of the December 2013 IR (Portuguese only).

Appendix

Table A1 shows the TRU product classification adopted to divide the intermediate consumption of activities into food, goods, and other products. Some products classified in the "administered prices" segment of the IPCA, such as gasoline, were classified as "goods" for the purposes of this exercise.

Table A1 – Classification of TRU products

Code	Name	Classification	Code	Name	Classification
01911	Rice, wheat, and other cereals	Food	18001	Printing and reproduction services	Goods
01912	Corn grain	Food	19911	Aviation fuels	Goods
01913	Herbaceous cotton, other temporary crop fibers	Food	19912	Gasoline	Goods
01914	Sugarcane	Food	19913	Naphtha for petrochemicals	Goods
01915	Soybeans	Food	19914	Fuel oil	Goods
01916	Other temporary crop products and services	Food	19915	Diesel - biodiesel	Goods
01917	Orange	Food	19916	Other petroleum refining products	Goods
01918	Coffee beans	Food	19921	Ethanol and other biofuels	Goods
01919	Other permanent crop products	Food	20911	Inorganic chemical products	Goods
01921	Cattle, other animals, and similar products	Food	20912	Fertilizers	Goods
01922	Cow milk and other animal milk	Food	20913	Organic chemical products	Goods
01923	Pigs	Food	20914	Resins, elastomers, and artificial and synthetic fibers	Goods
01924	Poultry and eggs	Food	20921	Agricultural pesticides and disinfectants	Goods
02802	Fishing and aquaculture (fish, crustaceans, and mollusks)	Food	20922	Miscellaneous chemical products	Goods
10911	Beef and other meat products	Food	20923	Paints, varnishes, enamels, and lacquers	Goods
10912	Pork	Food	20931	Perfumery, soaps, and cleaning products	Goods
10913	Poultry meat	Food	21001	Pharmaceutical products	Goods
10914	Processed fish	Food	22001	Rubber articles	Goods
10915	Refrigerated, sterilized, and pasteurized milk	Food	22002	Plastic articles	Goods
10916	Other dairy products	Food	23001	Cement	Goods
10921	Sugar	Food	23002	Cement articles, gypsum, and similar products	Goods
10931	Canned fruits and similar products, juices	Food	23003	Glass, ceramics, and other non-metallic mineral products	Goods
10932	Vegetable and animal oils and fats	Food	24911	Pig iron and ferroalloys	Goods
10933	Processed coffee	Food	24912	Semi-finished, flat-rolled and long steel products and pipes	Goods
10934	Processed rice and rice products	Food	24921	Non-ferrous metal products	Goods
10935	Wheat, cassava, or corn products	Food	24922	Cast steel and non-ferrous metal parts	Goods
10937	Other food products	Food	25001	Metal products, excluding machinery and equipment	Goods
11001	Beverages	Food	26001	Electronic components	Goods
02801	Forestry and logging products	Goods	26002	Office machinery and computing equipment	Goods
05801	Mineral coal	Goods	26003	Electronic materials and communication equipment	Goods
05802	Non-metallic minerals	Goods	26004	Measurement, testing, control, optical, and electro-medical equipment	Goods
06801	Petroleum, natural gas, and support services	Goods	27001	Electrical machinery, apparatus, and materials	Goods
07911	Iron ore	Goods	27002	Household appliances	Goods
07921	Non-ferrous metallic minerals	Goods	28001	Tractors and other agricultural machinery	Goods
10936	Balanced animal feed	Goods	28002	Machinery for mineral extraction and construction	Goods
12001	Tobacco products	Goods	28003	Other mechanical machinery and equipment	Goods
13001	Processed textile fibers	Goods	29911	Cars, pickups, and utility vehicles	Goods
13002	Fabrics	Goods	29912	Trucks and buses, including cabins, bodies, and trailers	Goods
13003	Household and other textile articles	Goods	29921	Parts and accessories for motor vehicles	Goods
14001	Clothing and accessories	Goods	30001	Aircraft, boats, and other transport equipment	Goods
15001	Shoes and leather products	Goods	31801	Furniture	Goods
16001	Wood products, excluding furniture	Goods	31802	Miscellaneous industrial products	Goods
17001	Cellulose	Goods	33001	Maintenance, repair, and installation of machinery and equipment	Goods
17002	Paper, cardboard, packaging, and paper products	Goods			

Table A2 shows the correspondence between IPCA sub-items and TRU economic activities. It also indicates the weights of the factors (labor, capital, IC food, IC goods, IC other products) for each sub-item. In this table, the weights in each row add up to 100%. As indicated in the main text, in several cases more than one IPCA sub-item is associated with the same TRU activity. This is the case of, for example, the sub-items of the group "Repairs and maintenance" and the sub-group "Hairdressing and similar services", all associated with the TRU activity "Associative organizations and other personal services".

Table A2 – Decomposition by subitem (selected)

IPCA service subitems	Associated TRU activity	Labor	IC - Food	IC - Goods	IC - Others	Capital
Food-away-from-home	Food services	37%	39%	4%	9%	11%
Residential rent	Real estate activities	2%	0%	2%	7%	90%
Condominium	Assoc. org. and other personal services	44%	1%	10%	40%	5%
Home-repair labor	Domestic services	100%	0%	0%	0%	0%
Repairs and maintenance	Assoc. org. and other personal services	44%	1%	10%	40%	5%
School transport	Land transport	30%	0%	33%	23%	13%
App transport	Land transport	30%	0%	33%	23%	13%
Voluntary vehicle insurance	Vehicle manufacturing, trade and repair*	27%	0%	44%	19%	10%
Car repair	Vehicle trade and repair	42%	0%	23%	19%	16%
Medical and dental services	Private health	45%	1%	19%	22%	12%
Lab and hospital services	Private health	45%	1%	19%	22%	12%
Hairdressers and similar services	Assoc. org. and other personal services	44%	1%	10%	40%	5%
Domestic worker	Domestic services	100%	0%	0%	0%	0%
Dispatcher	Assoc. org. and other personal services	44%	1%	10%	40%	5%
Banking service	Financial intermediation, insurance	26%	0%	2%	35%	38%
Animal treatment (clinic)	Private health	45%	1%	19%	22%	12%
Hotels and similar services	Hotels and similar services	43%	11%	7%	28%	11%
Tourism package	Hotels and similar services	43%	11%	7%	28%	11%
Animal hygiene service	Assoc. org. and other personal services	44%	1%	10%	40%	5%
Cinema, theater, and concerts	TV, radio, cinema and the like	28%	0%	6%	53%	13%
Education services	Private education	67%	1%	1%	30%	1%
Physical activities	Assoc. org. and other personal services	44%	1%	10%	40%	5%
Communication services	Telecommunications	11%	0%	3%	58%	28%

* The subitem "Voluntary vehicle insurance" was associated with a simple average of the activities "Trade and repair of motor vehicles and motorcycles" and "Manufacturing of automobiles, trucks and buses, except parts".

The sub-item "Voluntary vehicle insurance" was associated with an arithmetic average of the activities "Repairs and maintenance" and "Manufacturing of automobiles, trucks and buses, except parts". This option is justified because the weight structure of the activity "Financial intermediation, insurance" does not seem to correspond to the price formation of vehicles insurance – more dependent on claim costs – which, in turn, are more associated with the price of vehicle repairs and new and used vehicles. The average between "Repairs and maintenance" and "Manufacturing of cars, trucks and buses, except parts" was adopted since, in the National Accounts, the activity "Repairs and maintenance" does not account for the new or used vehicles received for resale as intermediate consumption.

Table A3 presents the weight of the main IPCA-Services sub-items in each of the different services inflation metrics analyzed in this box. The sub-item "Domestic Worker", for example, has a weight of 7.9% in services inflation (ex-airfare), but more than doubles its weight in labor-intensive services inflation (18.8%), and has zero weight in the other reweighted metrics.

Figures A1 and A2 refer to the 12-month change and the seasonally adjusted and annualized quarterly change of the inflation indicator for services intensive in intermediate consumption of other products (excluding food and goods), which were not presented in the main text. Compared with the usual aggregation of services,

this measure assigns higher weight to items in the group of communication services, banking services, and others. The figures show the general pattern of acceleration and disinflation during the pandemic and, more recently, stronger changes than in the usual measure of services inflation.

Table A3 – Weights by services sub-indexes

IC - Goods	Services ex-airfare	Labor	IC - Food	IC - Goods	IC - Others	Capital
Food-away-from-home	16.8%	14.9%	91.9%	10.5%	6.0%	9.5%
Residential rent	10.5%	0.5%	0.0%	2.5%	2.8%	48.1%
Condominium	6.4%	6.8%	0.5%	9.4%	10.5%	1.6%
Home-repair labor	1.7%	4.1%	0.0%	0.0%	0.0%	0.0%
Repairs and maintenance	1.0%	1.0%	0.1%	1.4%	1.6%	0.2%
School transport	0.4%	0.3%	0.0%	1.8%	0.4%	0.2%
App transport	0.6%	0.4%	0.0%	3.0%	0.6%	0.4%
Voluntary vehicle insurance	2.3%	1.5%	0.0%	15.1%	1.8%	1.1%
Car repair	5.0%	4.9%	0.0%	16.5%	3.8%	4.1%
Medical and dental services	3.3%	3.6%	0.5%	9.2%	3.0%	2.0%
Lab and hospital services	1.7%	1.8%	0.3%	4.7%	1.5%	1.1%
Hairdressers and similar services	4.7%	5.0%	0.3%	7.0%	7.7%	1.2%
Domestic worker	7.9%	18.8%	0.0%	0.0%	0.0%	0.0%
Dispatcher	0.3%	0.3%	0.0%	0.4%	0.4%	0.1%
Banking service	4.9%	3.0%	0.0%	1.1%	6.8%	9.4%
Animal treatment (clinic)	0.8%	0.9%	0.1%	2.2%	0.7%	0.5%
Hotels and similar services	1.7%	1.8%	2.6%	1.8%	2.0%	1.0%
Tourism package	1.5%	1.5%	2.2%	1.6%	1.7%	0.8%
Animal hygiene service	0.4%	0.4%	0.0%	0.6%	0.7%	0.1%
Cinema, theater, and concerts	1.5%	1.0%	0.0%	1.4%	3.1%	1.0%
Education services	14.3%	23.0%	1.2%	3.1%	17.1%	0.8%
Physical activities	1.1%	1.2%	0.1%	1.6%	1.8%	0.3%
Communication services	10.7%	2.9%	0.0%	4.1%	25.2%	15.4%
Other services subitems	0.6%	0.5%	0.0%	0.8%	0.7%	1.1%
Total in column	100%	100%	100%	100%	100%	100%

Weights refer to May 2024.

Figure A1 – IC-Others sub-index
%, YoY

Figure A2 – IC-Others sub-index
%, QoQ saar

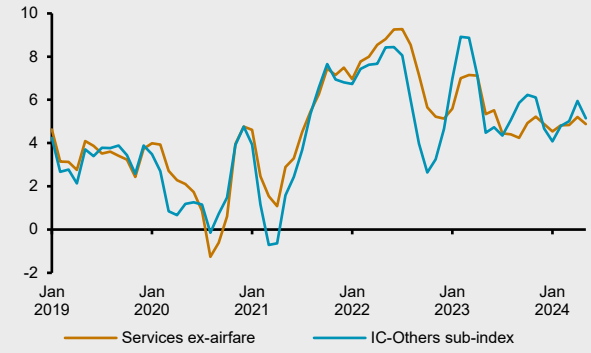


Table A4 compares weights calculated from the TRU for the labor factor – according to the methodology in this box – with weights derived from the PAS 2019 for selected IPCA itens.

Table A4 – Weight of labor remuneration in revenue - TRU vs PAS

Selected IPCA service components	Associated activity in PAS	TRU 2010 - 1029	PAS 2019
Food-away-from-home	Restaurants and similar	37%	28%
Condominium	Services for buildings	44%	73%
Repairs and maintenance	Maintenance of personal objects	44%	44%
School transport	Taxi and school transport	30%	34%
Car repair	Vehicle maintenance	42%	36%
Hairdressers and similar services	Hairdressers and similar services	44%	44%
Hotels and similar services	Hotels, motels, and inns	43%	35%
Cinema, theater, and concerts	Cinematographic exhibition	28%	16%
Education services	Continued education activities	67%	49%
Communication services	Telecommunications	11%	10%

For PAS, the weights represent the ratio between total personnel expenses and net operating revenue.

2 Inflation outlook

This chapter analyzes the inflation outlook until 2026. The projections presented use information available up to the 263rd Copom meeting, held on June 18-19, 2024. Therefore, they cover all the calendar years with inflation targets set by the CMN up to the time of this meeting. As for the conditioning assumptions used in the projections, especially those from the Focus survey, the cut-off date is June 14, 2024, unless otherwise stated.

These projections represent the Copom's view and are conditioned on a set of variables. Projections are generated using a set of models and available information, combined with judgement.[35] The scenarios presented in this chapter use as conditioning assumptions the trajectories of the Selic rate from the BCB's Focus survey and the exchange rate based on the purchasing power parity (PPP) theory.[36] The projections depend not only on assumptions about interest and exchange rates, but also on a set of assumptions about the behavior of other exogenous variables. Projections are presented together with probability intervals that highlight the degree of uncertainty involved.

2.1 Revisions and short-term projections

Consumer inflation in the Mar-May quarter was modestly higher than expected, given the surprise with food prices. The quarterly inflation was 0.14 p.p. higher than expected (Table 2.1.1).[37] The upside surprise in the quarter was mainly due to the food-at-home segment, with higher-than-expected increases in fresh food, poultry and eggs, and beverages. Administered prices were in line with projections, with the higher change in the price of gasoline being offset by a benign surprise in electricity and pharmaceutical goods. Services inflation was also in line with expectations, as well as its underlying component. Industrial goods inflation was otherwise lower than projected and widespread across their components, except ethanol. In addition to the quarterly surprise, the inflation projected for June was revised from 0.15% in the previous IR to 0.33% in this IR, also reflecting food prices.[38]

Table 2.1.1 – IPCA – Inflation surprise

% change

	2024				
	Mar	Apr	May	Quarterly up to May	12-month up to May
Copom scenario[1/]	0.24	0.35	0.27	0.86	3.78
Actual IPCA	0.16	0.38	0.46	1.00	3.93
Surprise	-0.08	0.03	0.19	0.14	0.14

Sources: IBGE and BCB

1/ Scenario at the March 2024 Inflation Report cut-off date.

35/ See box BCB'S analysis and projection system, of the March 2023 IR.
36/ Further details in the box Exchange rate path in BCB projections and the purchasing power parity, of the September 2020 IR.
37/ Inflation released in the Mar-May quarter was above market analysts' expectations by a higher margin than the Copom's projection. The median inflation accumulated in March, April, and May projected by Focus participants on March 15, 2024, was 0.78%.
38/ Analysts' median expectation for June is also higher than at the cut-off date of the previous IR. The Focus median inflation projection for June on March 15, 2024 (0.19%) increased to 0.31% at the cut-off date of this IR. The revision was mostly observed in the food-at-home segment, in which the Focus median rose from -0.27% to 0.80%.

Monthly inflation is expected to decline in the next months, with some contribution from the favorable seasonality of the period, but 12-month inflation will not decrease (Table 2.1.2). Regarding the composition of expected inflation, food prices – which grew sharply in the Mar-May quarter – are expected to show lower changes in the next months. Nevertheless, this segment should present a less benign change than typical for this period, due to the impact of floods in Rio Grande do Sul and drought in the Southeast and Central-West regions. The lower change of administered prices will reflect the end of the effects associated with the April's adjustment of maximum prices of medicines, the lower changes expected for electricity[39] [40], and the prospect of stability in gasoline prices, after increases observed in the previous quarters. Industrial goods prices are expected to maintain relatively low changes, in line with the recent and still well-behaved trajectory of producer prices. Services prices, in turn, are expected to register higher increases, with the end of strong airfare reductions, and its underlying inflation should remain under pressure. This short-term scenario is consistent with core inflation measures above the inflation target but within the tolerance interval.[41]

Table 2.1.2 – IPCA – Short-term projection[1/]

% change

	2024			
	Jun	Jul	Aug	Sep
Monthly change	0.33	0.12	0.07	0.21
Quarterly change	1.17	0.91	0.52	0.40
12-month change	4.35	4.35	4.19	4.13

Sources: IBGE and BCB

1/ Copom's reference scenario at cut-off date.

2.2 Conditional projections

Inflation determinants and conditioning assumptions

The Selic rate trajectory considered in the reference scenario, extracted from the Focus survey, has increased throughout the entire horizon since the previous IR. The Selic rate starts from 10.50% p.a., set in the 262nd Copom meeting (May 7-8, 2024), and follows the median expected trajectory extracted from the Focus survey of June 14, 2024. In this trajectory, the Selic rate starts to decline in the first meeting of 2025, closing the year at 9.50%. In the third meeting of 2026, the Selic reaches 9.00% and remains at this level throughout the entire horizon until 2027 (Figure 2.2.1)[42]. Throughout the entire horizon, the Selic rate remains above that of the previous IR, which showed 9.00% for the end of 2024 and 8.50% for the end of the subsequent three years. The increase of the Focus interest rate expectations is possibly related to higher inflation expectations and its upside risks, the higher neutral interest rate assessed by analysts and, in shorter terms, also to the monetary policy communication.[43]

Focus survey inflation expectations increased, even for longer terms, amplifying expectations of deanchoring. When compared with the previous IR, the median expectation rose from 3.79% to 3.96% for

39/ Projections presented in Table 2.1.2 do not consider the possible effect of the Itaipu Bonus on electricity rates. The refund to consumers of values defined by the Aneel Dispatch 1,405/2024 may imply relevant volatility to the short-term monthly inflation rate (decline in July, fully reversion in August). However, the impact on inflation tends to be neutral in the quarter and in the year. This effect was not incorporated into projections since the values allocated to each distributor had not been defined by Aneel by the cut-off date of this IR. Moreover, there is uncertainty as to whether the funds (or part of it) will be used to compensate the victims of floods in Rio Grande do Sul.

