

ISSN 1517-7289

# **Inflation Report**

Volume 21 | Number 1 | 2019 March



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ISSN 1517-7289  
CNPJ 00.038.166/0001-05

# Inflation Report

Quarterly publication of the Monetary Policy Committee (Copom), according to Decree nr. 3,088, dated 6.21.1999.

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## Statistical conventions

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

Hipphen 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

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## Mission and objectives

The Banco Central do Brasil (BCB) has as mission to ensure the stability of the currency's purchasing power and a solid and efficient financial system. The compliance with the task of ensuring price stability is achieved by means of the inflation targeting framework, with inflation targets set by the National Monetary Council.

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 families, businesses and governments, and erode business confidence. High inflation rates subtract the purchasing power of wages and transfers, with negative repercussions on household's 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 creation 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 Quarterly Inflation Report are key vehicles in communicating these assessments.

## Inflation Report

The inflation projections are presented in scenarios, and are conditional on assumptions for some economic variables. Traditionally, the assumptions refer to the paths for the exchange and Selic rates throughout the projection horizon. These values are usually extracted from the Focus survey, conducted by the BCB with independent analysts, or are assumed constant. The reported scenarios are based on a combination of those assumptions. Alternative scenarios may also be presented. It is important to stress that these scenarios 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 degree of uncertainty associated with them. 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 exogenous variables. The 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.



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## Executive summary

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The Brazilian economy remains on a gradual recovery path. Despite decelerating, Gross Domestic Product (GDP) continued to grow on a quarter-on-quarter basis for the eighth consecutive quarter in 2018Q4. On the supply side, the services sector stood out, offsetting the fall in manufacturing activity. On the demand side, household consumption rose, while government consumption and Gross Fixed Capital Formation (GFCF) contracted.

The lower activity growth in 2018Q4 reduced the statistical carry-over for the current year and contributed to reduce the projection for 2019 GDP growth to 2.0%<sup>1</sup> from 2.4% in the previous edition of the Inflation Report.

The economy continues to operate with a high level of economic slack, as reflected in the low industrial capacity utilization indexes and, mainly, in the unemployment rate.

The global outlook remains challenging. On the one hand, the risks associated with normalization of interest rates in some advanced economies have receded. On the other hand, the risks associated with a slowdown in global growth, as a result of several uncertainties, are more elevated.

Nevertheless, the Brazilian economy shows greater capacity to withstand eventual setbacks in the international scenario, given its robust balance of payments, anchored inflation expectations, and prospects of economic recovery.

Inflation expectations for 2019, 2020 and 2021 collected by the Focus survey are around 3.9%, 4.0% and 3.75%, respectively.

The Copom judges that various measures of underlying inflation are running at appropriate or comfortable levels. This includes the components that are most sensitive to the business cycle and monetary policy.

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1/ See box "Revision of the 2019 GDP projection".

Regarding conditional inflation projections, in the scenario with Selic rate and exchange rate paths extracted from the Focus survey, the projections stand around 3.9% for 2019 and 3.8% for 2020. This scenario assumes a path for the Selic rate that ends 2019 at 6.50% p.a. and increases to 7.75% p.a. over the course of 2020. It also assumes a path for the exchange rate that ends 2019 at R\$3.70/US\$ and 2020 at R\$3.75/US\$. In the scenario with a constant Selic rate at 6.50% p.a., and a constant exchange rate at R\$3.85/US\$, the projections for 2019 and 2020 stand around 4.1% and 4.0%, respectively.

The projections presented herein use data available up to the latest meeting of the Monetary Policy Committee (Copom) held on March 19th and 20th, of 2019 (221st meeting). As for the conditioning information used in the projections, especially those from the Focus survey, the cut-off date is March 15th 2019, unless otherwise stated.

In its most recent meeting (221st meeting), the Copom unanimously decided to maintain the Selic rate at 6.50% p.a. The Committee judges that this decision reflects its baseline scenario for prospective inflation and the associated balance of risks, and is consistent with convergence of inflation to target over the relevant horizon for the conduct of monetary policy, which includes 2019 and, with gradually increasing weight, 2020.

At the time, the Committee emphasized that risks around its baseline scenario remain in both directions. On the one hand, (i) the high level of economic slack may lead to a lower-than-expected prospective inflation trajectory. On the other hand, (ii) frustration of expectations regarding the continuation of reforms and necessary adjustments in the Brazilian economy may affect risk premia and increase the path for inflation over the relevant horizon for the conduct of monetary policy. Risk (ii) intensifies in case (iii) the global outlook for emerging economies deteriorates. The Committee judges that the balance of risks for inflation is symmetric.

The Committee reiterates that economic conditions prescribe accommodative monetary policy, i.e., interest rates below the structural level.

The Copom emphasizes that the evolution of reforms and necessary adjustments in the Brazilian economy is essential to maintain low inflation in the medium and long run, for the reduction of its structural

interest rate, and for sustainable economic recovery. The Committee also stresses that the perception of continuation of the reform agenda affects current expectations and macroeconomic projections.

In the Copom's assessment, the evolution of the baseline scenario and of the balance of risks prescribes keeping the Selic rate at its current level. The Committee deems important to observe how the Brazilian economy will behave over time, with lower uncertainty and without the effects of the various shocks that hit the economy last year. The Copom judges that this assessment takes time and should not be completed in the short run. The Copom emphasizes that the next steps in the conduct of monetary policy will continue to depend on the evolution of economic activity, the balance of risks, and on inflation projections and expectations.

The Copom asserts that caution, serenity, and perseverance in monetary policy decisions, even in the face of volatile scenarios, have been instrumental in pursuing its primary objective of keeping the inflation path towards the targets.



## Economic outlook

This chapter of the Inflation Report analyzes the recent evolution of the economic outlook, considering the international and domestic scenarios, as well as the prospects for the evolution of the country's economy in the coming quarters. The assessment of the international scenario addresses the most advanced and emerging economies, emphasizing aspects that tend to influence the Brazilian economy, mainly inflation and activity indicators.