40/ The projection considers the green flag for electricity rates, although the risk of a more expensive flag has increased recently.

41/ It considers cores Ex-0, Ex3, MS, DP, and P55 discussed in the box Update of the set of core inflation measures commonly considered by the BCB for economic outlook analysis of the June 2020 IR.

42/ As described in the box Updating of small-scale semi-structural models, of this IR, the Selic rate used in the IS curve refers to the one-year-ahead Selic rate path. Therefore, the interest rate over 2026 also depends on the Selic path over 2027. It is worth noting that the construction of the Selic rate path in this scenario includes interpolation for the months in which the survey does not collect the respective data, using as reference the values of each year's end.

43/ See, for instance, the PCQ of June 2024.

2024; from 3.52% to 3.80% for 2025; and from 3.50% to 3.60% for 2026, remaining stable at 3.50% for 2027. Therefore, the difference from the 3.00% target set for 2024, 2025, and 2026 has increased. Copom lists the main factors underlying this recent deanchoring: (i) the worsened external scenario; (ii) the recent fiscal policy announcements; and (iii) economic agents' perception about the monetary authority commitment to meeting the target over the years.[44]

The *ex-ante* real Selic rate increased, reflecting the growth of nominal interest rate expectations at a higher magnitude than the increase of inflation expectations. The four-quarter-ahead Selic rate discounted from inflation expectations for the same period, both extracted from the Focus survey and measured in terms of quarterly averages, increased throughout the entire horizon when compared with the previous IR (Figure 2.2.2). The real *ex-ante* interest rate peaked at 7.8% in 2022Q4 and then started to decline, reaching 5.7% in 2024Q1. While in the previous IR the real Selic rate was declining, in this IR it rises to 6.1% and 6.4% in 2024Q2 and 2024Q3, respectively, and then resumes a downward path. In this trajectory, the real interest rate reaches 6.0%, 5.4%, and 5.3% in 2024Q4, 2025Q4, and 2026Q4, respectively, above the values of the previous IR, of 5.0%, 4.8%, and 4.8%, respectively.

Figure 2.2.1 – Selic rate target assumption for projections – Focus survey expectations
Quarterly averages
% p.a.

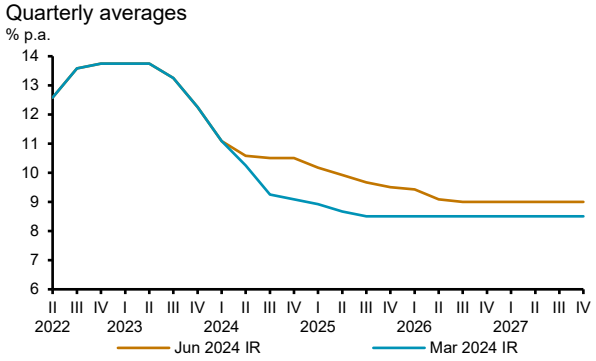
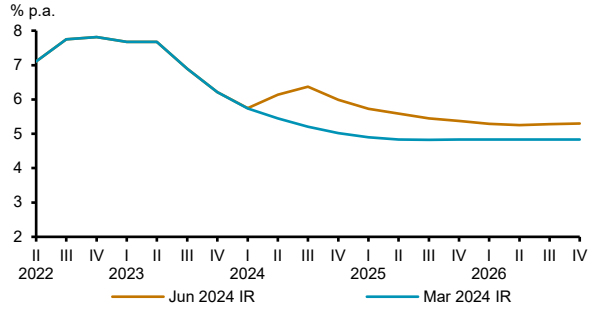


Figure 2.2.2 – Four-quarter-ahead real Selic
Quarterly averages
% p.a.



Note: Real Selic calculated as the four-quarter-ahead Selic rate, discounted from inflation expectations for the same period, both variables extracted from the Focus survey.

The exchange rate depreciated, reflecting external pressures associated with expectations about the U.S. monetary policy as well as domestic pressures. Inflation projections in the reference scenario are based on the exchange rate that starts at USD/BRL 5.30[45], 7.1% higher than the USD/BRL 4.95 assumed in the March 2024 IR, and follows a path according to the PPP[46] (Figure 2.2.3). Averages for the last quarters of 2024, 2025, and 2026 are USD/BRL 5.32, USD/BRL 5.37, and USD/BRL 5.43, respectively.

The quarterly trajectory expected for the oil price is slightly lower than that in the previous IR. Oil price has oscillated since the previous IR. It grew in the second half of March and early April, fell until early June, and rose in the subsequent period. Projections are based on a value around the average prices effective over the period of ten working days ending on the last day of the week prior to the Copom meeting. The assumption is that Brent-type oil prices follow approximately the futures market curve for the following six months and then start increasing 2% p.a. In this trajectory, oil price reaches USD 78 in 2025Q1, nearly 3% lower than considered in the previous IR (Figure 2.2.4). Commodity prices, measured by the IC-Br in USD, increased since the previous IR, driven by metal commodities.[47]

The neutral real interest rate assumed in projections rose to 4.75%. This IR contains a box with the updating of several neutral interest rate measures monitored by Copom.[48] As it is an unobservable variable subject to high uncertainty in its estimation, it is recommended to rely on several methodologies. Based on this set

44/ See the Minutes of the 262nd Copom Meeting (May 7-8, 2024).
45/ Value obtained according to the procedure, which began to be adopted in the 258th Copom meeting, of rounding the average USD/BRL exchange rate effective over the ten working days ending on the last day of the week prior to the Copom meeting.
46/ For the easiness in the construction of projections and the simplicity of communication, the assumed inflation differential is the difference between the Brazilian inflation target, of 3% p.a., and the long-term external inflation, 2% p.a., in line with the inflation target of most developed countries.
47/ See Section 1.2 of this IR.
48/ Box Update of neutral real interest rate measures in Brazil of this IR.

of measures, Copom decided to raise the neutral real interest rate assumed in the projections from 4.5% to 4.75% throughout the analyzed horizon.

Figure 2.2.3 – Exchange rate assumption for projections – PPP trajectory
Quarterly averages

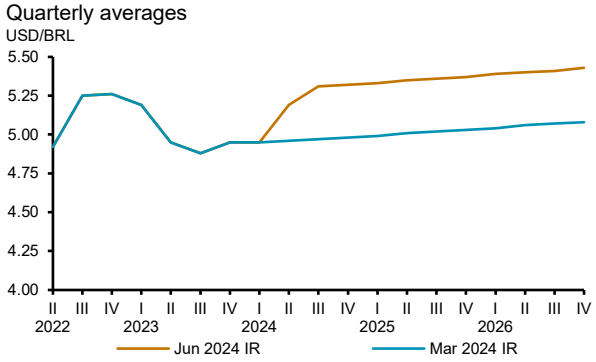
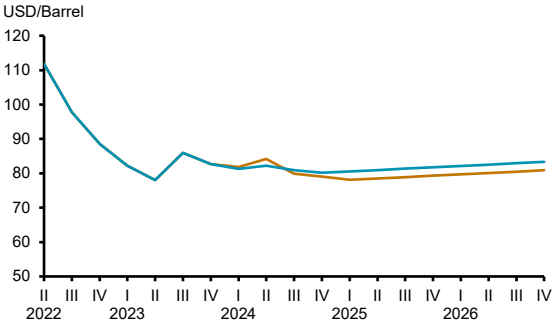


Figure 2.2.4 – Brent-type oil price
Quarterly averages



Sources: Bloomberg and BCB

The fiscal balance is assumed to improve over time. The variable used in the projections is the 12-month central government primary balance corrected by outliers and adjusted to the business cycle. This variable, after closing 2023 with a substantial deficit, partially due to the incorporation of delayed court-ordered payments (*precatórios*), is expected to recover partially over time. It should be emphasized that projections evaluated by Copom depend on assessments about the evolution of fiscal and quasi-fiscal policies and their institutional framework, reforms, and necessary adjustments in the economy. Their effects on projections are captured through asset prices, expectations from the Focus survey, and its effect on the economy's structural interest rate. Besides these channels, fiscal policy influences conditional inflation projections by effects in the aggregate demand.

Projections consider climate-related supply factors, such as the floods in Rio Grande do Sul and the *La Niña* phenomenon. The assessment about the economic consequences of the tragedy in Rio Grande do Sul is also incorporated into projections.[49] The scenarios also consider the occurrence of the *La Niña* phenomenon as of the second half of the year. In terms of electricity flag rates, the green flag is assumed for December of years 2024, 2025, and 2026.

The estimated output gap was revised upward, mainly reflecting the significant economic activity surprises. The output gap is an unobservable variable subject to high uncertainty in its estimation, being recommended to rely on several methodologies. The starting point are the estimates provided by several small-scale semi-structural models that are complemented with information from other methodologies. Therefore, the output gap presented in this chapter incorporates information from different methodologies and Copom's judgment. This IR includes, in particular, the box "Output gap measures in Brazil", which presents several of these methodologies and estimates. Among the economic activity variables used, the GDP, the Level of Capacity Utilization (Nuci), calculated by the Getulio Vargas Foundation (FGV), the unemployment rate (measured by the Brazilian Institute of Geography and Statistics – IBGE), and the stock of formal jobs (measured by New Caged of the Ministry of Labor and Employment – MLE) stand out.[50] These variables surprised with a stronger economic activity.

GDP and labor market data came stronger than expected. The seasonally adjusted GDP rose 0.8% QoQ in 2024Q1 exceeding expectations, with emphasis on the strong growth in household consumption, 1.5%, and in GFCF, 4.1%. The four-quarter consumption growth reached 3.2%. For 2024, the projected GDP growth rose from 1.9% to 2.3%.[51] Despite oscillating, Nuci has increased since the previous IR. The unemployment rate declined again, reaching 7.2% in the Feb-Apr quarter (seasonally adjusted), 0.4 p.p. lower than in Nov-Jan. This is the lowest rate since late 2014. The speed of decline – the highest of the time series – also stands out.

49/ See sections 1.2 and 2.1 and boxes Revision of the 2024 GDP projection and Initial impacts of the floods in the economic activity of Rio Grande do Sul, of this IR.
50/ Seasonally adjusted series are used.
51/ See box Revision of the 2024 GDP projection, of this IR.

After a quick increase due to the Covid-19 pandemic, the unemployment rate fell 7.8 p.p. in nearly three and a half years (peak of 15.0% in September 2020). Similarly, net hirings measured by the New Caged, which were already at significant levels, increased.

The labor market spider chart also reveals a heating up. This measure considers historical information from several labor market indicators until April 2024 (Figure 2.2.5).[52] Most variables are in the top two quartiles, i.e., they are above the historical median. It is notable the historical peak reached by the indicator of quits in the formal labor market, measured by the New Caged. Similarly, the ratio of salaries on hirings to those on layoffs is in the top quartile. In the comparison with previous twelve and three months, most of the series indicated a heating up, especially the rate and the level of unemployment. Despite a slowdown of real annual salaries growth, this metric remains in the top quartile of the distribution (among the 25% highest values of the time series). Furthermore, measures of lower pressure on the labor market, such as the Leading Indicator of Employment (LIEmp), calculated by the FGV (based on the expectations of consumers and entrepreneurs), and the participation rate (individuals in the labor force in relation to the working age population, measured by the IBGE), are heating up.

The output gap is deemed to have changed from slightly negative values to around neutrality. The output gap is estimated at around 0.1% and 0.0% for 2024Q1 and 2024Q2[53] (Figure 2.2.6), higher than the values used in the previous IR, of -0.6% for both quarters. The projected output gap for 2024Q4 is -0.4%, therefore higher than projected in the previous IR, -0.6%. Tighter monetary conditions result in a greater output gap widening than in the previous IR, with relevant impacts on inflation projections. It is noteworthy that, due to high uncertainties involving output gap estimates, Copom evaluates projections with different estimates and scenarios for this variable.

Figure 2.2.5 – Job Market

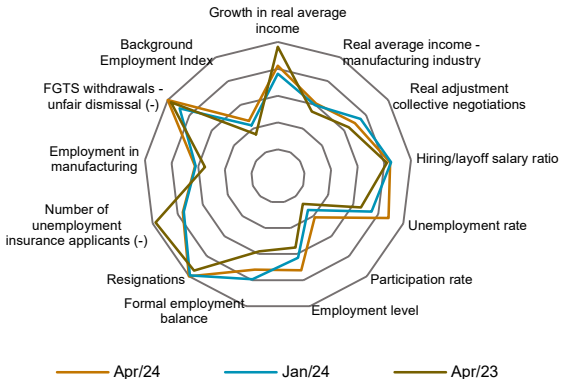
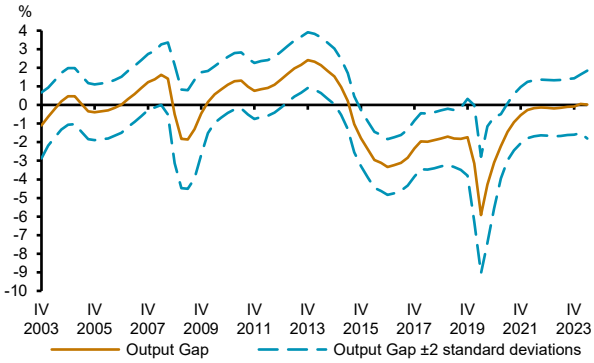


Figure 2.2.6 – Output gap estimates



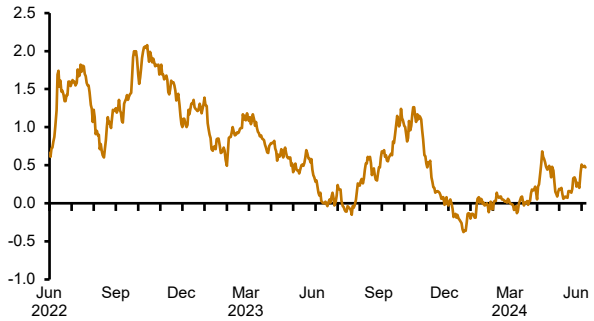
Note: Figure data: 2003Q4–2024Q2.

Financial conditions tightened, mainly driven by domestic factors, especially the strong BRL depreciation and the sharp increase of future domestic interest rates. Financial conditions tightened in April, loosened in May, but tightened again in June (data until June 14, 2024), as measured by the Financial Conditions Index (FCI), calculated by the BCB (Figure 2.2.7 and 2.2.8).[54] April and June's values were the tightest since October 2023, despite a Selic rate fall of 2.25 p.p. in this period. The tightening of financial conditions was driven by the BRL depreciation, at a significantly higher magnitude than in other emerging economies, and by the increase of domestic future interest rates, coupled by the increased country-risk premium, decline of domestic stock exchange, and higher future interest rates in developed countries. Oil price decline, higher agricultural and metal commodity prices, and increase of external stock exchanges contributed in the opposite direction. It should be emphasized that the FCI reflects a series of elements and should not be interpreted as an indicator of monetary stimulus or tightening. Moreover, the relationship of this indicator with inflation is ambiguous

52/ See box Labor market on the radar of the September 2022 IR.
53/ Projections of these activity variables were used for 2024Q2 when data were not available.
54/ By construction, the FCI is a dimensionless measure, with a zero mean and unit variance in the sample considered since January 2006. For a description of the methodology used in the FCI calculation, see box Financial Conditions Indicator of the March 2020 IR. For the FCI decomposition into domestic and external factors, see box Decomposition of the Financial Conditions Index into domestic and external factors of the December 2022 IR.

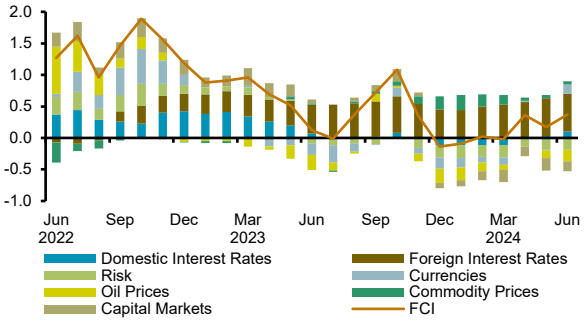
because some of its components, such as those related to the risk premium and the exchange rate, are in general related positively to inflation and negatively to activity. Therefore, tighter financial conditions indicate lower economic activity growth ahead but may imply either higher or lower inflation, depending on the factors affecting their movement.

Figure 2.2.7 – Financial Conditions Index
Standard deviations from the mean – daily series



Note: The higher the value of the index, the tighter the financial conditions.
Figure data: 6.1.2022–6.14.2024.

Figure 2.2.8 – Financial Conditions Index
Standard deviations from the mean and contributions



Note: The higher the value of the index, the tighter the financial conditions. Values refer to monthly averages. Jun/2024 value refers to the average until the 14th.