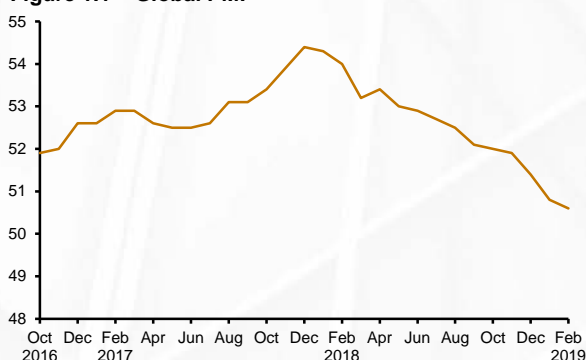
The analysis of the domestic outlook comprises the major drivers of economic activity, considering both the evolution of national accounts and the most frequent and timely sectoral indicators. In addition, central aspects related to the movements in the labor market, the evolution of credit markets, and the performance of the country's public and external accounts are also assessed. The final section of this chapter analyzes the behavior of inflation and market expectations, taking into account the trajectories of key price indicators.

### 1.1 External scenario

Recent indicators confirm an ongoing moderation of the global economic activity. This trend, associated with a reduction in confidence levels among economic agents, has contributed to lower growth projections in major economies. Several central banks have reported the economic deceleration as an important factor in the balance of risks. The moderation in the marginal global growth occurs in a context of anchored inflation expectations in major economies, despite significant pressures in respective labor markets.

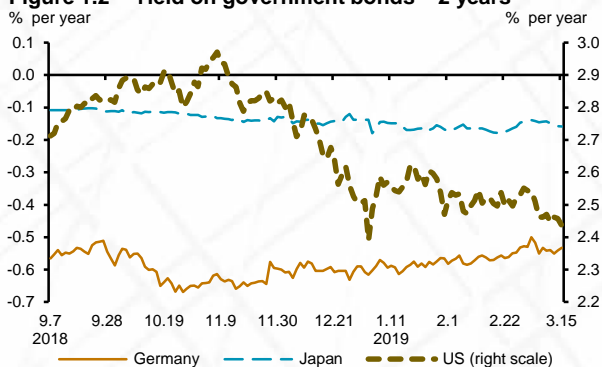
The Federal Reserve substantially modified its press releases at the end of 2018 indicating a more cautious approach to the implementation of additional moves in the interest rate. The institution warned that some negative risks have increased, including the possibility of a steeper than anticipated global

**Figure 1.1 – Global PMI**

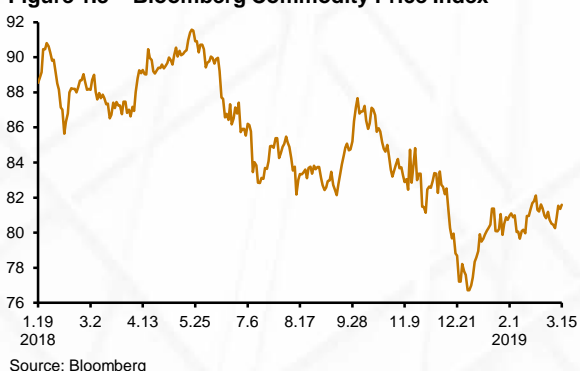


Source: Thomson Datastream

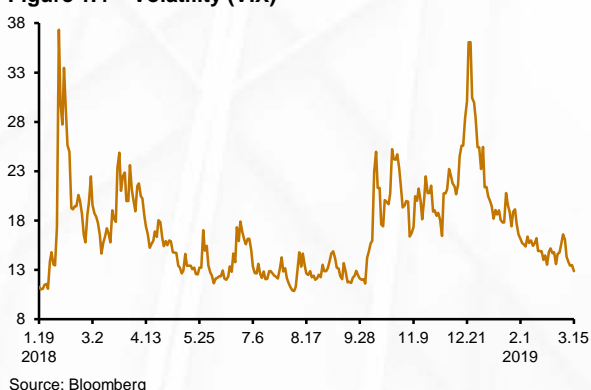
**Figure 1.2 – Yield on government bonds – 2 years**



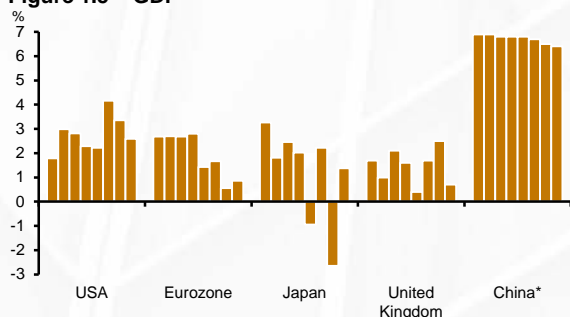
**Figure 1.3 – Bloomberg Commodity Price Index**



**Figure 1.4 – Volatility (VIX)**



**Figure 1.5 – GDP<sup>1/</sup>**



deceleration (particularly in China and in Europe), and a decrease in the impact of fiscal stimuli and occasional financial tightening.

Recently the European Central Bank also postponed the initial plans of increasing interest rates in 2019. Besides the prospects of lower economic activity, it is also noteworthy the fall in commodity prices relatively to those observed during most of 2018, contributing to reduce the risks of inflationary pressures. These factors contributed to a greater flexibility of central banks in their respective paths of monetary policy normalization.

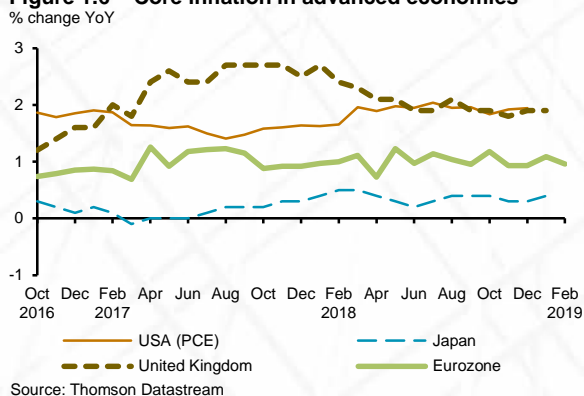
The behavior of international markets in the beginning of the year has shown an overall improvement in asset prices, after the volatility occurred at the end of 2018. It reflects, to a great extent, prospects of changes in the monetary conditions of major economies.

Amidst this still challenging outlook, with changes in the expectations for monetary normalization in advanced economies and a slowdown in global growth, the risks of tightening conditions in global financial markets have also receded.

In the United States, the GDP grew 2.6% in 2018Q4 over the previous quarter (annualized rate), mostly driven by private consumption. The decline in consumer confidence indicators and the government shutdown at the end of 2018 and the beginning of 2019 should impact significantly economic activity in the 2019Q1. The labor market persists in a robust pace of job creation and slow ascent of wages. Consumer prices remain under control, although pressures on the prices of some goods, stemmed from the increase in tariffs in 2018, may be observed.

In the Euro Area, despite GDP growth in 2018Q4 at a slightly faster pace over the third quarter (0.22% against 0.15%, QoQ), this was the worst performance since 2012 for this period of the year. The perception of a moderation in the pace of growth in the region is reinforced by the modest results in high-frequency indicators. Discussions about the UK leaving the EU – the Brexit – remain unsolved, and more adverse scenarios may not be ruled out. Consumer price indices have declined, contributing to the fall in oil prices, although the core of the Harmonized Consumer Price Index (HICP) remains around 1.0% per year.

**Figure 1.6 – Core inflation in advanced economies**



In China, the economy grew 6.4% in 2018Q4 (YoY variation), confirming the decelerating growth process. The Chinese government has acted actively with measures to encourage domestic demand, this time with a greater focus on private consumption. By 2019, the government set as a target for the GDP growth rate an interval between 6.0% and 6.5%. Prospects for a possible trade agreement with the US have improved, easing the tensions that had intensified over 2018, thus affecting Chinese exports.

In Japan, 2018Q4 GDP expanded 1.4% (annualized rate compared to the previous quarter), after a significant contraction in the third quarter caused by adverse weather events. The result was boosted by the performance of consumption and investment. On the other hand, the contribution of the foreign sector was negative for the third consecutive quarter, mainly due to the reduction of exports to Asia, reflecting the slowdown in economic growth in the region.

In summary, since the previous 2018 December Inflation Report, the slowdown of the global economy has been more evident, reflecting weak data and deterioration of expectations for activity in major economies. It is worth noting, however, that more favorable prospects for trade dispute resolutions may provide some support for the resumption of growth. The main central banks reassessed their intentions to adjust interest rates in 2019, lengthening the process of monetary normalization, considering that the risk balance for activity has substantially changed downwards.

## 1.2 Domestic outlook

### Economic activity and the labor market

The recent evolution of activity indicators has been consistent with the scenario of gradual recovery of the Brazilian economy.

According to National Accounts data released by the IBGE, the GDP has increased 0.1% in the last quarter of 2018 compared to the previous quarter (seasonal adjusted data). Although with a lower magnitude than the growth registered in 2018Q3 (0.5%), this is the eighth consecutive increase in this comparison basis. From the supply perspective, this result mainly reflected the performance of the services sector (+0.2%), whose effects overcame the decline

**Figure 1.7 – GDP<sup>1/</sup>**

Average 2013 = 100



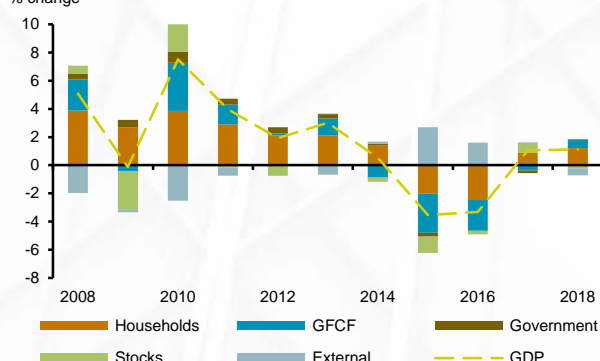
Source: IBGE  
1/ Seasonally adjusted data.

**Table 1.1 – Gross Domestic Product**  
Yearly and quarter/previous quarter variations  
Seasonally adjusted for quarterly variations

	% growth					
	2017	2018				
	Year	I Q	II Q	III Q	IV Q	Year
GDP at market prices	1.1	0.4	0.0	0.5	0.1	1.1
Agriculture and livestock	12.5	1.6	0.2	0.8	0.2	0.1
Industry	-0.5	-0.3	-0.3	0.3	-0.3	0.6
Services	0.5	0.2	0.3	0.5	0.2	1.3
Household consumption	1.4	0.5	0.0	0.5	0.4	1.9
Government consumption	-0.9	-0.3	-0.4	0.3	-0.3	0.0
Gross Fixed Capital Formation	-2.5	0.8	-0.9	5.5	-2.5	4.1
Exports	5.2	2.9	-4.1	6.3	3.6	4.1
Imports	5.0	2.2	-1.8	9.4	-6.6	8.5

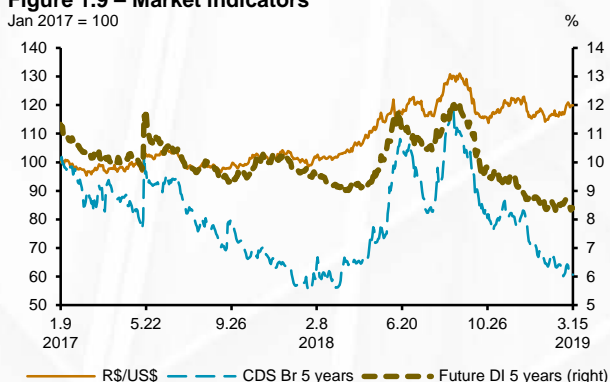
Source: IBGE

**Figure 1.8 – Contributions to GDP annual growth**  
% change



Source: IBGE

**Figure 1.9 – Market indicators**  
Jan 2017 = 100



Sources: BCB and Bloomberg

of industrial activity (-0.3%). On the demand side, household consumption rose 0.4%, accumulating a rise of 4.6% over eight uninterrupted quarters of expansion. Government consumption declined (-0.3%), in a scenario of fiscal restraint, while Gross Fixed Capital Formation (GFCF) contracted 2.5%, a performance that partially reflected the lower import of oil and gas equipment<sup>1</sup>, compared to the previous quarter.

With the result in 2018Q4, GDP accumulated a rise of 1.1% in 2018, the same variation registered in 2017. It should be highlighted, in the year, the activity growth in the services sector, 1.3%, the greatest contribution to the GDP expansion in the period. The agriculture and livestock output remained relatively stable, in view of the high base of 2017, when a record grain harvest was observed. The industrial output grew 0.6%, mainly reflecting increased activity in the manufacturing industry. In terms of demand, household consumption gave the main contribution to the maintenance of economic activity recovery, driven, among other factors, by higher real wages – expansion of real income, in a context of low inflation, and employed population –, and by growth of household credit operations, especially in the non-earmarked segment, in a scenario of lower credit cost.

The weaker activity in 2018Q4 reduced the statistical carry-over for the current year and meant that the projection of GDP growth in 2019 would be reduced to 2.0%<sup>2</sup> from the 2.4% presented in the previous Inflation Report. This perspective of annual growth, conditioned to the scenario of continuity of the necessary reforms and adjustments in the Brazilian economy, incorporates expectation of an increased quarterly growth rate in comparison to that observed during 2018. The recent evolution of consumers and entrepreneurs confidence indicators and the improvement in financial conditions, highlighted by the trajectory of market indicators, continue to signal a favorable environment to the continuity of the economic recovery cycle.