Inflation projections

Projections in this IR represent Copom's view and reflect a combination of analysis of recent developments, use of models and conditioning assumptions, and the assessment on the state and outlook of the economy. More specifically, projections involve the following elements: i. analysis of recent developments and experts' projections for market prices in shorter horizons and for administered prices up to a certain horizon; ii. use of macroeconomic models, satellite models, specific models for administered price items, and studies; iii. building of trajectories and assumptions for the conditioning variables; and iv. assessment on the state and outlook of the economy.[55]

In the reference scenario projection, inflation rises in 2024Q2 and then resumes a downward path, still remaining above the target. In this scenario, which uses the Selic rate of the Focus survey and the exchange rate following the PPP, four-quarter inflation, after closing 2023 at 4.6%, falls to 4.0% in 2024, 3.4% in 2025, and 3.2% em 2026, against the 3.00% target (Table 2.2.1 and Figure 2.2.9).

In the comparison with the previous IR, the inflation projection increased for 2024 and 2025. The rise for 2024 was 0.5 p.p., and, for 2025, 0.2 p.p. (Table 2.2.1). For 2024, the increase reflected higher projection for market prices, while for 2025 pressure came from both groups (Table 2.2.2). In comparison with the 262nd Copom Meeting held in May, inflation projections increased 0.2 p.p. for 2024 and 0.1 p.p. for 2025 (see the Minutes of the 262nd Meeting).

The higher projection throughout the relevant horizon was mainly due to the stronger-than-expected economic activity, which led to the increase of the estimated output gap, yet constrained by the real interest rate increase. Increased projection was also driven by higher inflation expectations, the exchange rate depreciation, the inertia associated with the increased short-term projection, and the adoption of a higher neutral interest rate. The increase of the real interest rate, in turn, was fundamental to prevent an even stronger projection increase. In the comparison with the May's Copom Meeting, the contribution came from the same factors, with the addition of the oil price decline preventing an even greater projection increase.

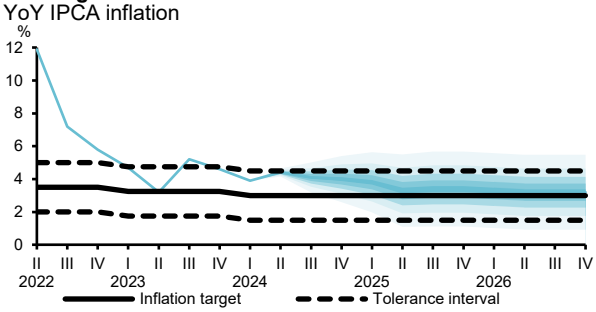
55/ See box BCB's analysis and projection system of the March 2023 IR.

Table 2.2.1 – Inflation projections – Scenario with Selic from Focus survey and PPP exchange rate
YoY IPCA inflation

%

Year	Qtr	Target	March IR	June IR	Difference (p.p.)
2024	II		4.0	4.4	0.4
2024	III		3.7	4.1	0.4
2024	IV	3.00	3.5	4.0	0.5
2025	I		3.1	3.8	0.7
2025	II		3.1	3.3	0.2
2025	III		3.1	3.4	0.3
2025	IV	3.00	3.2	3.4	0.2
2026	I		3.2	3.3	0.1
2026	II		3.2	3.2	0.0
2026	III		3.2	3.2	0.0
2026	IV	3.00	3.2	3.2	0.0

Figure 2.2.9 – Inflation projection and fan chart – Scenario with Selic from Focus survey and PPP exchange rate
YoY IPCA inflation



Note: The lines of the inflation target and the tolerance interval refer only to the calendar year, but, for better visualization, they are presented for all quarters.

Table 2.2.2 – Inflation projections of market and administered prices – Scenario with Selic from Focus survey and PPP exchange rate
YoY IPCA inflation

%

Year	IPCA		Market prices		Administered prices	
	March IR	June IR	March IR	June IR	March IR	June IR
2024	3.5	4.0	3.2	3.9	4.4	4.4
2025	3.2	3.4	3.0	3.2	3.9	4.0
2026	3.2	3.2	3.1	3.1	3.4	3.5

Note: Numbers are rounded. A simple combination of rounded disaggregated values may not coincide with aggregated values.

Given the more challenging scenario, the Committee analyzed and communicated an alternative scenario with a constant interest rate throughout the relevant horizon. In such a scenario, inflation projections stand at 4.0% and 3.1%, respectively, for 2024 and 2025. When constructing alternative scenarios, the aim is to capture the effect of the new conditioning assumption on the trajectories of other variables, even when these were originally used as conditioning assumptions in the reference scenario. Thus, variables as inflation expectations, exchange rate, and ex-ante real interest rate are also affected in such scenarios. In this particular scenario, agents anticipate the trajectory of the Selic rate for the next four quarters.[56]

The probability of inflation exceeding the upper tolerance interval, as a result of the increased projection, rose for 2024 and 2025. The estimated probability, based on the probability intervals (Table 2.2.3), grew from 19% to 28% for 2024 and from 17% to 21% for 2025 (Table 2.2.4). As inflation projections lie above the target, the probabilities of exceeding the upper limit are higher than exceeding the lower limit.

56/ In the small-scale semi-structural models, the *ex-ante* real interest rate depends on the expectations about the Selic rate and inflation over four quarters. To build the Selic rate trajectory for the next four quarters, it can be assumed that agents use the future Selic rate path consistent with the model, incorporating information from the Taylor rule, or alternatively that agents use a predetermined interest rate path to construct the *ex-ante* rate. In the latter case, if the interest rate path considered is greater than the model's endogenous path, the effect on inflation will be greater.

Table 2.2.3 – Inflation projection and probability intervals – Scenario with Selic from Focus survey and PPP exchange rate

YoY IPCA inflation

%

Year	Qtr	50%		30%		10%		
					Central			
2024	II	4.3	4.3	4.4	4.4	4.4	4.5	4.5
2024	III	3.7	3.9	4.0	4.1	4.2	4.3	4.5
2024	IV	3.4	3.7	3.9	4.0	4.1	4.3	4.6
2025	I	3.1	3.4	3.7	3.8	3.9	4.2	4.6
2025	II	2.4	2.8	3.1	3.3	3.5	3.8	4.2
2025	III	2.5	2.9	3.2	3.4	3.6	3.9	4.3
2025	IV	2.5	2.9	3.2	3.4	3.6	3.9	4.3
2026	I	2.4	2.8	3.1	3.3	3.5	3.8	4.2
2026	II	2.3	2.7	3.0	3.2	3.4	3.7	4.1
2026	III	2.3	2.7	3.0	3.2	3.4	3.7	4.1
2026	IV	2.3	2.7	3.0	3.2	3.4	3.7	4.1

Table 2.2.4 – Estimated probabilities of inflation surpassing the target tolerance interval

%

Year	Lower limit	Probability of surpassing the lower limit	Upper limit	Probability of surpassing the upper limit
2024	1.50	0	4.50	28
2025	1.50	9	4.50	21
2026	1.50	11	4.50	17

Note: Numbers rounded to the nearest integer value.

2.3 Conduct of monetary policy and balance of risks

The global environment remains adverse because of the heightened and persistent uncertainty about the easing cycle in the United States and the speed of sustained disinflation in many countries. The central banks of major economies remain committed to bringing inflation back to its targets in a context characterized by labor market pressures. The Committee judges that the environment continues to require caution from emerging market economies.

Regarding the domestic scenario, the set of indicators on economic activity and labor market continues to exhibit more strength than expected by Copom. Headline consumer inflation has been following a path of disinflation, while various measures of underlying inflation are above the inflation target in recent releases.

In its most recent meeting (263rd meeting), the Committee emphasized that risks to its scenarios remain in both directions. Among the upside risks for the inflationary scenario and inflation expectations, it should be emphasized (i) a greater persistence of global inflationary pressures; and (ii) a stronger-than-expected resilience of services inflation due to a tighter output gap. Among the downside risks, it should be noted (i) a greater-than-projected deceleration of global economic activity; and (ii) an impact on global inflation larger than expected from synchronized monetary policy tightening. The Committee judges that the domestic and international environments remain more uncertain, requiring greater caution on the conduct of monetary policy.

The Committee monitors closely how the recent developments on the fiscal side impact monetary policy and financial assets. The Committee stresses that a credible fiscal policy, committed to debt sustainability, contributes to the anchoring of inflation expectations and to the reduction in the risk premia of financial assets, therefore impacting monetary policy.

On that occasion, considering the evolution of the disinflationary process, the assessed scenarios, the balance of risks, and the broad array of available information, Copom decided to maintain the Selic rate at 10.50% p.a. and judges that this decision is consistent with the strategy for inflation convergence to a level around its target throughout the relevant horizon for monetary policy, which includes 2025. Without compromising its fundamental objective of ensuring price stability, this decision also implies smoothing economic fluctuations and fostering full employment.

The current context, characterized by a stage in which the disinflationary process tends to be slower, further deanchoring of inflation expectations, and a challenging global outlook, requires serenity and moderation in the conduct of monetary policy.

The Committee unanimously decided to interrupt the easing cycle, highlighting that the uncertain global scenario and the domestic scenario, marked by resilient economic activity, an increase in its own inflation projections and deanchored expectations, require greater caution. The Committee also stresses that monetary policy should continue being contractionary for sufficient time at a level that consolidates both the disinflation process and the anchoring of expectations around the targets. The Committee will remain vigilant and reminds, as usual, that potential future changes in the interest rate will be determined by the firm commitment of reaching the inflation target.

Output gap measures in Brazil

The output gap is a key concept for monetary policymakers, as it is a variable that seeks to capture whether the economic activity conditions are exerting an upward or downward pressure on inflation. It is the percentage difference between the real levels of effective output and potential output, the latter being defined as the economic activity level that does not generate inflationary or disinflationary pressures on the economy.

However, the potential output is an unobservable variable, so that the output gap estimation is subject to high uncertainty, with no consensus in the literature or among central banks about the best method to estimate it. Therefore, central banks usually estimate the output gap using different methodologies, a procedure that has also been adopted by the Banco Central do Brasil (BCB). This provides monetary policymakers with a better understanding about the degree of uncertainty involved in the output gap measurement. In fact, different statistical methodologies may indicate, via the estimated output gap, different states of the economy for an identical period. Furthermore, when using the same methodology, results may be reviewed should data be revised, or the sample size be changed. Information provided by the use of several methodologies, together with that coming from small-scale semi-structural models, is used by Copom to assess the output gap level. Moreover, it allows the construction of counterfactual scenarios using different output gap assessments from that used in the reference scenario, thus improving risk assessment.[1]

This box presents the output gap estimates derived from the following methodologies (for which a brief description is presented in Appendix 1)[2]:

Group I – Statistical univariate gaps

I. Quadratic trend with breaks;
II. Non-parametric trend;
III. HP (Hodrick-Prescott) trend;
IV. ℓ_1 trend;
V. Modified HP trend;
VI. Band-Pass filter – Christiano and Fitzgerald approximation;
VII. Beveridge and Nelson – Kamber et al. (2018) variant.

Group II – Multivariate gaps

I. Production function with a simple combination;
II. Production function based on the Areosa (2008) approach;
III. Production function based on the model used by the U. S. Congressional Budget Office (CBO);
IV. Estimation based on the Jarocinski and Lenza (2018) model;
V. Estimation based on principal components.

1/ For example, in the September 2022 IR, inflation projections were presented assuming a different output gap level from that used in the reference scenario.
2/ It is worth noting that, in New Keynesian structural models of general equilibrium, the potential output, typically in this framework, is the output that would prevail in a counterfactual situation with no nominal frictions and no monetary shocks and markups. Different models with different types of friction and shocks may be applied, thus making it difficult to reach a consensus on the potential output.

Statistical univariate gaps

Univariate methodologies perform the trend-cycle decomposition and generally share the assumption that trends are uncorrelated with the cycle, with the gap being the difference between the level of the observed activity variable and the trend. Seven traditional univariate methods for output gap decomposition are presented below as examples. It is noteworthy that this is a non-exhaustive set of the univariate methodologies available in the related literature.[3] The first methodology derives the trend by partial smoothing through sample plots, assuming that each part of the trend is deterministic, calculated through **quadratic trend regression with breaks**. The sample's breakpoints are determined by the statistical test of multiple structural breakpoints by Bai and Perron (2003). Thus, each additional piece of information may change substantially the trend adjustment after the last breakpoint, and may lead to changes in the previously selected breakpoints. The second methodology, "**non-parametric**", based on Cleveland (1979), derives the trend using local smoothing via locally weighted regressions, so that the trend change due to the addition of observations is local.

The third type of output gap measure is the **HP method** by Hodrick and Prescott (1997), whose trend is stochastic and smooth, obtained via Ridge regression with a smoothing parameter that is usual for quarterly data. The fourth methodology is the **ℓ_1 trend filter**, proposed by Kim et al (2009), which is a modification of the HP method, replacing the sum of squares used in this filter to penalize trend variations for a sum of absolute values (i.e., an ℓ_1 norm). The resulting trend is piecewise linear, and there is no need to specify, *a priori*, the number or location of the breakpoints. The fifth output gap estimation also introduces a **modification in the HP filter**, based on Andrle (2013), assuming that the long-term growth rate of the economy's productivity has a defined steady state.[4] The sixth output gap estimation is the **Band-Pass – "bp"**, using the approach of Christiano and Fitzgerald (2003), which typically represents frequencies between 8 and 32 quarters for the cyclical output component.

The seventh methodology introduces **a modification to the Beveridge-Nelson (BN) decomposition** carried out by Kamber et al. (2018), imposing a lower signal-to-noise ratio. The BN decomposition defines the GDP trend as the limit of conditional expectation over long forecast horizons. Following the approach of Kamber et al. (2018), an autoregressive model is used for the GDP growth rate conditional expectation, imposing long lags and restrictions on the coefficients to maximize the amplitude of the resulting gap.[5]

These methodologies are initially applied to the logarithm of the seasonally adjusted quarterly series of GDP at market prices, calculated by the Brazilian Institute of Geography and Statistics (IBGE). Figure 1A shows the estimates using a sample starting in 1996Q1 and ending in 2024Q1, the last released data.[6] There is a substantial dispersion of gap measurements, highlighting the high degree of uncertainty in the estimation of this variable. Different types of gaps may indicate different states of the economy for the same period such as, for instance, from 2010 to 2013, characterized by high GDP growth rates, immediately before the outbreak of the Covid-19 pandemic, or especially in 2024Q1, reflecting greater uncertainty at the end of the sample. This characteristic translates into an even more challenging conduct of monetary policy, since greater emphasis is given to the estimation of the current gap, as long as it not only reveals the current state of the economy but is also the starting point for projections of the output gap down the

3/ Canova (2020) emphasizes that statistical decompositions between transitory and permanent output components might not recover the gap and potential output when assuming that the data-generating process comes from canonical New-Keynesian general equilibrium models. For example, in these canonical models that are a benchmark for economic policy analysis, the gap and potential output have correlated spectral characteristics – short and long frequency oscillations over time – while the basic assumption of several statistical filters is that the trend r is uncorrelated with the cycle. These types of spectral distortions of statistical gaps in relation to gaps in canonical general equilibrium models require caution by analysts when considering a specific output gap. That also corroborates the central motivation of this box.

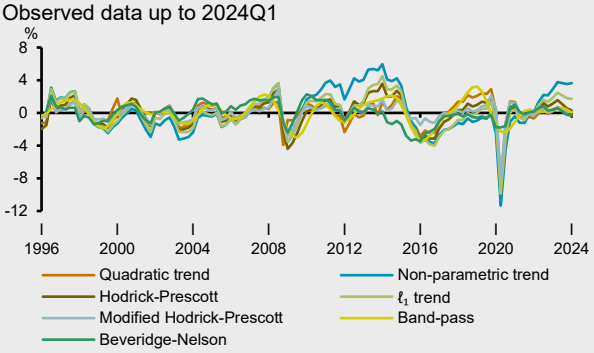
4/ This methodology is used in the Samba model. Further details in Fasolo et al. (2023). Andrle (2013) uses an AR(1) autoregressive term to characterize the cyclical component. To provide greater richness in the dynamics of the output gap, an AR(2) was introduced in the estimation for Brazil.

5/ As suggested by the authors, the average growth rate over the period is modeled as a constant. Furthermore, following Morley et al. (2023), the relative variance of shocks during the pandemic is calibrated.

6/ The selected breakpoints for the quadratic trend in this sample were 2000Q1, 2008Q4, 2013Q3, and 2020Q2. As for the ℓ_1, trend, the breakpoints were 2003Q3, 2012Q1, 2012Q4, and 2020Q3.

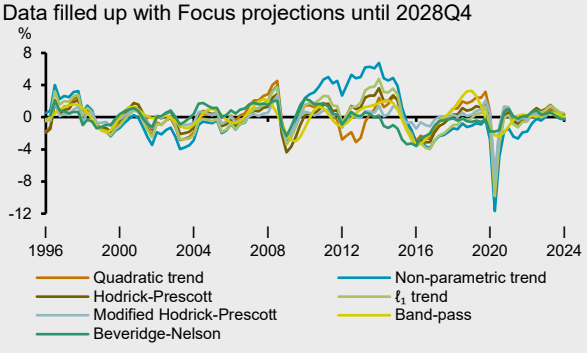
line. Conversely, despite differences observed in the output gap level, there is a high correlation among measures, i.e., all measures tend to move in the same direction.

Figure 1A – Univariate statistical output gaps
Observed data up to 2024Q1



Obs.: Data period: 1996Q1–2024Q1.

Figure 1B – Univariate statistical output gaps
Data filled up with Focus projections until 2028Q4



Obs.: Data period: 1996Q1–2024Q1.

To mitigate the end-of-sample problem, literature and experience have highlighted the benefits of extending the sample using some forecasting source before estimating the gap.[7] This reduces the usual end-of-sample problem, although results become, to some extent, dependent on the forecasts used. In this box, the GDP sample was extended to 2028Q4, using the median expectations from the Focus survey of June 14, 2024, with interpolation from 2026Q2 onwards to obtain quarterly values.[8] Results are shown in Figure 1B and a comparison for 2024Q1 is presented in Table 1. One may observe significant changes in this quarter's values in some specifications.[9]

Table 1 – Univariate statistical output gaps
Comparison between the gaps obtained for 2024Q1 using only observed data or filling up with Focus projections

%

Method	Output gap with observed data	Output gap with Focus projections	Difference (p.p.)
Quadratic trend	-0.31	-0.21	0.10
Non-parametric trend	3.67	-0.04	-3.71
Hodrick-Prescott	0.33	0.33	0.00
ℓ_1 trend	1.75	0.47	-1.27
Modified Hodrick-Prescott	0.12	-0.17	-0.30
Band-pass	0.03	0.02	-0.01
Beveridge-Nelson	-0.30	-0.28	0.02

Multivariate gaps

Multivariate gaps involve different methodologies and approaches. The output gap may result from a combination of observable variables or may be treated as an unobservable variable estimated through the

7/ Another approach is to use one-sided methodologies, whose gap estimate is not revised as the sample size increases, such as the one-sided HP-filter, the use of the YoY GDP change or of local projections. See Stock and Watson (1999) and Hamilton (2018). Of the univariate gaps presented, only the Beveridge-Nelson gap is a one-sided output gap method.
8/ For this sample, the selected breakpoints for the quadratic trend were 2012Q4 and 2020Q2. As for the ℓ_1 trend, the breakpoints were 2003Q2, 2012Q1, 2012Q4, and 2020Q3.
9/ Appendix 2 presents another exercise illustrating the end-of-sample problem, using pseudo real-time estimates.

Kalman filter. Macroeconomic relationships, particularly the Phillips curve, may be used to provide information on the output gap estimation.

The key feature of some multivariate estimates is the use of a production function that combines capital and labor through via a Cobb-Douglas technology. The main idea is to capture possible inflationary or disinflationary pressures based on estimated pressures on production factor markets. Estimates, however, may vary according to the techniques used to measure the degree of slack of production factors.

The first estimate uses a **production function** to make a linear combination of labor and capital gaps, obtained by the HP method applied to the employment rate from the quarterly IBGE'S Continuous National Household Sample Survey (PNAD Continuous) and the Level of Capacity Utilization (Nuci) from the Fundação Getulio Vargas (FGV), both seasonally adjusted.[10] The weights correspond to the estimated share of these factors in the national income.[11]

The second methodology, based on **Areosa** (2008), also combines two methods commonly used to estimate the potential output – the production function and the HP filter. Via a Cobb-Douglas production function, it is possible to express the output gap as a linear combination of two other gaps – the employment gap and the capacity utilization gap. This relationship shows that, when employment and level of capacity utilization deviate from their natural levels, the output deviates from its potential level. The methodology uses this relationship to create a filter that simultaneously estimates these three gaps by solving a single optimization problem that represents three HP filters interconnected by the constraint derived from the production function.

The third method is **based on the model used by the U. S. Congressional Budget Office** (CBO), presented in Shackleton (2018), but using aggregated data.[12] The estimation is based on the production function, whose potential levels are decomposed into three components: labor contribution, obtained by the potential employment level; capital contribution, obtained by the potential stock of capital; and the residual, which would represent the potential total factor productivity. Piecewise linear regressions are used to estimate these values, which also include terms for capturing the cyclical component. Then, to find the non-cyclical values, these terms are set to zero. Each part of the trend is built based on the cycle classification by the Brazilian Business Cycle Dating Committee (Codace). The series estimated by Souza Júnior and Cornelio (2020) was used for capital.

The following approach is an application of the model developed by **Jarocinski and Lenza** - JL (2018) (JL) for Brazil. This is a Bayesian dynamic factor model in which output gap estimates are consistent with inflation behavior. The output gap is an unobservable variable and a common factor to activity variables and inflation. Inflation is measured by the core inflation Ex-0 (a combination of services inflation and industrial goods inflation), modeled as a deviation from a trend and a function of its past values, the output gap, and imported inflation. In addition, the variance of shocks is allowed to change over time (stochastic volatility). The activity variables in this approach are the same used in the small-scale semi-structural model: GDP, IBGE's unemployment rate, stock of formal jobs measured by the New Caged of the Ministry of Labor and Employment, and Nuci calculated by the FGV.

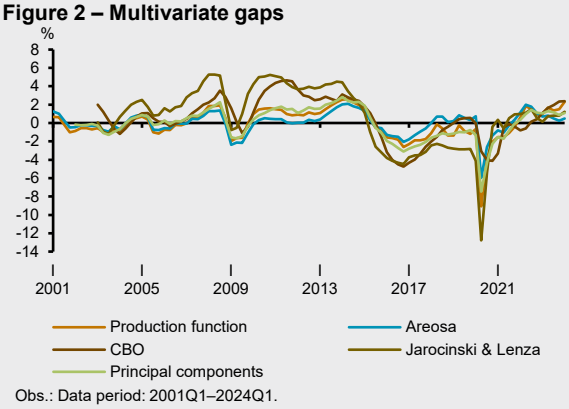
Finally, the method of **principal components** is used to obtain a common series that simultaneously explains the cyclical dynamics in economic activity and the labor market. The first estimated principal component summarizes 71.9% of the total variance of the database, which contains standardized GDP series, stock of formal jobs measured by the New Caged, Nuci calculated by the FGV, and the IBGE's employment rate, all of which have a positive correlation with market prices inflation.

10/ Further details in Alves and Correia (2013).
11/ Respective weights of 0.4 and 0.6 were used for capital and labor, obtained by estimating the average participation of these production factors in the GDP from 1999 to 2019.
12/ The U. S. Congressional Budget Office (CBO) uses disaggregated series for both labor and capital and thus manages to better capture differences arising from the heterogeneity in these factors.

Although multivariate models include more economic activity information and have theoretical references, output gaps are sensitive to specification, such as, the model's equations, the number of lags, the number and type of variables, the size of the sample, etc.[13]

Figure 2 presents output gaps estimated by multivariate methods. As in the case of univariate output gaps, there are high correlations among measures and significant level differences.

Figure 2 – Multivariate gaps

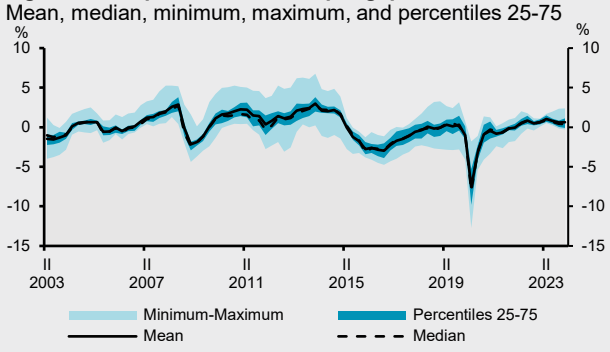


Obs.: Data period: 2001Q1–2024Q1.

Set of measures

Figure 3 shows the area covered by all univariate and multivariate output gaps and the curves with their simple average, median, the 25th and 75th percentiles, and minimum and maximum values. The amplitude of the area indicates the degree of uncertainty involved in these measurements. In the period between 2003Q2 and 2024Q1, the average difference between the most extreme measures was 4.25 p.p., and between the 25th and 75th percentiles, 1.31 p.p. Conversely, in general, the high correlation among the measures stands out (Table 2).

Figure 3 – Dispersion of the output gap measures
Mean, median, minimum, maximum, and percentiles 25-75



Obs.: Data period: 2003Q2–2024Q1.

Table 3 shows the output gap levels in 2023 and in 2024Q1 for all the discussed methodologies. Considering 2024Q1, the estimated range is between -0.28% and 2.37%, with an average of 0.63%, median of 0.40%, and 25th and 75th percentiles at -0.08% and 1.13%, respectively. Finally, the Pre-Copom Questionnaire (PCQ), sent to participants of the Market Expectations System before each Monetary Policy Committee (Copom) meeting, periodically includes a question about the participants' estimates of the output gap. In the June 2024 Copom's PCQ, the median estimate of the output gap for 2024Q1 was 0.3%, with 25th and 75th percentiles at -0.1% and 0.7%, respectively.

13/ Output gaps derived from these models are also not exempt from potential spectral distortions when using canonical general equilibrium models as a reference for the data-generating process.

Table 2 – Correlation of output gap measures
Sample 2003Q2–2024Q1

	Quadratic trend	Non-parametric trend	Hodrick-Prescott	ℓ_1 trend	Modified Hodrick-Prescott	Modified Hodrick-Prescott	Band-pass	Production function	Areosa	CBO	Beveridge-Nelson	Jarocinski & Lenza
Quadratic trend	1.00											
Non-parametric trend	0.53	1.00										
Hodrick-Prescott	0.81	0.81	1.00									
ℓ_1 trend	0.77	0.92	0.94	1.00								
Modified Hodrick-Prescott	0.85	0.65	0.91	0.82	1.00							
Band-pass	0.67	0.50	0.74	0.64	0.50	1.00						
Beveridge-Nelson	0.52	0.40	0.52	0.51	0.47	0.44	1.00					
Production function	0.60	0.85	0.83	0.89	0.70	0.52	0.42	1.00				
Areosa	0.73	0.72	0.90	0.85	0.77	0.71	0.38	0.90	1.00			
CBO	0.36	0.77	0.57	0.72	0.33	0.48	0.41	0.75	0.60	1.00		
Jarocinski & Lenza	0.48	0.83	0.69	0.80	0.56	0.40	0.68	0.85	0.65	0.78	1.00	
Principal components	0.55	0.89	0.82	0.89	0.63	0.54	0.47	0.96	0.86	0.83	0.89	1.00

Table 3 – Output gap levels from 2023Q1 to 2024Q1 by type of methodology

%

	2023				2024
	Q1	Q2	Q3	Q4	Q1
Statistical univariate gaps					
Quadratic trend	0.57	1.00	0.49	0.00	-0.21
Non-parametric trend	0.07	0.69	0.35	0.02	-0.04
Hodrick-Prescott	1.07	1.53	1.03	0.54	0.33
ℓ_1 trend	0.93	1.47	1.04	0.62	0.47
Modified Hodrick-Prescott	0.23	0.64	0.24	-0.09	-0.17
Band-pass	0.38	0.53	0.52	0.33	0.02
Beveridge-Nelson	0.41	0.63	0.22	-0.18	-0.28
Multivariate gaps					
Production Function	0.97	1.67	1.35	1.49	2.31
Areosa	0.70	0.79	0.47	0.24	0.48
CBO	1.07	1.65	1.96	2.33	2.37
Jarocinski & Lenza	0.15	0.74	0.79	0.82	1.22
Principal components	1.06	1.31	1.16	0.89	1.10
Summary					
Mean	0.63	1.06	0.80	0.58	0.63
Median	0.63	0.90	0.66	0.43	0.40
25th percentile	0.34	0.68	0.44	0.01	-0.08
75th percentile	1.00	1.49	1.07	0.84	1.13

Conclusion

This box presented a set of output gap measures, thus highlighting the high degree of uncertainty involved in the estimation of this variable. This box enhances the transparency of the BCB's decision-making processes.[14] The BCB monitors different output gap measures and has made efforts to improve the methodologies used.

14/ Regarding the analysis and projections system that supports the Copom's decision-making process, see box BCB's Analysis and Projections System of the March 2023 IR.

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Appendix 1 – Brief description of methodologies

1. Univariate gaps

a) Quadratic trend with breaks: deterministic and uncorrelated with the economic cycle $y_t = a + bt + ct^2 + \epsilon_t$; where y : observable variable; $\hat{\epsilon}_t$: cycle.

b) Non-parametric trend: smoothed by a locally weighted regression. For each t , smoothed trend y_t^S is the following weighted prediction: The subset to calculate y_t^S is made up of the indexes $t_- = \max(1, t-k)$ up to $t_+ = \min(t+k, T)$, where k =⌊(T × bwidth − 0.5)/2⌋ ; bwidth=0,4. The weights for each observation $j = t_-, \ldots, t_+$ follow the tricube:

$w_j = \left\{1 - \left(\frac{|t_j - t_i|}{\triangle}\right)^3\right\}^3$, where $\triangle$= 1,0001 $\max(t_+ - t, t - t_-)$; cycle $= y_t$ - y_t^S .

c) HP (Hodrick-Prescott) trend: stochastic and smooth – uncorrelated with the cycle: trend via Ridge estimator: $\tilde{y} = (H'H + \lambda Q'Q)^{-1} + H'y$; where: y : observable variable; $\tilde{y}$: trend; $H = (I_{t\times t} 0_{t\times 2})$; $Q_{t\times(t+2)}$; smoothing parameter (1600 – quarterly data); $y - \tilde{y}$: cycle.

d) ℓ₁ trend (Kim et al. (2009)): piecewise linear trend

ℓ₁ trend is obtained by solving the following minimization problem:

$\tilde{y} = argmin_{\mu\in\mathbb{R}^t} \left\{\sum_{i=1}^{t}(y_i - \mu_i)^2 + \lambda \sum_{i=3}^{t}|\Delta^2\mu_i|\right\}$; where: y : observable variable; $\tilde{y}$: trend;

λ : smoothing parameter; $\Delta^2\mu_i = \Delta\mu_i - \Delta\mu_{i-1} = \mu_i - 2\mu_{i-1} + \mu_{i-2}$.

Unlike the HP filter, in which the trend converges to a linear trend when $\lambda \to \infty$, in the ℓ₁ filter the trend becomes linear without breakpoints when $\lambda \geq \lambda_{max}$, where $\lambda_{max} = \|(DD^T)^{-1}Dy\|_\infty$ and, with D being the second-order difference matrix:

$$D = \begin{bmatrix} 1 & -2 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & -2 & 1 & 0 & 0 & 0 \\ 0 & 0 & \ddots & \ddots & \ddots & 0 & 0 \\ 0 & 0 & 0 & 1 & -2 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 & -2 & 1 \end{bmatrix}$$

For this box, the ℓ₁ trend was obtained using $\lambda = (1/2)^5 \times \lambda_{max}$, which resulted in four breakpoints for both samples presented in the "Statistical univariate gaps" section, as per footnotes 6 and 8.

e) HP trend modified by Andrle (2013): long-term growth rate of the economy productivity with a defined steady state. The estimation uses the following state-space form:

$$Y_t^{obs} = y_t + \log Z_t$$

$$y_t = \alpha_1 y_{t-1} + (\alpha_2 - \alpha_1) y_{t-2} + \sigma_y \epsilon_t^y$$

$$\log\left(\frac{Z_t}{Z_{t-1}}\right) = \log Z_t^z = \log Z_{ss}^z + \log Z_t^{zc} + \log Z_t^{zt}$$

$$\log\left(\frac{Z_t^{zc}}{Z_{ss}^z}\right) = \rho_z \log\left(\frac{Z_{t-1}^{zc}}{Z_{ss}^z}\right) + (1 - \rho_z^2)^{0.5} \sigma_{zc} \varepsilon_t^{zc}$$

$$\log Z_t^{zt} = (1 - \rho_z^2)^{0.5} \sigma_{zt} \varepsilon_t^{zt}$$

$$\epsilon_t^y \sim N(0,1) \quad \varepsilon_t^{zc} \sim N(0,1) \quad \varepsilon_t^{zt} \sim N(0,1)$$

where Y_t^{obs} is the (logarithm of) real GDP per capita; y_t is the (logarithm of) output cyclical component, modeled as an AR(2) where the restriction of the parameters, combined with the priors defined for the model's estimation, ensure stationarity of the output gap; $\log Z_t$ is the (logarithm of) the trend level. The third equation of the model characterizes the model's growth rate trend consisting of a cyclical component, $\log Z_t^{zc}$, which follows an AR(1) process, and a temporary component, $\log Z_t^{zt}$, besides the deterministic growth rate $\log Z_{ss}^{z}$. The exogenous shocks $\epsilon_t^{y}, \varepsilon_t^{zc}$ and ε_t^{zt} follow the Standard Normal distribution, with the coefficients σ_y, σ_{zc} and σ_{zt} defining, respectively, the standard deviation of each of the system's components.

f) Band-Pass filter (8-32 quarters – Christiano and Fitzgerald approach): quadratic function equals 1 for frequencies between (ω_1, ω_2) quarters and 0 outside this range. Low Pass: $\mathcal{B}_0^{lp} = {\omega_1}/{\pi}$; $\mathcal{B}_j^{lp} = {sin(j\omega_1)}/{j\pi}$; $0 < j < \infty$, for some ω_1. High Pass: $\mathcal{B}_0^{hp} = 1 - \mathcal{B}_0^{lp}$; $\mathcal{B}_j^{hp} = -\mathcal{B}_j^{lp}$; $0 < j < \infty$. Band-Pass for the cycle: $\mathcal{B}_0^{hp} = \mathcal{B}_j^{lp}(\omega_2) - \mathcal{B}_j^{lp}(\omega_1);\ 0 < j < \infty; \omega_2 > \omega_1$. CF use non-stationary, asymmetric, and optimal approach (min. error).

g) Beveridge-Nelson modified by Kamber et al. (2018): the BN trend is defined by $\tau_t = \lim_{j\to\infty} E_t y_{t+j}$, without loss of generality, disregarding deterministic terms. Kamber et al. (2018) use an autoregressive $\phi(L)\Delta y_t = e_t$ model for quarterly GDP, imposing twelve quarters of lags and carrying out an exhaustive search in a grid to $\phi(1)$ so that maximizing the amplitude of the resulting gap $h_t = y_t - \tau_t$. Morley et al. (2023) also proposed correction for heteroscedasticity in e_t during the pandemic.