The recent performance of industry does not indicate yet resumption in the pace of growth of manufacturing activity. Industrial physical production retreated 0.8% in the quarter ended in January,

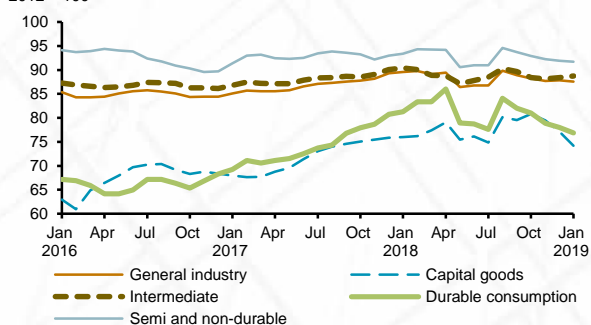
1/ Within the scope of the Special Customs Regime for Goods destined to the Research and Mining Activities of Oil and Natural Gas (Repetro), the internalization of equipment for oil and gas exploration that are still operating in the national territory (hypothetical imports) and imports of new equipment of this type affect the GFCF and the import into National Accounts.

2/ See box "Revision of the 2019 GDP projection".

**Figure 1.10 – Industrial production<sup>1/</sup>**

3MMA

2012 = 100



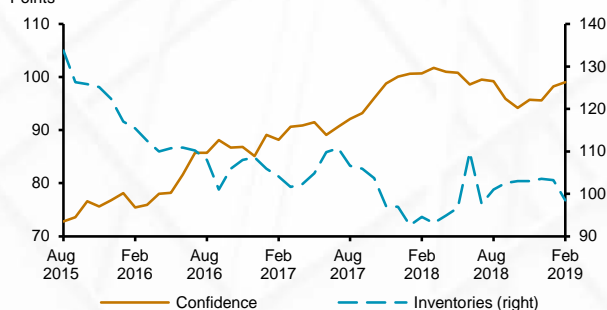
Source: IBGE

1/ Seasonally adjusted data.

**Figure 1.11 – Inventories and confidence<sup>1/</sup>**

Manufacturing

Points



Source: FGV

1/ Seasonally adjusted data.

Inventories calculated as 200 – released stock index.

over the previous quarter, when it had increased by 1.7% on the same comparison basis, according to seasonally adjusted data from the Monthly Industrial Survey – Physical Production (PIM-PF) of IBGE. In the period, production in the extractive industry increased 1.7% while that of manufacturing industry decreased 1.3%, the latter reflecting contraction in 18 out of the 25 activities in this segment. In the breakdown by categories of use, there was a quarterly decline in capital goods (7.6%), in durable consumer goods (4.8%), and in semi-durable and non-durable consumer goods (1.4%). The intermediate goods category, which accounts for most of the industry's output, expanded by 0.3% in the period.

The confidence of entrepreneurs follows a recovery trajectory. The Industrial Confidence Index<sup>3</sup> (ICI) reached 97.6 points in the average of the quarter ended in February, according to seasonally adjusted data from Getulio Vargas Foundation (FGV), 2.3 points higher than in the quarter ended in November. This upward trajectory reflected increased business confidence in all industrial categories of use: durable consumer goods (5.1 points), semi and non-durable consumer goods (6.3 points), capital goods (1.4 point) and intermediate goods (0.3 point). In addition, the index of inventories, also calculated by FGV, fell by 1.1 point in the quarter ended in February compared to the quarter ended in November, reaching the average level of 101.7 points<sup>4</sup>, considering seasonally adjusted data.

In summary, industrial activity generally maintains a relatively stable trajectory since mid-2018<sup>5</sup>. The improvement of entrepreneurial confidence and, to a certain extent, a perception of more adjusted inventories are factors that may contribute to industrial recovery in the following quarters.

**Figure 1.12 – Volume of services index<sup>1/</sup>**

Average 2014 = 100



Source: IBGE

1/ Seasonally adjusted data.

Regarding activity in the tertiary sector, IBGE's Monthly Survey of Services (PMS) showed growth of 0.5% in the quarter ended in January 2019 compared to the one completed in October 2018, when it grew by 1.9%, considering seasonally adjusted data. Three out of the five segments surveyed expanded in the period, emphasizing increases of 4.6% in other services and 1.8% in information and communication services. In the opposite direction, professional, administrative and complementary services; and transport, auxiliary services to transport and postal

3/ Values above 100 points denote a feeling of optimism.

4/ Complement of 200 points of the original index published by FGV. Values above 100 points indicate inventories above planned.

5/ The box "2018 industry performance" of this Report presents some non-recurring factors that contributed to the declining trajectory of industrial production (PIM-PF of IBGE) in 2018.

**Figure 1.13 – Retail sales index<sup>1/</sup>**

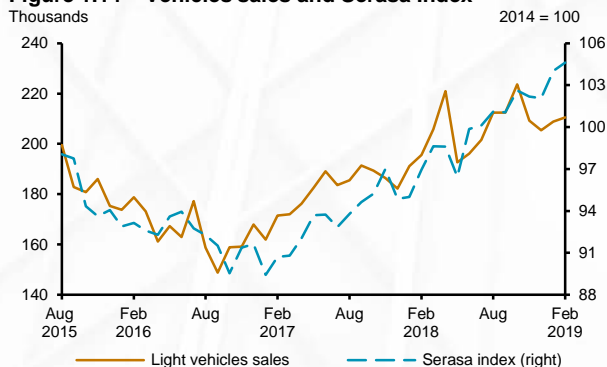
Average 2014 = 100



Source: IBGE  
1/ Seasonally adjusted data.

**Figure 1.14 – Vehicles sales and Serasa Index<sup>1/</sup>**

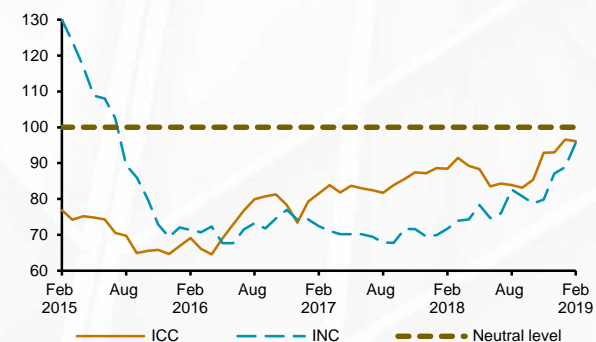
Thousands



Sources: Sources: Fenabrave and Serasa  
1/ Seasonally adjusted data.