2. Multivariate gaps

a) Production function: output gap with Cobb-Douglas technology: $\frac{Y_t}{Y_t^n} = \left(\frac{C_t}{C_t^n}\right)^{1-\alpha}\left(\frac{1-U_t}{1-U_t^n}\right)^{\alpha}$; where: Y_t : output; Y_t^n: potential output; C_t: industry capacity utilization; C_t^n: Naicu; U_t: unemployment rate; U_t^n: Nairu; α: share of employment in output (0.6). Output gap in log: $\hat{y}_t = (1-\alpha)\hat{c}_t - \alpha(\hat{u}_t)$, where $\hat{y}_t$; $\hat{c}_t$ and $\hat{u}_t$ are the output, level of capacity utilization and unemployment rate gaps, respectively. The level of capacity utilization and the unemployment rate gaps are calculated using the HP filter.

b) Production function based on the Areosa approach (2008): The Kalman filter algorithm may be used to solve the proposed optimization problem. To do this is necessary to build a state-space model and impose restrictions on the variance-covariance matrix of the errors so that the resulting likelihood function, to be maximized by the Kalman filter, is the objective function of the proposed filter. Thus, the solution found by the Kalman filter will be the same as that of the HP filters restricted by the relationship extracted from the production function. The state-space representation, used in the Kalman filter, would then be given by:

$$\begin{bmatrix} x_{1,t} \\ x_{2,t} \\ x_{3,t} \\ x_{4,t} \\ x_{5,t} \\ x_{6,t} \end{bmatrix} = \begin{bmatrix} 2 & -1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 2 & -1 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} x_{1,t-1} \\ x_{2,t-1} \\ x_{3,t-1} \\ x_{4,t-1} \\ x_{5,t-1} \\ x_{6,t-1} \end{bmatrix} + \begin{bmatrix} e_{1,t} \\ 0 \\ e_{2,t} \\ 0 \\ e_{3,t} \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} y_{1,t} \\ y_{2,t} \\ y_{3,t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} x_{1,t} \\ x_{2,t} \\ x_{3,t} \\ x_{4,t} \\ x_{5,t} \\ x_{6,t} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ 0{,}6 \cdot \varepsilon_{1,t} + 0{,}4 \cdot \varepsilon_{2,t} \end{bmatrix}$$

Where the states $x_{1,t}$, $x_{3,t}$ and $x_{5,t}$ represent the potential unemployment series, the level of capacity utilization, and the output, while $y_{1,t}$, $y_{2,t}$ and $y_{3,t}$ are the observable series of these same three variables. In this case, the restriction on the variance-covariance matrix of the errors is given by:

$$\begin{bmatrix} V_{e_1} & 0 & 0 & 0 & 0 \\ 0 & V_{e_2} & 0 & 0 & 0 \\ 0 & 0 & V_{e_3} & 0 & 0 \\ 0 & 0 & 0 & V_{\varepsilon_1} & Cov(\varepsilon_1, \varepsilon_2) \\ 0 & 0 & 0 & Cov(\varepsilon_1, \varepsilon_2) & V_{\varepsilon_2} \end{bmatrix} =$$

$$\begin{bmatrix} {V_{e_3}}/{\beta_1} & 0 & 0 & 0 & 0 \\ 0 & {V_{e_3}}/{\beta_2} & 0 & 0 & 0 \\ 0 & 0 & V_{e_3} & 0 & 0 \\ 0 & 0 & 0 & {1600 \cdot V_{e_3} \cdot (\beta_2 + 0.4^2)}/{den} & {-1600 \cdot V_{e_3} \cdot 0.4 \cdot 0.6}/{den} \\ 0 & 0 & 0 & {-1600 \cdot V_{e_3} \cdot 0.4 \cdot 0.6}/{den} & {1600 \cdot V_{e_3} \cdot (\beta_1 + 0.6^2)}/{den} \end{bmatrix}$$

where den = $(\beta_1 \cdot \beta_2) + (\beta_2 \cdot 0.6^2) + (\beta_1 \cdot 0.4^2)$.[15]

c) Production function based on the model used by the U. S. Congressional Budget Office (CBO): The estimation is based on Shackleton (2018), used in the U.S. Congress potential output model, but with publicly available aggregate data for Brazil. It consists in a potential output version with conventional Cobb-Douglas production function.

In general terms, variations of Okun's Law are applied in piecewise linear regressions that associate production factors (total factors productivity – TFP, labor, and capital stock) with the employment gap and time dummies associated with the peak of economic cycles to extract the trends. The equations for extracting the trend for each production input are presented below.

- Labor (retropolated PNAD-C[16] – sample from 2002Q1):
  - Natural unemployment rate (U_t^*): uses Nairu as a *proxy*, as in the CBO potential output.[17]
  - Working Age Population (PEA):

$$\ln(PEA_t) = \alpha + \beta_1 Egap_t \times Covid + \beta_2 Egap_{t-1} \times Covid + \beta_3 T_{2002} + \beta_4 T_{2008} + \beta_5 T_{2014} + \beta_6 T_{2019} + \varepsilon_t$$

where time trends (*T*) correspond to a specific business cycle, defined by Codace, dated similarly to the original CBO potential output (demarcating cycles as defined by the NBER).[18] Potential PEA is the prediction of this regression by applying a zero value to the employment rate gap coefficients (cyclical

15/ The weights in this relation represent the labor elasticity and the labor force elasticity, usually estimated at 0.6 and 0.4 for Brazil.
16/ See Alves and Fasolo (2015).
17/ Estimated using quarterly data (four-quarter moving average) with a sample from 2006Q1 to 2019Q4. The GDP deflator (GDP data from the IBGE Quarterly National Accounts System) is regressed against a constant, four lag terms for the GDP deflator (each lag term is a third-degree distributed lag polynomial), a four-quarter lag term for the unemployment rate (demean), a quarter lag term for food-at-home and energy sub-index in the IPCA and a productivity deviation variable (difference between the growth rate of labor productivity (GDP/occupation) and the trend, which is measured as the potential working age population in the methodology. The regression is conditioned to the restrictions that the GDP deflator lags add up to 1 (one), in order to solve for Nairu, and the last term in the past is restricted to zero. – See "The Economic and Budget Outlook" (CBO, 1994) for details on the original implementation.
18/ Cycles dating is obtained on the basis of peak to peak values in each cycle. For example, the trend T_{2008} assumes zero values until the peak of the previous cycle, which T_{2002} is in 2002Q4, when it assumes a value of 25 and then a value of 25 is added every quarter until the peak of the trend cycle T_{2008}, which occurs in September 2008, repeating the peak value until the end of the sample. The same computing method is applied for all time trends.

variable). The trends of all other variables – GFCF, Nuci, and TFP – are extracted in this way.[19] For the PEA, a dummy was applied for the period following the outbreak of the pandemic, interacting with the terms of the employment rate gaps to differentiate the relatively disparate cyclical dynamics in this series before and after the pandemic.

- Employment rate (E_t), potential employment rate (E_t^*), employment rate gap ($Egap_t$) and potential employment ($OCUP_t^*$):

$$E_t = \left[1 - \left({U_t}/{100}\right)\right]$$

$$E_t^* = \left[1 - \left({U_t^*}/{100}\right)\right]$$

$$Egap_t = \left[\left({E_t}/{E_t^*}\right) - 1\right] \times 100$$

$$OCUP_t^* = E_t^* \times PEA_t^*$$

- Stock of capital:

  - Gross Fixed Capital Formation (GFCF): Obtained from the quarterly difference of the IPEA stock of capital series (K) released by the Institute of Applied Economic Research (Ipea) (see Souza Júnior and Cornelio, 2020). Since the capital stock is obtained using the perpetual stock methodology, the quarterly difference in the stock of capital includes the depreciation rate between quarters. Ipea's stock of capital stock series goes until 2023Q4. For the 2024Q1 GFCF values, the quarterly change in the volume of GFCF in seasonally adjusted real terms calculated by the IBGE on the last observation in the series (2023Q4) is applied. This output is added by a pro-rata of the average implicit depreciation rate for 2010-2017, estimated at 6.39% p.a. in Souza Júnior and Cornelio (2020).

$$FBKF_t \equiv K_t - K_{t-1}; \quad ;$$

$$\ln(FBKF_t) = \alpha + \beta_1 Egap_t + \beta_2 Egap_{t-1} + \beta_3 T_{2002} + \beta_4 T_{2008} + \beta_5 T_{2014} + \beta_6 T_{2019} + \varepsilon_t;$$

  - Potential GFCF ($FBKF_t^*$) is obtained by predicting this regression and applying zero to the employment rate gap coefficients.

  - Nuci (industry – FGV): Used together with GFCF to add cyclical variation to the stock of capital.

$$NUCI_t = \alpha + \beta_1 Egap_t + \beta_2 Egap_{t-1} + \beta_3 T_{2002} + \beta_4 T_{2008} + \beta_5 T_{2014} + \beta_6 T_{2019} + \varepsilon_t ;$$

  - Potential Nuci ($NUCI_t^*$) is obtained by predicting this regression and applying zero to the employment rate gap coefficients.

  - Stock of capital adjusted by Nuci:

$$K_0^* \equiv K_0; \text{ where the asterisk refers to the potential}$$

$$K_1^* = K_0 + FBKF_t^*;$$

$$K_t^* = (K_{t-1} + FBKF_t^*) \times NUCI_t^*;\ t > 0$$

19/ Nairu and, consequently, potential PEA and occupation were projected to correct for the more recent time trend since the outbreak of the pandemic.

- TFP (derivative of a production function with stock of capital adjusted by Nuci):

$$\ln(A_t) \equiv \ln(QPIB_t) - 0{,}6 \times \ln(IOCUP_t) \quad - 0{,}4 \times \ln(IKN_t);$$

where: $IKN_t \equiv IK_t \times NUCI_t$; *I*: Index numbers are based on 2002Q4.

$$\ln(A_t) = \alpha + \beta_1 Egap_t + \beta_2 Egap_{t-1} + \beta_3 T_{2002} + \beta_4 T_{2008} + \beta_5 T_{2014} + \beta_6 T_{2019} + \varepsilon_t;$$

Potential TFP using Nuci in the formulation is $\ln(A_t)^*$ and is obtained by predicting this regression and applying a zero value to the employment rate gap coefficients.

- Potential output and output gap:

$$\ln(Gap_t) \equiv \ln(QGDP_t) - \ln(QGDP_t)^* \quad ;$$

Where: $\ln(QGDP_t)^* = \ln(A_t)^* + 0{,}6 \times \ln(IOCUP_t)^* - 0{,}4 \times \ln(IKN_t)^*$.

d) Jarocinski and Lenza Model:

Observable:

$$y_t^n = b^n(L)g_t + w_t^n + \varepsilon_t^n, for\ n = 1, \dots, 4$$

$$(\pi_t - z_t) = a_g(L)g_t + a_p(L)(\pi_{t-1} - z_{t-1}) + a_v(L)v + e^{\frac{1}{2}h_t}\epsilon_t^{\pi}$$

$$\pi_t^e = c_0 + c_1 z_t + \varepsilon_t^e$$

Laws of motion:

$$g_t = \phi_1 g_{t-1} + \phi_2 g_{t-2} + \eta_t^g$$

$$w_t^n = d^n + w_{t-1}^n + \eta_t^n, for\ n = 1, \dots, 4$$

$$z_t = z_{t-1} + e^{\frac{1}{2}f_t}\epsilon_t^z$$

where: $b^n(L)$: 1 lead, contemporaneous and 2 lags; $a_g(L)$: 1 lead, contemporaneous and 1 lag $a_p(L)$: 1 lag; $a_v(L)$: 2 lags.

The output gap (g_t) is a common factor of the GDP (y_t^1), Nuci (y_t^2), the unemployment rate (y_t^3), and the stock of formal jobs measured by the New Caged (y_t^4), which have specific trends w_t^1, w_t^2, w_t^3 and w_t^4. g_t follows AR(2), w_t^1 follows a random walk with drift and w_t^2, a random walk without drift. $\varepsilon_t^1 = 0$ is imposed so that the output gap g_t so that it coincides with the cyclical GDP trend.

The Phillips curve describes the relationship between the deviation of core inflation Ex-0 from its trend (π_t - z_t) and the output gap, past values of Ex-0, and the IC-BR change (v_t) and considers stochastic volatility (h_t). The last equation of observable variables shows the relationship between the inflation trend (z_t) and 12-month inflation expectations starting in two years (π_t^e). Thus, medium-term inflation expectations and the inflation trend are linked, also following a random walk and presenting stochastic volatility (f_t).

e) Estimation by principal components:

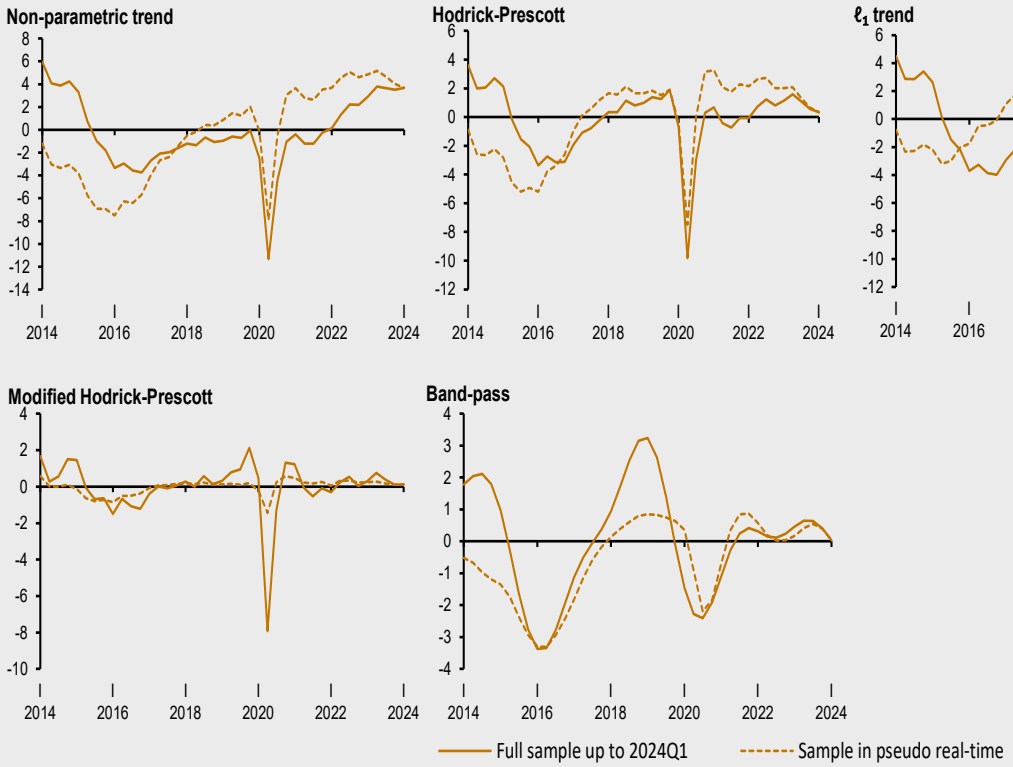
Principal components are used to summarize the relevant information in a data set and are obtained by solving the characteristic equation $\det[S - \lambda I]=0$, where S is the data covariance matrix. The principal components are the eigenvectors associated with the eigenvalues that solve the equation.

To obtain the common series that summarizes changes in activity and in the labor market, a database is used with the ex-trend of GDP series (IBGE), industrial capacity utilization (FGV); the PNAD unemployment rate (IBGE), with inverted signal; and the Caged employment series (MTE). The output and Caged employment gaps are calculated previously through an HP filter and the four stationary series are standardized before the components are estimated through a singular value decomposition.

Appendix 2 – Pseudo real-time estimation exercise

Bilateral methodologies are known to present end-of-sample problems, as each new observation at the end causes a general revision of the filtered series. Although useful for analyzing historical patterns, they are noisier indicators of real-time economic conditions.[20] Figure 4 presents estimates using the entire sample until 2024Q1 and the pseudo real-time estimate for the statistical univariate gaps.[21] The latest estimates are obtained by fixing the beginning of the sample (1996Q1), but varying its end for each period from 2014Q1 to 2024Q1. For example, the gap estimate in 2014Q1 uses the GDP series only up to that quarter.[22] The substantial difference between the two series in most estimates is noteworthy.

Figure 4 – Forecasting excercise in pseudo real-time



Obs.: Data period: 2014Q1–2024Q1.

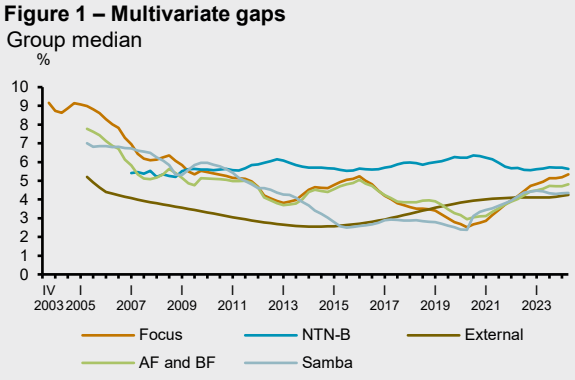
20/ Further details in Orphanides and Norden (2002).
21/ For this exercise were not included the quadratic trend gap, since changes in the samples could lead to the selection of different structural breaks; and the Beveridge-Nelson gap, since it is a one-sided gap, for which the pseudo real-time exercise presents the same result as using the full sample.
22/ As the latest available GDP vintage is used in all cases, this is a pseudo real-time estimation. If the vintage available at that time was used, it would be a real-time estimation. For an example of the effects of real-time and pseudo real-time estimates for Brazil, see Cusinato, Minella, and Pôrto Júnior (2013).