**Figure 1.15 – Confidence indexes<sup>1/</sup>**

Points



Sources: ACSP and FGV  
1/ Seasonally adjusted data.

services decreased by -2.0% and -0.9%, respectively, in the same comparison basis.

The Services Confidence Index (ICS) increased by 5.7 points in the quarter ended in February 2019, compared to that ended in November 2018, according to FGV seasonally adjusted data. The positive performance was influenced by increases in both the Current Situation Index (2.4 points) and Expectations Index (9.2 points).

Household consumption, the main driver of economic growth in 2018, is still on an upward trend, although recent sales statistics suggest a slight decline in the QoQ comparison. In fact, sales volume of the broad retail sales decreased by 0.3% in the quarter ended in January compared to that ended in October (seasonally adjusted data), when it grew 3.7%. Retail sales, in the restricted concept, increased by 1.0% in the quarter, highlighting the growth in the supermarket sector (+1.6%).

Coincident indicators suggest continuity of a gradual recovery of retail sales. Although sales of automobiles and light commercial vehicles declined by 3.2% in the quarter ended in February, compared to that ended in November – according to data released by the National Federation of Automotive Vehicle Distribution (Fenabrave) – it is worth noting that this result occurred after a period of significant growth. The monthly comparison shows that vehicle sales increased again in the first two months of the year, with rises of 1.7% in January and 0.8% in February. The favorable performance of car sales throughout 2018, as well as in the QoQ comparison, is supported by an expansion in credit for this sector, both for household and corporate segments<sup>6/</sup>.

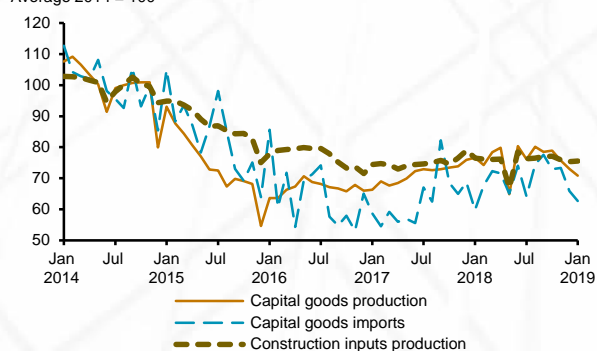
The index from Serasa-Experian, a Consumer Credit Reporting Agency, built from monthly consultations conducted by commercial establishments with Serasa registries, increased 1.6% in the quarter ended in February 2018, compared to that ended in November 2018, when it grew by 1.6%, considering seasonally adjusted data.

In addition, consumer confidence indicators continue to corroborate the upward trend in sales, with emphasis on greater optimism in those components related to future expectations. The FGV Consumer Confidence Index (ICC) rose 8.1 points in the quarter ended in February 2019, in relation to that ended in

6/ See box "Credit and the recent dynamics of the automotive sector".

**Figure 1.16 – GFCF indicators<sup>1/</sup>**

Average 2014 = 100



Sources: IBGE and Funcex  
1/ Seasonally adjusted data.

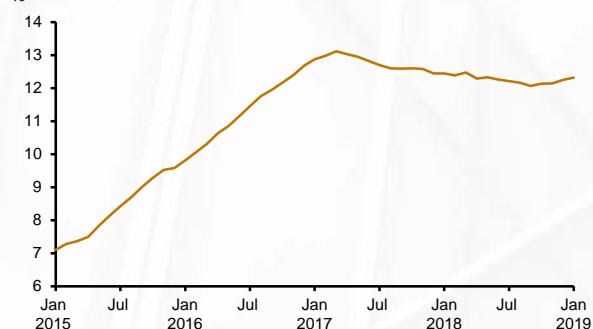
November 2018, using seasonally adjusted data, with highs of 3.6 points in the Current Situation Index and of 10.9 points in the Expectations Index. The National Confidence Index (INC), elaborated by Ipsos Public Affairs to the São Paulo Trade Association (ACSP), advanced 10.8 points in the same comparison basis<sup>7</sup>.

Regarding investment, monthly indicators suggest that the recovery movement observed since the end of 2016 lost traction in the recent period. The production of typical construction inputs fell 1.6% in the quarter ended in January compared to that ended in October, according to seasonally adjusted data. Imports<sup>8</sup> and production of capital goods, which continue to indicate a recovery trend in the absorption of machinery and equipment, declined respectively 7.6% and 10.3%, on the same comparison basis.

On the one hand, the still incipient recovery of the real estate market – given the high level of residential and commercial real estate inventory – and the fiscal constraints on the public sector, jeopardize a more vigorous reaction in investment. On the other hand, the recent decline of risk premiums and rise of entrepreneurs' expectations favor an improved activity in the subsequent months. Nevertheless, the economy continues to operate with a high level of economic slack, as reflected in the low industrial capacity utilization indexes and, mainly, in the unemployment rate.

**Figure 1.17 – Unemployment rate<sup>1/</sup>**

3MMA  
%



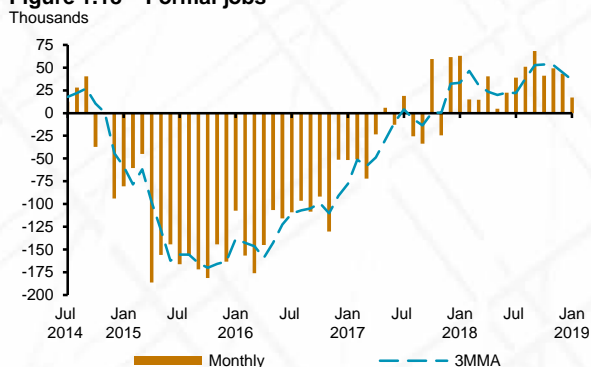
Source: IBGE  
1/ Seasonally adjusted data.

The labor market persists in a path of gradual recovery, in line with the evolution of economic activity. According to the IBGE's Continuous National Household Sample Survey (PNAD Contínua), the unemployment rate ended 2018 at 11.6%, slightly lower than that observed in the last quarter of the previous year (11.8%). In the QoQ comparison, the unemployment rate rose from 12.1% in the quarter ended in October to 12.3% in January, considering data from the seasonally adjusted series<sup>9</sup>. This result was due to a retreat of 0.2% in the employed population and stability in the workforce. According to PNAD Contínua, the gradual recovery in labor market continues to reflect the employment dynamics in the occupational categories most associated with informality, as opposed to lower dynamics in the formal segment.