Update of neutral real interest rate measures in Brazil

The economy's neutral real interest rate is a fundamental reference in the formulation of monetary policy. Nevertheless, some facts make it inherently difficult to use in this process, namely it being an unobservable variable and one that changes over time according to the evolution of its determinants. Therefore, its estimates are highly uncertain and need to be frequently reassessed. This box presents an update of several estimates of the neutral real interest rate for the Brazilian economy[1], obtained via different methodologies. It should be emphasized that other approaches are available in the literature and may also be considered in the monetary authority's decision-making process.

Figure 1 shows the evolution over time of the medians for several groups of neutral interest rate measures, while Table 1 shows a comparison of different measures between 2023Q2 and 2024Q2[2]. After reaching a trough with the outbreak of the Covid-19 pandemic, the estimated rates, in general, have followed an upward trend. The comparison between the estimated values for 2023Q2 with those for 2024Q2 reveals that neutral interest rates increased when assessed by the Focus survey, the PCQ, the interest rate parity, and the output gap-based high and low frequency interest rates, while neutral rates based on the NTN-Bs market rates discounted by the term premium[3] followed a downward trend. In turn, neutral interest rates based on the BCB's models remained relatively stable. The average neutral real interest rate obtained through different methodologies rose in the period under analysis from 4.8% to 4.9%, while the median grew from 4.8% to 5.0%. The interval between the 25th e 75th percentiles, previously from 4.4% to 5.5%, became 4.7% to 5.5%. In turn, the median for the several groups of estimates rose from 4.6% to 5.0%.

Figure 1 – Multivariate gaps



Obs.: Data period: 2001Q1–2024Q1.

1/ Methodological details are available in the box Measures of neutral real interest rate in Brazil of the June 2023 IR.
2/ Data calculated until the cut-off date of June 14, 2024.
3/ In the box Measures of neutral real interest rates in Brazil of the June 2023 IR, the term premium was based on the difference between market and Focus survey real rates for the same horizon. In this box, instead, the term premium is based on the Adrian, Crump and Moench (2013) model. This model is within the Gaussian class and is estimated sequentially by ordinary least squares via three regressions. Currently, this is the mainstream approach for estimating long-term risk-neutral interest rates and the term premium, with several central banks such as the New York Fed updating and releasing related results.

Table 1 – Neutral real interest rate in Brazil
Estimates for 2023Q1[1] and 2024Q2[2]

% p.a.

Methodology	2023Q2	2024Q2
Ex-ante real Selic rate from the Focus survey		
Real Selic expected in 4 years	4.8	5.0
Real Selic expected in 1 year, HP filter	5.2	5.7
Group median	5.0	5.4
High and low frequency neutral rates		
Band-Pass gap (HF)	4.8	5.0
Beveridge-Nelson gap (HF)	4.8	5.0
Band-Pass gap (LF)	4.3	4.8
Beveridge-Nelson gap (LF)	4.4	4.8
Group median	4.6	4.9
Real market rates discounted of the term premium[2]		
5 years	5.5	5.4
10 years	5.6	5.5
20 years	5.6	5.6
5 to 10 years	5.7	5.6
5 to 20 years	5.7	5.7
10 to 20 years	5.7	5.7
Group median	5.7	5.6
Uncovered interest rate parity		
Treasury 1y + Embi + exchange rate risk premium	4.0	4.3
TIPS 5y + Embi + exchange rate risk premium	4.1	4.1
TIPS 5y + CDS + exchange rate risk premium	3.5	3.5
Laubach-Williams (two-sided) + Embi + exchange rate risk premium[3]	5.3	5.1
Laubach-Williams (two-sided) + CDS + exchange rate risk premium[3]	4.6	4.5
Group median	4.1	4.3
Neutral interest rate from the BCB's models		
2 years future rate - Samba model	3.8	3.6
5 years future rate - Samba model	3.7	3.5
Aggregated model[4]	5.5	5.5
Disaggregated model	5.1	5.2
Group median	4.4	4.4
Neutral real interest rate from the PCQ[5]		
Short-term median	4.8	5.2
2 years median	4.8	5.0
5 years median	4.5	5.0
Group median	4.7	5.0
Summary		
Mean	4.8	4.9
Median	4.8	5.0
25th percentile	4.4	4.7
75th percentile	5.5	5.5
Median of group medians	4.6	5.0

1/ Data collected up to the cut-off date of June 14, 2024.
2/ The term premium is calculated based on the model by Adrian, Crump, and Moench (2013).
3/ For the portion referring to the neutral real interest rate published by the Fed-NYC, estimated with the Laubach-Williams model, the latest available data refers to 2024Q1.
4/ Rates obtained endogenously by filtering small-scale semi-structural models.
5/ Questionnaires refer to June 2023 and June 2024, respectively.

References

ADRIAN, T.; CRUMP, R. K.; and MOENCH, E. (2013). Pricing the Term Structure with Linear Regressions. *Journal of Monetary Economics*, 110 (1), 110-38.

Updating of small-scale semi-structural models

The projection models of the Banco Central do Brasil (BCB) are an important input to assist the decision-making process of the Monetary Policy Committee (Copom)[1] and are under continuous improvement. In line with the BCB's efforts to improve communication and transparency, this box updates information on the small-scale semi-structural models, both aggregate and disaggregate versions.[2]

The parameters of the revised versions have been re-estimated in relation to the previous versions by using a more up-to-date sample, which is extended to the end of 2023, thus encompassing the Covid-19 pandemic period. This required careful methodological re-estimation procedures and slight changes in some equations as described below. In general, the estimated parameters have changed little compared with previous versions.

Specification of the models' main equations

The BCB makes use of several models to support Copom's analyses and decisions, including two small-scale semi-structural models, an aggregate version and a disaggregate one. These versions have almost the same set of equations, differing only in the representation of market prices inflation. In the aggregate model, this is represented by a single equation for market prices inflation, whereas in the disaggregate model there are three equations, one for each of the following groups: services, industrial goods, and food-at-home.The models focus on the main economic relationships relevant to monetary policy analysis. The basic structure is defined by the following equations: (i) a Phillips curve(s) that determine(s) the dynamics of market prices inflation (one in the aggregate model, three in the disaggregate model); (ii) an IS curve, which determines the dynamics of the output gap; (iii) a Taylor rule, which represents the central bank's response function; (iv) an Uncovered Interest Parity equation – UIP, which describes the relationship between the exchange rate variable and the differential of domestic and external interest rates and a risk premium; and (v) an inflation expectations equation, which react endogenously in the model.[3] The model's series have a quarterly periodicity and, in general, variables are logarithmic.

Phillips curves

In the aggregate model, the single Phillips curve is represented by the equation below, which determines the dynamics of market prices inflation as a function of lagged inflation, inflation expectations, external inflation, exchange rate, domestic output gap, and climate anomalies:

$$(1)\ \pi_t^{L,sa} = \alpha_{1\mathrm{L}}\pi_{t-1}^{L,sa} + \alpha_{1\mathrm{I}}\frac{\sum_{i=1}^{4}\pi_{t-\mathrm{i}}^{IPCA,sa}}{4} + (1-\alpha_{1\mathrm{L}}-\alpha_{1\mathrm{I}})\frac{\pi_{t,t+4|t}^{e}}{4} + \alpha_2\hat{\pi}_t^{*} + \alpha_3\widehat{\Delta e}_{t-1} + \alpha_4 h_t + \frac{\sum_{i=0}^{2}(\alpha_5 d_{t-i}^{el} + \alpha_6 d_{t-i}^{la})Clima_{t-i}^{2}}{3} - \frac{\sum_{i=3}^{5}(\alpha_5 d_{t-i}^{el} + \alpha_6 d_{t-i}^{la})Clima_{t-i}^{2}}{3} + \epsilon_t^{\pi^L}$$

$$(1.1)\quad \hat{\pi}_t^{*} = w_{\mathrm{a}}\hat{\pi}_t^{*\mathrm{agri}} + w_{\mathrm{m}}\hat{\pi}_t^{*\mathrm{metal}} + w_{\mathrm{e}}\hat{\pi}_t^{*\mathrm{energia}}$$

1/ See box BCB's analysis and projection system of the March 2023 IR.
2/ See boxes New small-scale disaggregate model of the March 2021 IR, and Revision of the small-scale aggregate model, of the December 2021 IR.
3/ It is noteworthy that the models used for administered prices basically follow those presented in the box Revision of the medium-term projection models for administered prices of the September 2017 IR. The elaboration of projections also makes use of experts' projections.

where $\pi_t^{L,sa}$ represents the seasonally adjusted quarterly market prices inflation of the Extended National Consumer Price Index (IPCA); $\pi_t^{IPCA,sa}$ represents the seasonally adjusted quarterly IPCA inflation; $\pi_{t,t+4|t}^{e}$ is the expectation at t, extracted from the Focus survey, about the four-quarter-ahead expected inflation (quarterly average of 12-month ahead expectations); $\hat{\pi}_t^{*}$ is the quarterly imported inflation from commodities, measured by the deviation of the Commodities Index – Brazil (IC-Br) change in BRL from the domestic inflation target[4]; $\hat{\pi}_t^{*agri}$ is the quarterly imported inflation from agricultural commodities, measured by the deviation of the IC-Br Agricultural from the domestic inflation target; $\hat{\pi}_t^{*metal}$ is the quarterly imported inflation from metal commodities, measured by the deviation of the IC-Br Metal from the domestic inflation target; $\hat{\pi}_t^{*energia}$ is the quarterly imported inflation from energy commodities, measured by the deviation of the IC-Br Energy from the domestic inflation target; w_{a} , w_{m} and w_{e} are the respective weights of imported sectoral inflations, such as $w_{\mathrm{a}}+w_{\mathrm{m}}+w_{\mathrm{e}}=1$; $\widehat{\Delta e}_t$ is the deviation from the quarterly nominal exchange rate (USD/BRL) change from its long-term change according to the purchasing power parity[5]; h_t is the domestic output gap; $Clima_t^2$ represents the variable that captures supply shocks resulting from climate anomalies[6]; d_{t-i}^{el} is a dummy that assumes value 1 if the climate anomaly is positive (*El Niño* events); d_{t-i}^{la} is a dummy that assumes value 1 if the climate anomaly is negative (*La Niña* events); and $\epsilon_t^{\pi^I}$ is the error term. The only change in the specification of this equation in relation to model presented in the 2021 IR is that the exchange rate change now has one quarter lag instead of two quarters lag.

In the disaggregate model, the sectoral Phillips curves for industrial goods, food-at-home, and services inflations, for which the weighted sum results in market prices inflation, are represented by:

$$\text{(1a)}\quad \pi_t^{B,sa} = A_t^B + \alpha_1^B\left(\pi_{t-1}^{B,sa} - A_{t-1}^B\right) + \left(1-\alpha_1^B\right)\frac{\pi_{t,t+4|t}^{e}}{4} + \alpha_{2,0}^B\hat{\pi}_t^{*metal} + \alpha_{2,1}^B\hat{\pi}_{t-1}^{*metal} + \alpha_3^B\hat{\pi}_t^{*petro} + \alpha_4^B\widehat{\Delta e}_{t-1} + \alpha_5^B IPPCV_t + \alpha_6^B h_t + \epsilon_t^B$$

$$\text{(1b)}\quad \pi_t^{A,sa} = A_t^A + \alpha_1^A\left(\pi_{t-1}^{A,sa} - A_{t-1}^A\right) + \left(1-\alpha_1^A\right)\frac{\pi_{t,t+4|t}^{e}}{4} + \alpha_2^A\hat{\pi}_t^{*agri} + \alpha_3^A\widehat{\Delta e}_{t-1} + \alpha_4^A h_t + \frac{\sum_{i=0}^{2}\left(\alpha_5^A d_{t-i}^{el} + \alpha_6^A d_{t-i}^{la}\right)Clima_{t-i}^2}{3} - \frac{\sum_{i=3}^{5}\left(\alpha_5^A d_{t-i}^{el} + \alpha_6^A d_{t-i}^{la}\right)Clima_{t-i}^2}{3} + \epsilon_t^A + \alpha_7^A\epsilon_{t-1}^A$$

$$\text{(1c)}\quad \pi_t^{S,sa} = A_t^S + \alpha_1^S\left(\frac{\sum_{i=1}^{4}\pi_{t-i}^{IPCA,sa}}{4}\right) + \alpha_2^S\frac{\sum_{i=1}^{4}\left(\pi_{t-i}^{S,sa} - A_{t-i}^S\right)}{4} + \left(1-\alpha_1^S-\alpha_2^S\right)\frac{\pi_{t,t+4|t}^{e}}{4} + \alpha_3^S h_t + \epsilon_t^S$$

$$\text{(1d)}\quad \pi_t^{L,sa} = w^A\pi_t^{A,sa} + w^B\pi_t^{B,sa} + w^S\pi_t^{S,sa}$$

$$\text{(1.1)}\quad \hat{\pi}_t^{*} = w_{\mathrm{a}}\hat{\pi}_t^{*\mathrm{agri}} + w_{\mathrm{m}}\hat{\pi}_t^{*\mathrm{metal}} + w_{\mathrm{e}}\hat{\pi}_t^{*\mathrm{energia}}$$

$$(1.2a)\quad A_t^A = A_{t-1}^A + \epsilon_t^{A^A}$$

$$(1.2b)\quad A_t^B = A_{t-1}^B + \epsilon_t^{A^B}$$

$$(1.2c)\quad w^A A_t^A + w^B A_t^B + w^S A_t^S = 0$$

where $\pi_t^{B,sa}$, $\pi_t^{A,sa}$ and $\pi_t^{S,sa}$ represent seasonally adjusted industrial goods, food-at-home, and services inflations, respectively; w^B, w^A and w^S are the respective weights of the sectoral inflations on the market

4/ Imported inflations from the IC-Br, both in the aggregate index and in the group indexes, are represented as the index changes measured in BRL, i.e., they incorporate the exchange rate variation measured in USD.

5/ This term captures possible effects of the exchange rate not related to commodity prices. The long-term variation refers to the difference between the domestic inflation target and the target of most developed countries, 2%.

6/ Due to the role that the *El Niño* and *La Niña* phenomena play in the food inflation trajectory, a control variable that reflects the temperatures of the Pacific Ocean is used. The series used is the Oceanic Niño Index (ONI), from the Climate Prediction Center, linked to the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Further details in the box Small-scale aggregate model – 2017 of the June 2017 IR.

prices inflation, so that $w^B + w^A + w^S = 1$; A_t^B, A_t^A and A_t^S are unobservable variables responsible for capturing the difference relative to inflation between groups[7]; $IPPCV_t$ is the Brazilian Supply Chains Pressure Index[8] in the period from 2020Q4 and 2022Q3; and ϵ_t^B, ϵ_t^A and ϵ_t^S are error terms.

There are only two changes to the specification in comparison with the version published in 2021. The term, $IPPCV_t$ which represents the impact on supply chains occurred during the pandemic, mostly hitting the industrial goods sector, was added to the industrial goods equation. The other change refers to the food-at-home equation, where a MA(1) lag term relative to the error term was added ($\alpha_7^A \epsilon_{t-1}^A$). This lag, whose estimated coefficient is negative, helps represent the quick reversal of food price shocks.

IS curve

The IS curve describes the dynamics of the domestic output gap as a function of its lags, of the *ex-ante* real interest rate gap, of a fiscal variable, and of the global output gap:

$$(2) \quad h_t = \beta_1 h_{t-1} - \beta_2 \frac{\hat{r}_{t-1}}{4} - \beta_3 \widehat{rp}_t + \beta_4 h_t^* + s_t^h + \epsilon_t^{h,crise2008} + \epsilon_t^{h,crise2020}$$

with

$$(2.1) \quad \hat{r}_t = i_{t,t+4|t}^e - \pi_{t,t+4|t}^e - \overline{rr}_t^{IS}$$

$$(2.2) \quad s_t^h = \beta_5 s_{t-1}^h + \epsilon_t^h$$

$$(2.3) \quad \overline{rr}_t^{IS} = \overline{rr}_t^{trend} + \widehat{rr}_t^{IS}$$

$$(2.4) \quad \widehat{rr}_t^{IS} = \widehat{rr}_{t-1}^{IS} + \epsilon_t^{rr,IS}$$

where $\hat{r}_t$ is a measure of the real interest rate gap, obtained by the difference in the expected Selic rate one year ahead ($i^e_{t,t+4|t}$) and the inflation expected for the same period ($\pi^e_{t,t+4|t}$), both extracted from the Focus survey and represented in terms of annual rate, and an unobservable equilibrium real interest rate ($\overline{rr}_t^{IS}$); $\widehat{rp}$ is a measure of the central government primary balance corrected by outliers and adjusted to the economic cycle, expressed as a deviation from its trend; h_t^* is a measure of the share of the global output gap relevant to the Brazilian economy[9]; s_t^h is an autoregressive shock; and, lastly, ϵ_t^h is an error term.