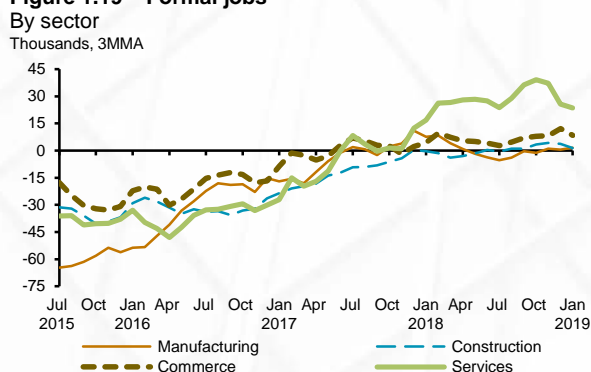
7/ Seasonally adjusted by the BCB.

8/ Imports of capital goods, in this comparison, exclude imports of equipment for oil extraction and an extraordinary event occurred in June 2016.

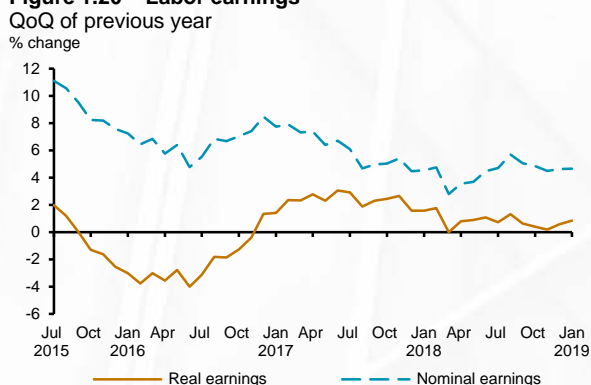
9/ Seasonally adjusted by the BCB.

**Figure 1.18 – Formal jobs<sup>1/</sup>**

Source: Secretariat of Labor/ME  
1/ Seasonally adjusted data.

**Figure 1.19 – Formal jobs<sup>1/</sup>**

Source: Secretariat of Labor/ME  
1/ Seasonally adjusted data.

**Figure 1.20 – Labor earnings**

Source: IBGE

The General Registry of Employed and Unemployed Persons (Caged), of the Ministry of Economy, revealed improved performance of the formal labor market in 2018, mainly driven by the service and commerce sectors. Interrupting the three-year sequence of job losses, there was a net generation of 421.1 thousand formal jobs in 2018 (loss of 123.4 thousand in 2017)<sup>10</sup>. The intermittent labor modality, introduced with the labor reform in force since November 2017, reached a balance of 39.800 contracts in the year.

In the quarter ended in January, a period of unfavorable seasonality for formal employment, net layoffs reached 241.5 thousand (263.0 thousand in the same period of the previous year). In seasonally adjusted terms<sup>11</sup>, 109.6 thousand formal jobs were created, compared to 160.2 thousand jobs in the previous three months, with net job generation in all sectors, with emphasis on services (70.8 thousand) and commerce (25.5 thousand). The formal employment index grew by 0.3%, the same rate observed in the quarter ended in October, discounting the seasonal effects.

The improvement in labor market conditions and the benign evolution of inflation allowed the acceleration of labor income growth throughout 2018. In the year, overall real wages expanded by 2.7%, reflecting increases of 1.4% in the paid workforce and 1.3% of average real income, compared to a 2% variation in the previous year, according to data from the PNAD Contínua.<sup>12</sup> In the quarter ended in January, overall real wages increased 0.7%, after growing 0.8% in the previous quarter (seasonally adjusted data)<sup>13</sup>, with the income acceleration partially offsetting the slowdown in the occupation variation.

The continuity of the gradual economic activity recovery and the benign inflation scenario tend to benefit the ongoing process of labor market improvement. However, as presented in a box in the previous Inflation Report<sup>14</sup>, there is room for labor productivity gains, thus suggesting that indicators improvement, especially in the unemployment rate, continues to occur at a moderate pace.

10/ Non-adjusted data so as to incorporate late statements.

11/ Seasonally adjusted by the BCB.

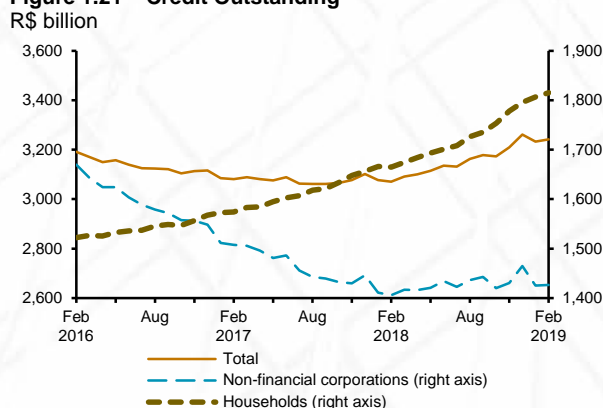
12/ The BCB carried out an adjustment for the outlier that refers to a individual with domicile in a low-income neighborhood and reported monthly income of R\$1 million, which remained in the PNAD *Contínua* sample between December 2016 and December 2017, affecting the evolution of average income series.

13/ Seasonally adjusted by the BCB.

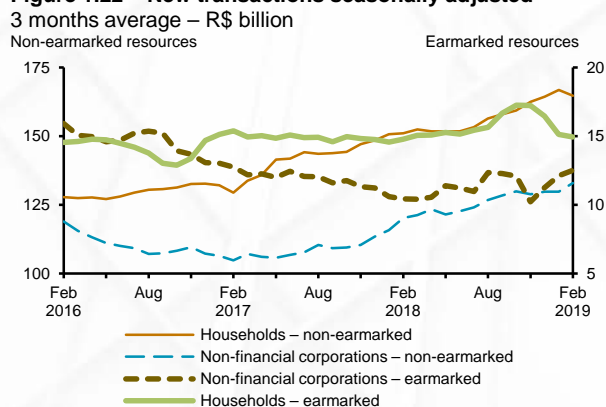
14/ Box "Evolution of labor productivity and labor earnings" in the December 2018 Inflation Report.

## Credit

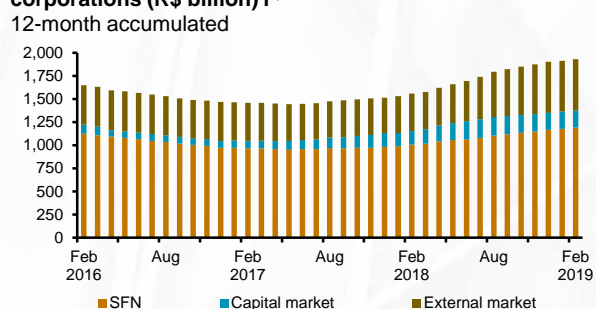
**Figure 1.21 – Credit Outstanding**



**Figure 1.22 – New transactions seasonally adjusted**



**Figure 1.23 – Credit granting to non-financial corporations (R\$ billion) I<sup>1/</sup>**



Source: Anbima

1/ SFN – excludes guaranteed overdraft, overdraft facility and credit card.

Capital mkt – debentures, commercial papers and shares.

External mkt – loans/debt securities and intercompany lending.

The credit market continues on an upward trajectory, with emphasis to a expansion of credit operations in the non-earmarked segment, especially personal credit. The favorable trend of credit balances contributed to maintain the expansion in household consumption, as well as recovery of business activities throughout 2018 and at the beginning of 2019. Delinquency rates at low levels, relatively lower cost of credit and a deleverage process contribute to the perspective of maintenance of credit expansion in 2019.

The stock of National Financial System (SFN) credit operations rose by 1.0% in the quarter ended in February, according to preliminary data<sup>15</sup>, highlighting the sharpest expansion by private banks, 2.8%, against a decline of 0.6% by public banks. The balance of credit operations with non-earmarked resources increased 2.2% in the quarter (2.7% and 1.5% in the household and corporate segments, respectively) whereas the credit portfolio with earmarked resources dropped by 0.3% (1.3% and -2.4% in the household and corporate segments<sup>16</sup>, respectively). It is noteworthy, in the non-earmarked segment, the positive variations of anticipation of credit card invoices (14.7%), personal credit other than payroll-deducted loans (4.4%) and household vehicles financing (4.4% in the quarter ended in February and 22.8% since May 2017, when it reached the lowest value over the last 24 months).

Credit grantings rose by 1.9% in the quarter ended in February, according to seasonally adjusted data, reinforcing the maintenance of the upward trend of credit stocks. As for the non-earmarked segment, seasonally adjusted credit grantings grew by 2.2%, with respective variations of 1.4% and 3.2% in the household and corporate segments. Credit operations in the earmarked segment fell by 0.4% in the quarter, reflecting the 13.2% decline in new household credit operations (especially housing financing) and expansion by 22.4% in the corporate segment. It should also be mentioned the persistent growth of corporate financing through resources outside the SFN – foreign market and domestic capital market – as revealed in previous boxes.<sup>17</sup>

15/ In view of the cut-off date of this Report, credit data for February are preliminary.

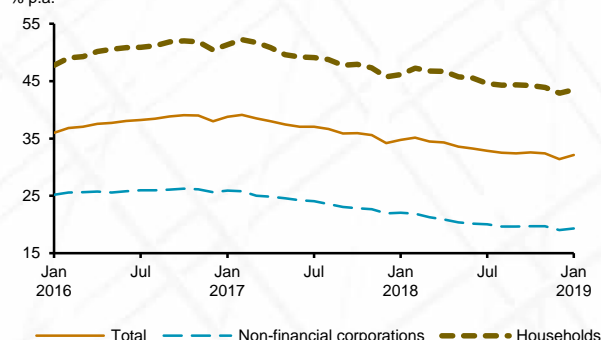
16/ There is evidence that part of the corporate stock of credit with earmarked resources has been replaced by fundraising in the foreign market and in the domestic capital market. For further details, see box “Early settlement of National Financial System (SFN) credit operations” in the December 2018 Inflation Report.

17/ Boxes “Broad corporate financing” and “Corporate financing cost” in the June and September 2018 Inflation Reports.

**Figure 1.24 – Average cost of outstanding loans (ICC)**

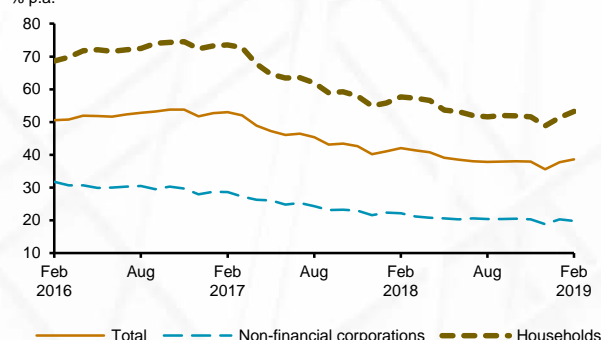
Non-earmarked resources

% p.a.

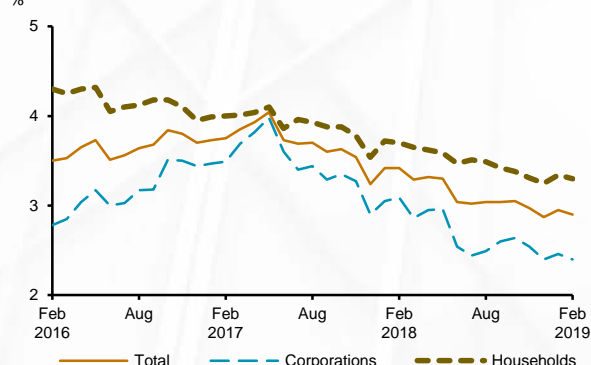
**Figure 1.25 – Interest rates**

Non-earmarked resources

% p.a.

**Figure 1.26 – Delinquency rates<sup>1/</sup>**

%

<sup>1/</sup> Credit operations overdue for more than 90 days.

The Average Cost of Outstanding Loans (ICC), which measures the average cost of outstanding credit operations, regardless of the contracting date, declined slightly (-0.1 p.p.) in the quarter ended in January. With regard to credit operations with non-earmarked resources, more sensitive to the monetary policy cycle, the ICC reached 32.1% in January, following a decline by 0.5 p.p. in the period, while, in the earmarked segment, the indicator remained stable (8.8% p.a.).

The average interest rate of new SFN credit operations rose by 0.5 p.p. in the quarter ended in February. It should be noticed that the QoQ expansion does not change the downward trend of interest rates, and mainly reflected seasonal oscillations. Interest rates in the household and corporate segments rose by 0.8 p.p. and 0.1 p.p., respectively. As for non-earmarked credit operations, the average interest rates reached 53.3% p.a. (1.7 p.p. in the quarter) in the household segment and 19.8% p.a. (-0.5 p.p. in the quarter) in the corporate segment in February, highlighting the respective variations of 5.8 p.p. and -2.3 p.p. in credit card (household segment) and export financing.