Regarding the 2021 versions, the IS curve no longer includes an economic uncertainty index term. An additional change was the introduction of a persistent component in the IS shock, which previously was only a white noise ϵ_t^h and now is a shock s_t^h with an autoregressive coefficient β_5 to be estimated. Two error terms were also added, $\epsilon_t^{h,crise2008}$ and $\epsilon_t^{h,crise2020}$, with relatively high calibrated variances during the 2008/2009 global financial crisis and the Covid-19 pandemic, respectively[10]. The specification of the equilibrium interest rate $\overline{rr}_t^{IS}$ has also been revised. It was previously a simple random walk and now it comprises two components, a highly persistent component $\widehat{rr}_t^{IS}$ and a long-term trend $\overline{rr}_t^{trend}$, given by the HP trend of the Focus real interest rate $\left(i_{t,t+4|t}^e - \pi_{t,t+4|t}^e\right)$. The standard deviation of the shock $\epsilon_t^{rr,IS}$ is calibrated so that the variance of

7/ These variables, represented in the model as random walks with calibrated variances, accommodate different trends of sectoral inflations. The productivity of industrial goods, for example, grows at a higher rate than that of services, thus resulting in lower average inflation for the first group. These distinct sectoral trends are defined in terms of aggregate market prices inflation and, therefore, their weighted sum is, by definition, zero (equation 1.2c).

8/ See box Brazilian supply chains pressure index of the September 2022 IR.

9/ Calculated from the combination of GDP of several countries, where the weight for each country is based on its share on Brazilian exports.

10/ The term $\epsilon_t^{h,crise2008}$ covers the period from 2008Q4 to 2009Q4, and the term $\epsilon_t^{h,crise2020}$, the period from 2020Q1 to 2020Q4. Terms are zero outside these intervals. The inclusion of these terms advantageously replaces the uncertainty index in periods of crisis. Furthermore, the presence of these shocks with high variance reduces the possible bias caused by these atypical periods of crisis in the sample when estimating the model's parameters. This type of solution has been used by several authors to deal with the estimation of models during the pandemic period, for example Lenza and Primiceri (2022).

the resulting path $\overline{rr}_t^{IS}$ is similar to those observed in the paths of the average and median neutral interest rate indicators presented in the box Update of neutral real interest rate measures in Brazil of this IR.

Central bank's response function

The central bank's response function, represented here by a Taylor rule, is given by:

(3) $$i_t = \theta_1\, i_{t-1} + \theta_2\, i_{t-2} + (1-\theta_1-\theta_2)\left[\overline{rr}_t^{taylor} + \pi_t^{meta} + \theta_3\left(\pi_{t,t+4|t}^{e} - \pi_t^{meta}\right)\right] + \epsilon_t^i$$

(3.1) $$\overline{rr}_t^{taylor} = \overline{rr}_t^{trend} + \widehat{rr}_t^{taylor}$$

(3.2) $$\widehat{rr}_t^{taylor} = \widehat{rr}_{t-1}^{taylor} + \epsilon_t^{rr,taylor}$$

where i_t represents the target for the nominal Selic rate, which is a function of its own past value and the BCB's responses to inflation expectation deviations $\pi_{t,t+4|t}^{e}$ from the target (π_t^{meta}), and ϵ_t^i is an error term[11]. All variables are represented in annualized rates.

As with the IS curve, a change in the specification of the equilibrium rate in comparison with the 2021 model's version has been made. The equilibrium interest rate was decomposed into two parts, one is the HP trend of the Focus real interest rate $\overline{rr}_t^{trend}$, which is used in the IS curve, and the other is a high persistence component $\widehat{rr}_t^{taylor}$, different from that of the IS. Similarly to the IS curve, the standard deviation of the shock $\epsilon_t^{rr,taylor}$ is calibrated so that the variance of the resulting trajectory $\overline{rr}_t^{taylor}$ is similar to those observed in the average and median trajectories of neutral interest rate indicators. The estimated Taylor rule represents an average monetary authority's response function to the differential of inflation expectations from the inflation target. The sample's deviations from this average response function are distributed between $\overline{rr}_t^{taylor}$ (the most persistent part) and ϵ_t^i (the most transitory part). Therefore, the interpretation of the variable $\overline{rr}_t^{taylor}$ of the Taylor rule is different from that of the variable $\overline{rr}_t^{IS}$ of the IS curve (which represents a persistent unobservable component of the aggregate demand), which would justify undoing the link between these variables present in the 2021 models' versions.

The other models' equations maintain the original specification of the 2021 versions and are referred to below for completeness and closing of the main blocks of models.

Uncovered interest rate parity

The equation relative to the uncovered interest rate parity equation (below) links the exchange rate variation (Δe_t) with the change in the differential of domestic and external interest rate (i_t^{dif}) (in this case, the Fed Funds rate), adjusted by the risk-premium, measured in this estimation by the 5-year Credit Default Swap (CDS) for Brazil. The expected long-term exchange rate change (Δe_t^{ppc}) follows the Purchasing Power Parity (PPP) and is the differential between the domestic inflation target (π_t^{meta}) and the external equilibrium inflation rate (π^{*ss})[12]:

(4) $$\Delta e_t = \Delta e_t^{ppc} - \delta\left(i_t^{dif} - i_{t-1}^{dif}\right) + \epsilon_t^e$$

(4.1) $$i_t^{dif} = i_t - (i_t^{*} + CDS_t)$$

(4.2) $$\Delta e_t^{ppc} = (\pi_t^{meta} - \pi^{*ss})/4$$

11/ As in the previous version of this model, no response term to the output gap is included in this model, as this was not clearly identified and significant in the estimation process. However, it is not correct to simply interpret this result as a lack of BCB response to activity, since inflation expectations are correlated to the output gap, and tends to be higher the more positive the gap and vice versa.

12/ Further details about the use of PPP in projections in box Exchange rate path in BCB projections and the purchasing power parity, of the September 2020 IR.

Δe_t and Δe_t^{ppc} are quarterly variations, and i_t, i_t^* and CDS_t refer to annualized rates.

Inflation expectations

The purpose of the inflation expectations equation is to maintain the coherence and consistency between inflation expectations measured by the Focus survey and the other model's variables, especially while building alternative scenarios to the reference scenario, as it allows changes in projection conditioning factors to be translated into changes in expectations. The equation is:

(5) $\pi^e_{t,t+4|t} = \varphi_1 \pi^e_{t-1,t+3|t-1} + \varphi_2 E_t \pi_{t,t+4} + \varphi_3 \sum_{i=1}^{4} \pi^{IPCA}_{t-i} + (1 - \varphi_1 - \varphi_2 - \varphi_3)\pi^{meta}_t + \epsilon^e_t$

where $E_t\pi_{t,t+4}$ represents the four-quarter ahead model-consistent inflation expectations; π_t^{IPCA} is represented by the quarterly IPCA inflation; and ϵ_t^e is an error term.

Output gap

In this estimation, the output gap is an unobservable variable whose trajectory incorporates information from four economic activity variables referring to the economy output and the slack of production factors. Specifically, the model uses the GDP, calculated by the IBGE, the Level of Utilization of Installed Capacity (Nuci), calculated by FGV, the unemployment rate, measured by the IBGE, and the stock of formal jobs, measured by the New Caged of the Ministry of Labor and Social Security. The specification of the observation equations for these four variables aims to capture the cyclical component common to these activity measures, normalized by the GDP variance:

(6) $fpib_t = h_t + \sigma^h \epsilon_t^{pib}$

(7) $(fnuci_t/\gamma_{nuci}) = h_t + \sigma^h \epsilon_t^{nuci}$

(8) $(femp_t/\gamma_{emp}) = h_{t-1} + \sigma^h \epsilon_t^{emp}$

(9) $(fcaged_t/\gamma_{caged}) = h_{t-1} + \sigma^h \epsilon_t^{caged}$

where fx_t represents the cyclical component of the variable x in the period t; σ^h is the standard deviation of the measurement error, which is supposed to be the same for all variables; and ϵ_t^x represents the error terms. The cyclical component of the non-stationary variables GDP and Caged are obtained from an HP filter with lambda 1600; the cyclical components of Nuci and unemployment are obtained by subtracting from the series the respective averages from the pre-Covid period (up to 2019Q4). The model adds economic structure to the estimation of the output gap by also conditioning it to its relationship with market prices inflation via Phillips curve(s), to inflation expectations via expectations equation, and the IS curve itself. Therefore, the estimated output gap trajectory will be influenced by both activity indicators and the trajectory of the other variables in the model.

Estimated parameters

Estimation was carried out with quarterly data from 2003Q4 to 2023Q4. The early period of the inflation target regime, characterized by high volatility, was excluded. The estimation sample, however, was extended to include the entire Covid-19 pandemic period. Some measures have been taken to prevent the extreme events in the period from biasing the estimation of the parameters. The main measure was to impose higher variances for shocks in the period. This approach applied to the IS curve was explained above. As for the Phillips curves in both the aggregate and disaggregate models, higher variances of the error terms were

calibrated from 2020Q2 to 2022Q4. The impact of this calibration is to reduce the weight of observations from these periods when estimating the parameters of these curves, since the focus is to obtain parameter values consistent with periods in which the economy operates regularly. For the industrial goods Phillips curve, it was necessary to add IPPCV as an explanatory variable during the pandemic, since, for this particular sector, the impact of the pandemic was felt not only as higher variance shocks, but also as a persistent rise in sectoral inflation due to disturbances in global supply chains.

Tables 1 and 2 detail, for the aggregate and disaggregate models, respectively, the construction of *prior* distributions of each parameter estimated through Bayesian techniques, as well as presenting the mode and the 90% credible interval of the estimated *posterior* distributions. In general, the estimation by this model's version sought to use little informative *priors*, limiting only the support. Therefore, the estimation's result mainly reflects the adjustment of equations to the observed data.

Table 1 – Estimated parameters, aggregate model

Parameters	Variable or parameter description	*Prior*	*Posterior*	
		Distribution*	Mode	Credible interval (90%)
Phillips curve				
α_{1L}	Market prices inflation inertia	Uniform ([0;1])	0.24	[0.02; 0.38]
α_{1I}	IPCA inflation inertia	Uniform ([0;1])	0.38	[0.13; 0.69]
α_2	Imported inflation	Uniform ([0;1])	0.023	[0.006; 0.039]
α_3	Foreign exchange variation	Uniform ([0;1])	0.011	[0; 0.025]
α_4	Domestic output gap	Uniform ([0;1])	0.120	[0.072; 0.198]
α_5	Temperature anomaly, El Niño	Uniform ([0;0,01])	0.0012	[0.0004; 0.0019]
α_6	Temperature anomaly, La Niña	Uniform ([0;0,01])	0.0007	[0; 0.0021]
IS curve				
β_1	Autoregressive term	Uniform ([0;1])	0.85	[0.7; 0.95]
β_2	Real interest-rate gap	Uniform ([0;1])	0.44	[0.21; 0.66]
β_3	Primary balance	Beta ([0,03;0,002])	0.030	[0.027; 0.032]
β_4	Global output gap	Uniform ([0;1])	0.054	[0; 0.23]
β_5	Shock autoregressive	Uniform ([0;1])	0.84	[0.59; 0.99]
Taylor rule				
θ_1	Interest rate smoothing, 1st lag	Uniform ([0;2])	1.48	[1.41; 1.54]
θ_2	Interest rate smoothing, 2nd lag	Uniform ([-1;1])	-0.58	[-0.63; -0.52]
θ_3	Deviation of inflation expectations from the target	Uniform ([0;4])	2.03	[1.47; 2.64]
Inflation expectation				
φ_1	Expectations inertia	Uniform ([0;1])	0.75	[0.68; 0.82]
φ_2	Model-consistent inflation expectation	Uniform ([0;1])	0.11	[0.06; 0.13]
φ_3	Past IPCA headline inflation	Uniform ([0;1])	0.021	[0; 0.049]
Other curves				
δ	Domestic and foreign interest rate differential	Uniform ([0;10])	1.90	[0.77; 3.22]
γ_{nuci}	Nuci indicator proportionality coefficient	Uniform ([0;3])	1.87	[1.65; 2.12]
γ_{emp}	Employment proportionality coefficient	Uniform ([0;3])	1.10	[0.96; 1.25]
γ_{caged}	Caged proportionality coefficient	Uniform ([0;3])	0.69	[0.61; 0.79]
σ^h	Standard deviation of measure error	Uniform ([0;2])	1.09	[0.98; 1.21]

* Uniform distributions specifications given by distribution intervals limits, beta distributions given by mean and standard deviation.

Table 2 – Estimated parameters, disaggregate model

	Variable or parameter description	*Prior*	*Posterior*	
		Distribution*	Mode	Credible interval (90%)
Phillips curve, Industrial goods				
α^{B}_{1}	Sectoral inflation inertia	Uniform ([0;1])	0.43	[0.252; 0.598]
$\alpha^{B}_{2,0}$	Metal commodities in BRL, contemporaneous term	Uniform ([0;1])	0.0095	[0; 0.024]
$\alpha^{B}_{2,1}$	Metal commodities in BRL, 1st lag term	Uniform ([0;1])	0.0082	[0; 0.021]
α^{B}_{3}	Brent oil in BRL	Uniform ([0;1])	0.0086	[0; 0.015]
α^{B}_{4}	Exchange-rate change, 1st lag term	Uniform ([0;1])	0.015	[0.0011; 0.0302]
α^{B}_{5}	Supply Chain Pressure Index	Uniform ([0;1])	0.23	[0; 0.45]
α^{B}_{6}	Output gap	Uniform ([0;1])	0.079	[0.017; 0.15]
Phillips curve, Food-at-home				
α^{A}_{1}	Sectoral inflation inertia	Uniform ([0;1])	0.53	[0.12; 0.63]
α^{A}_{2}	Agricultural commodities in BRL	Uniform ([0;1])	0.045	[0.0001; 0.083]
α^{A}_{3}	Exchange-rate change	Uniform ([0;1])	0.023	[0; 0.066]
α^{A}_{4}	Output gap	Uniform ([0;1])	0.073	[0; 0.22]
α^{A}_{5}	Temperature anomaly, El Niño	Uniform ([0;0,01])	0.0044	[0.0022; 0.0069]
α^{A}_{6}	Temperature anomaly, La Niña	Uniform ([0;0,01])	0.0041	[0.0008; 0.0094]
α^{A}_{7}	MA coefficient of Philips shock	Uniform ([0;1])	-0.50	[-0.62; -0.01]
Phillips curve, Services				
α^{S}_{1}	IPCA headline inflation inertia	Uniform ([0;1])	0.37	[0.19; 0.55]
α^{S}_{2}	Sectoral inflation inertia	Uniform ([0;1])	0.30	[0.104; 0.497]
α^{S}_{3}	Output gap	Uniform ([0;1])	0.13	[0.095; 0.173]
IS curve				
β_1	Autoregressive term	Uniform ([0;1])	0.86	[0.7; 0.96]
β_2	Real interest-rate gap	Uniform ([0;1])	0.44	[0.14; 0.69]
β_3	Primary balance	Beta ([0,03;0,002])	0.030	[0.027; 0.033]
β_4	Global output gap	Uniform ([0;1])	0.053	[0; 0.22]
β_5	Shock autoregressive	Uniform ([0;1])	0.83	[0.56; 1]
Taylor rule				
θ_1	Interest rate smoothing, 1st lag	Uniform ([0;2])	1.48	[1.41; 1.53]
θ_2	Interest rate smoothing, 2nd lag	Uniform ([-1;1])	-0.58	[-0.63; -0.53]
θ_3	Deviation of inflation expectations from the target	Uniform ([0;4])	2.07	[1.55; 2.7]
Inflation expectation				
φ_1	Expectations inertia	Uniform ([0;1])	0.74	[0.66; 0.79]
φ_2	Model-consistent inflation expectation	Uniform ([0;1])	0.12	[0.08; 0.15]
φ_3	Past IPCA headline inflation	Uniform ([0;1])	0.026	[0.004; 0.056]
Other curves				
δ	Domestic and foreign interest rate differential	Uniform ([0;10])	1.95	[0.73; 3.19]
γ_{nuci}	Nuci indicator proportionality coefficient	Uniform ([0;3])	1.86	[1.65; 2.12]
γ_{emp}	Employment proportionality coefficient	Uniform ([0;3])	1.09	[0.97; 1.25]
γ_{caged}	Caged proportionality coefficient	Uniform ([0;3])	0.70	[0.62; 0.79]
σ^{h}	Standard deviation of measure error	Uniform ([0;2])	1.10	[0.98; 1.21]

* Uniform distributions specifications given by distribution intervals limits, beta distributions given by mean and standard deviation.

Impulse response functions

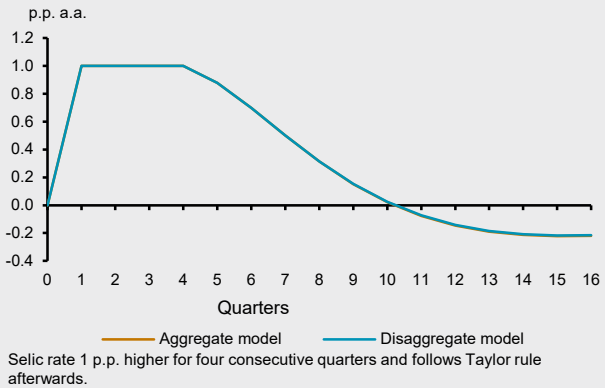
The properties of the model are illustrated in the following figures by the impulse response functions of different shocks to economic variables and their impact on inflation, measured by the IPCA change. Response functions are presented to shocks in the Selic, exchange rate, and the output gap. For each shock, the figure on the left shows the variable trajectory to which the shock is applied and that on the right shows the trajectory of four-quarter accumulated inflation. The figure below them shows, for the disaggregate model, services, industrial prices, and food-at-home inflations. Simulations are carried out also incorporating the administered prices model.[13]

The first simulation illustrates the effect of a shock on interest rate. The annualized Selic rate rises 1 p.p. during four quarters and then follows the trajectory based on the Taylor rule (Figure 1A). IPCA inflation falls, reaching a maximum estimated effect between 0.27 p.p. and 0.,24 p.p. in a four-quarter period, according to the aggregate and disaggregate models, respectively, reached in the fourth quarter after the initial shock. Considering the disaggregate model groups, services inflation responds more strongly and persistently (Figure 1C), reflecting the estimation, in the Phillips curve, of coefficients of higher magnitude in the output gap and inertial components. The response of food-at-home inflation is quicker and stronger than that of industrial goods due to the quicker and stronger response to the exchange rate resulting from a shock on the interest rate.

A permanent exchange rate depreciation of 10%, in turn, produces a maximum effect of approximately 0.96 p.p. and 0.87 p.p. on the four-quarter accumulated IPCA (Figures 2A and 2Bb), according to the aggregate and disaggregate models, respectively. In this case, market prices inflation increases 0.72 p.p. and 0.61 p.p. and administered prices inflation, 1.65 p.p. and 1.61 p.p., according to the aggregate and disaggregate models, respectively. Considering the weights of these groups, the contribution of administered prices inflation to the IPCA is nearly 0.41 p.p. and 0.40 p.p., according to the aggregate and disaggregate models, respectively. Using the disaggregate model, it may be observed that, among the market prices groups, food-at-home is the most strongly impacted by the exchange rate depreciation, followed by industrial goods, and, lastly, by services (Figure 2C). The latter is affected only indirectly by the exchange rate. Its response peaks later and is more persistent than the responses of the other groups.

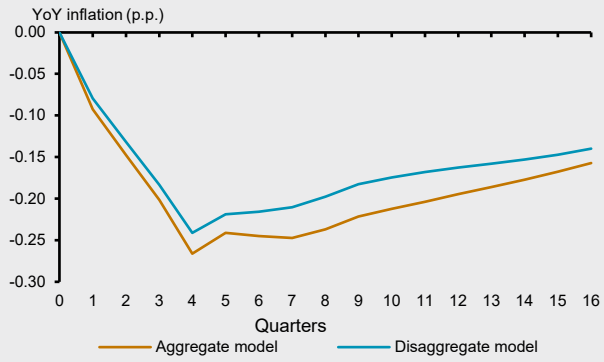
For the IS curve, a negative shock of 1% in the output gap (which can be interpreted as a demand shock) increases 0.49 p.p. and 0.45 p.p. the four-quarter accumulated IPCA, according to the aggregate and disaggregate models, respectively. In the disaggregate model, services inflation is the most responsive to the output gap, followed by industrial goods, and food-at-home (Figure 3C), reflecting the differences in the magnitude of the coefficient of the output gap in the sectoral Phillips curves. Services inflation also presents more persistence.

Figure 1A – Selic rate after a monetary policy shock



Selic rate 1 p.p. higher for four consecutive quarters and follows Taylor rule afterwards.

Figure 1B – Inflation (IPCA) response to nominal interest rate shock



13/ See the box Revision of the medium-term projection models for administered prices of the September 2017 IR.

Figure 1C – Inflation (IPCA) response to nominal interest rate shock

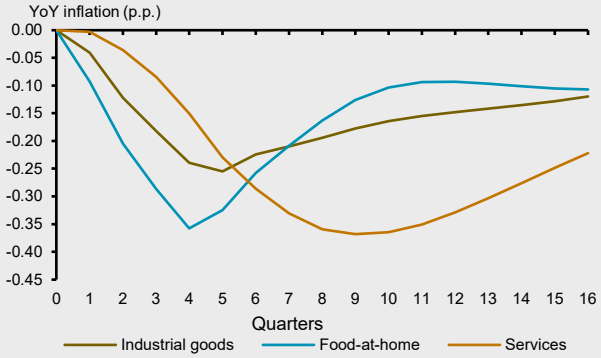
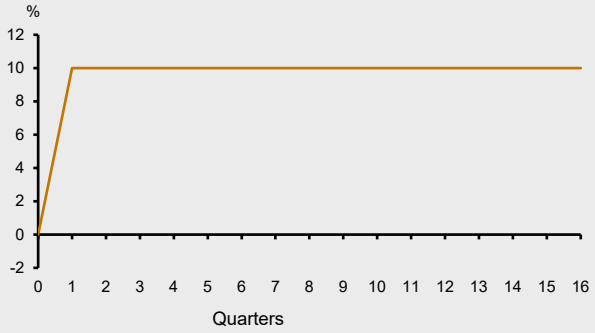


Figure 2A – Cumulative change in the exchange rate after a currency depreciation shock



Exchange rate depreciation of 10% over one quarter.

Figure 2B – Inflation (IPCA) response to an exchange rate depreciation shock

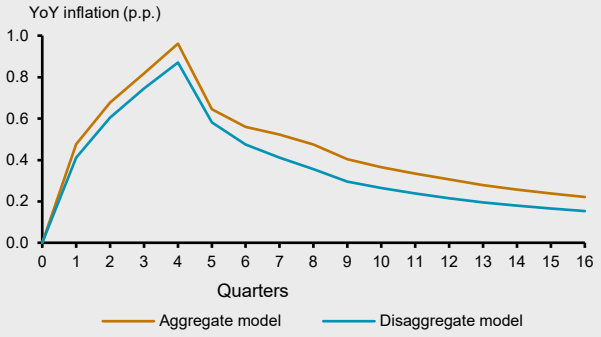


Figure 2C – Disaggregate inflation response to an exchange rate depreciation shock

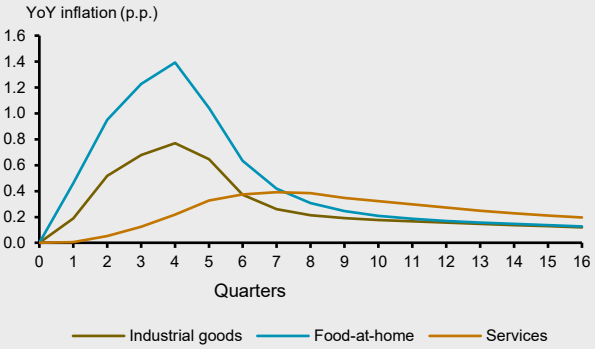
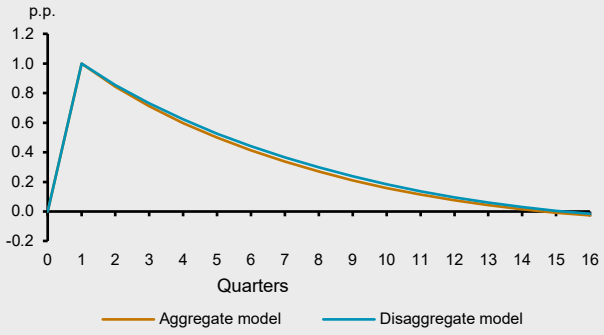


Figure 3A – Output gap after an output gap shock



Output gap falls by 1 p.p. over one quarter.

Figure 3B – Inflation (IPCA) response to an output gap shock

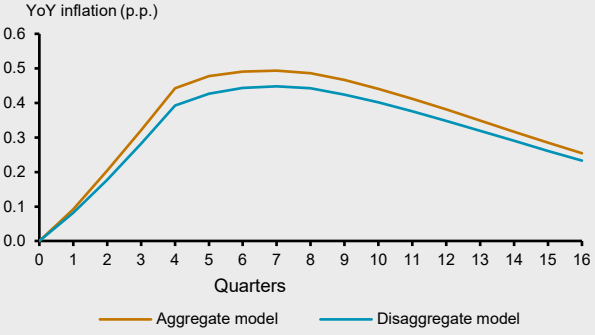
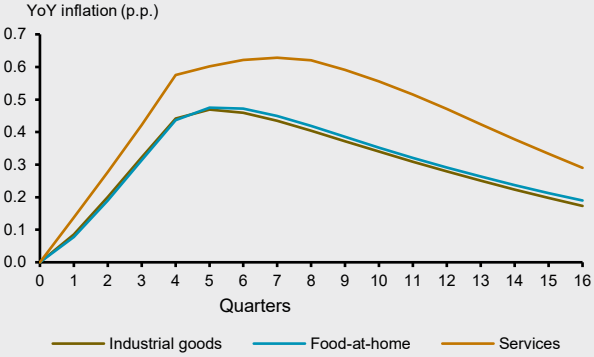


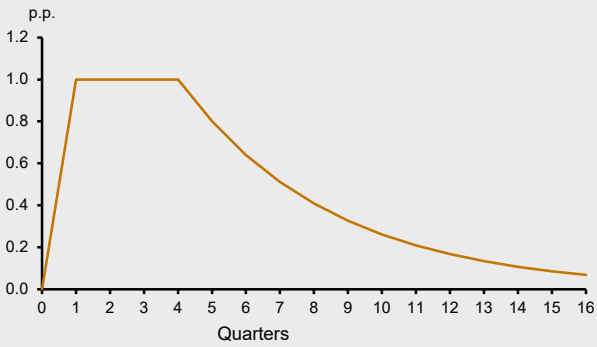
Figure 3C – Disaggregate inflation response to an output gap shock



The transmission of a monetary policy shock occurs through several channels in the model. In addition to

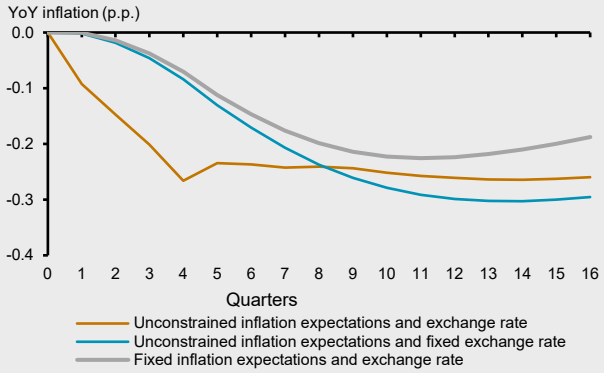
the impact on the aggregate demand and the output gap, represented in the IS curve, the shock also affects inflation through the exchange channel in the UIP equation and indirectly through the impact on inflation expectations. The existence of these channels may be illustrated by an exercise using the aggregate model. An exogenous interest rate shock with a fixed trajectory is introduced, increasing the interest rate by 1 p.p. during four quarters and then declining to a fixed factor of 0.8 per quarter (Figure 4A). This fixed trajectory is intended to silence the model's endogenous response via Taylor rule, ensuring an identical interest rate trajectory in the subsequent exercises, rendering them more comparable. In the first case, the exchange rate and expectations are allowed to respond endogenously to the interest shock, resulting in a quick and strong response (Figure 4B). In the second case, the exchange rate transmission channel has been silenced, and the inflation response becomes more lagged and persistent. Lastly, in a final scenario in which the response of inflation expectations is also muted, the intensity of the inflation response is reduced even further, and also becomes less persistent. It is interesting to illustrate these transmission channels also because, in the process of building projection scenarios based on models, the same interest rate trajectory produces different inflation responses depending on the assumptions simultaneously made about the behavior of the other variables.

Figure 4A – Selic rate after a monetary policy shock



Selic rate 1 p.p. higher for four consecutive quarters, followed by a decay rate of 0.8.

Figure 4B – Inflation (IPCA) response to a nominal interest rate shock



Conclusion

This box presents updated information on the small-scale semi-structural models used by the BCB, to maintain the level of transparency that characterizes monetary policy actions.

This review did not significantly change the structure of the models. It focused on refining specific estimation issues and extending the estimation sample up to 2023Q4, considering the necessary adjustments to deal with the economic shock of the Covid-19 pandemic. As in other models used by the BCB to analyze scenarios and projections, this model's specifications and estimation are continually reassessed and revised.

It is noteworthy that projections presented in the Copom's official documents are a combination of the following elements: (i) conjuncture analysis and experts' projections for market prices for shorter horizons and for administered prices up to a certain horizon; (ii) use of macroeconomic models, satellite models, specific models for administered price items, and studies; (iii) building of trajectories and assumptions for the conditioning variables; and (iv) assessment on the state and prospects of the economy.

References

LENZA, M., & PRIMICERI, G. E. (2022). "How to estimate a vector autoregression after March 2020", *Journal of Applied Econometrics*, 37(4), 688-699.

Appendix

Banco Central do Brasil Management

Monetary Policy Committee (Copom)

Banco Central do Brasil Management

Board of Governors

Roberto de Oliveira Campos Neto
Governor

Ailton de Aquino Santos
Deputy Governor for Supervision

Carolina de Assis Barros
Deputy Governor for Institutional Relations, Citizenship and Conduct Supervision

Diogo Abry Guillen
Deputy Governor for Economic Policy

Gabriel Muricca Galípolo
Deputy Governor for Monetary Policy

Otávio Ribeiro Damaso
Deputy Governor for Regulation

Paulo Picchetti
Deputy Governor for International Affairs and Corporate Risk Management

Renato Dias de Brito Gomes
Deputy Governor for Licensing and Resolution

Rodrigo Alves Teixeira
Deputy Governor for Administration

Monetary Policy Committee (Copom)

Members

Governor
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Deputy Governor
Ailton de Aquino Santos

Deputy Governor
Carolina de Assis Barros

Deputy Governor
Diogo Abry Guillen

Deputy Governor
Gabriel Muricca Galípolo

Deputy Governor
Otávio Ribeiro Damaso

Deputy Governor
Paulo Picchetti

Deputy Governor
Renato Dias de Brito Gomes

Deputy Governor
Rodrigo Alves Teixeira

Monetary Policy Committee (Copom)

Heads of Department Participating in the Copom Meetings (Resolution nr. 61/2021)

Department of Banking Operations and Payments System – Deban
Rogério Antônio Lucca

Department of Economics – Depec
Ricardo Sabbadini

Department of Foreign Reserves – Depin
Alan da Silva Andrade Mendes

International Affairs Department – Derin
Marcelo Antônio Thomaz de Aragão

Open Market Operations Department – Demab
André de Oliveira Amante

Research Department – Depep
André Minella

Acronyms

ACC	Advance on Exchange Contracts
Anbima	Brazilian Financial and Capital Markets Association
BCB	Banco Central do Brasil
BNDES	Brazilian Development Bank
BoE	Bank of England
BPC	Continuous Benefit Payment
CBE	Brazilian Assets Abroad Survey
CBO	U.S. Congressional Budget Office
CCI	Consumer Confidence Index
CCT	Collective Bargaining Agreements
CDS	Credit Default Swap
CMN	National Monetary Council
CNAE	National Classification of Economic Activities
CNI	National Confederation of Industry
Cofins	Contribution for Social Security Financing
Conab	National Supply Company
Continuous PNAD	Continuous National Household Sample Survey
Copom	Monetary Policy Committee
Covid-19	Coronavirus disease 2019
CPI	Consumer Price Index
Depec	Department of Economics
Depep	Research Department
Derin	International Affairs Department
Dstat	Department of Statistics
ECB	European Central Bank
EPE	Energy Research Company
FCI	Financial Conditions Index
Fed	Federal Reserve
FGI	Investment Guarantee Fund
FGO	Operations Guarantee Fund
FGTS	Employment Compensation Fund
FGV	Getulio Vargas Foundation
Fiergs	Rio Grande do Sul State Federation of Industries
FOMC	Federal Open Market Committee
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GVA	Gross Value Added
HGDNI	Household Gross Disposable National Income
HICP	Harmonized Index of Consumer Prices
IBC-Br	Central Bank Economic Activity Index
IBCR	Regional Economic Activity Index
IBGE	Brazilian Institute of Geography and Statistics

Ibre	Brazilian Institute of Economics
IC-Br	Commodities Index – Brazil
Icei	Industrial Business Confidence Index
IIP	International Investment Position
ILO	International Labour Organization
INPC	National Consumer Price Index
INSS	National Social Security Institute
IPA-DI	Producer Price Index
IPCA	Extended National Consumer Price Index
Ipea	Institute of Applied Economic Research
IR	Inflation Report
LSPA	Systematic Survey of Agricultural Production
MBS	Mortgage-backed securities
MDIC	Ministry of Development, Industry, Foreign Trade, and Services
Mediator	Labor Collective Bargaining System
MPME	Micro, small, and medium-sized enterprises
MTE	Ministry of Labor and Employment
NBS	National Bureau of Statistics of China
New Caged	New General Registry of Employed and Unemployed Persons
NOAA	National Oceanic and Atmospheric Administration
Nuci	Industry Installed Capacity Usage Level
ONI	Oceanic Niño Index
OPEC+	Organization of the Petroleum Exporting Countries Plus
p.a.	Per annum
p.p.	Percentage points
PAE	Payment in Advance
PAS	Annual Survey of Services
PCQ	Pre-Copom Questionnaire
PEAC	Emergency Employment Support Program
Perse	Emergency Program for the Recovery of the Events Sector
PIS	Social Integration Program
PLDO	Budget Guidelines Bill
PMC	Monthly Survey of Trade
PMS	Monthly Survey of Services
PPP	Purchasing Power Parity
Pronaf	National Program for Strengthening Family Agriculture
Pronampe	National Program for the Support of Micro and Small Businesses
RS	State of Rio Grande do Sul
s.a.	Seasonally adjusted data
saar	Seasonally adjusted annual rates
Secex	Foreign Trade Secretariat
SFH	Housing Financing System
SFN	National Financial System
SGS	Time Series Management System
SIF	Federal Inspection Service
STF	Federal Supreme Court
STM	Smoothed Trimmed Mean
TRU	Table of Resources and Uses
U.S.	United States of America
UIP	Uncovered interest rate parity