The delinquency rate, considering operations overdue for more than 90 days, dropped 0.1 p.p. in the quarter ended in February, closing at 2.9%. As for corporate loans, the indicator reached 2.4% in the month (-0.1 p.p. in the quarter), reflecting respective defaults by 2.8% and 1.8% in the non-earmarked and earmarked segments. With regard to household operations, the delinquency rate closed at 3.3%, remaining stable in the quarter.

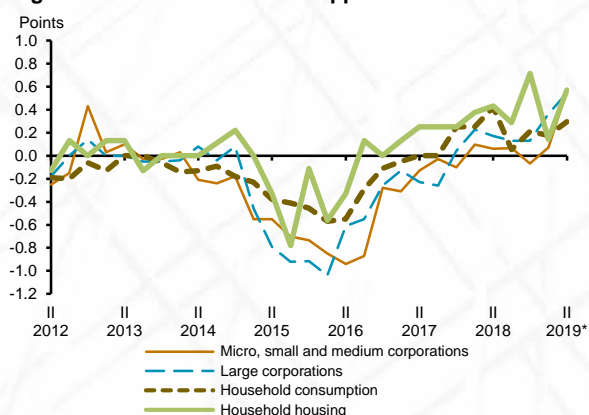
Favorable factors signal the maintenance of the process of credit growth, highlighting low delinquency rates, the historically low interest rate level and the household income commitment at a level similar to the period before the recessive cycle of 2014/2015. In this context, the balance of SFN credit is expected to expand by 7.2% in the year, compared with expansion by 5.1% in 2018.<sup>18</sup>

Data from the last Quarterly Credit Conditions Survey (PTC)<sup>19</sup>, performed between the 1st and the 13th of March 2019 with financial institutions, indicate that

18/ Further details about estimates for credit are shown in box "Credit projection for 2019" in this Inflation Report.

19/ Data shown in this Inflation Report refer to the institutions' evaluation about the percentage of approval of new loans, considering four segments (large enterprises, household house financing, and consumption-oriented credit) for both the last three months and the next three months. Indicators presented correspond to the average of each interviewee answers, varying from -2 (considerably lower approval) to +2 (considerably higher approval). For further details of the PTC methodology, see Annibal, Clodoaldo e Koyama, Sérgio (2011), "Pesquisa Trimestral de Condições de Crédito no Brasil", BCB, Trabalho para Discussão nº 245.

**Figure 1.27 – New credit lines approvals indicators**



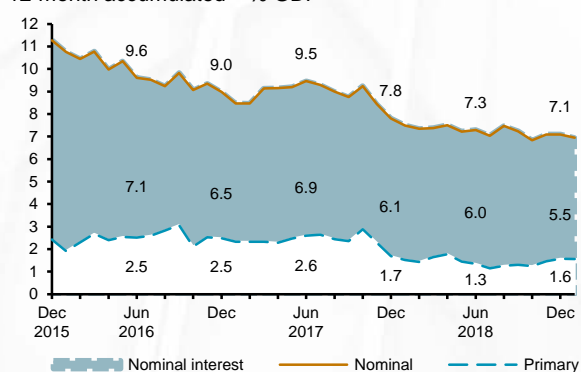
\* 2019 II values correspond to the expectations of the respondents for 2019Q1. The others correspond to perceptions about the situation in each quarter.

**Table 1.2 – Public Sector Borrowing Requirements – Primary result**

12-month accumulated

Itemization	R\$ billion		
	2017	2018	Jan/2019
Central Government	118.4	116.2	117.1
o/w Federal Government	-64.8	-79.7	-77.7
o/w INSS	182.4	195.2	194.3
Regional governments	-7.5	-3.5	-3.7
State-owned companies	-0.4	-4.4	-5.1
Total	110.6	108.3	108.3

**Figure 1.28 – Public Sector Borrowing Requirements 12-month accumulated – % GDP**



credit recovery continues. In the second quarter of 2019, new credit operations are expected to expand in all four corporate segments (large enterprises and micro, small and medium-sized enterprises) and in the household segment (consumption and housing). It should be highlighted expected improvement in the segment of micro, small and medium-sized enterprises.

## Fiscal

The consolidated public sector, excluding state financial enterprises belonging to the Petrobras and Eletrobras groups, posted a primary deficit of R\$108.3 billion in 2018, compared with a deficit of R\$110.6 billion in 2017. The performance in 2018 was better than the official target that stipulated a deficit of R\$161.3 billion.<sup>20</sup> The central government posted a negative result of R\$116.2 billion, while regional governments and state companies contributed with respective surpluses of R\$3.5 billion and R\$4.4 billion. It should be mentioned that the federal government result posted a surplus of R\$79.7 billion, lower than the social security deficit (INSS) of R\$195.2 billion.

The public sector nominal result, which includes accrued interests, registered a deficit of R\$487.4 billion in 2018, compared to a deficit of R\$511.4 billion in 2017. This reduction reflected the lower implicit interest rate accumulated in 12 months – from 13.7% in December 2017 to 11.5% in December 2018, in line with the process of monetary easing in the period and the reduction of implicit subsidies in assets of the Public Sector Net Debt (PSND). Interests incorporated to the PSND in 2018 reached R\$379.2 billion (5.5% of GDP), compared with R\$400.8 billion (6.1% of GDP) in 2017.

With regard to the rules of the New Fiscal Regime, established by the Constitutional Amendment no. 95 (“Public Expenditures Ceiling”), the primary expenditures under this regulation totaled R\$1,288 billion in 2018, compared with the established ceiling of R\$1,348 billion. Capital expenses, in turn, added up R\$904.1 billion, surpassing revenues with credit operations by R\$35.8 billion, complying with article 167, item III, of the Federal Constitution (“Golden Rule”).

20/ Law nº 13,473, of August 8, 2017, with new wording given by Law nº 13,480, of September 13, 2017.

In January 2019, the consolidated public sector primary result reached a surplus of R\$46.9 billion, practically the same surplus observed in January 2018. The central government posted a primary surplus of R\$35.6 billion, for which the federal government contributed with a surplus of R\$49.3 billion, surpassing the deficit of R\$13.8 billion of the INSS. As for consolidated regional governments, the result was a surplus of R\$10.8 billion, in line with the surplus achieved in January 2018 (R\$10.5 billion). Finally, state enterprises reached a primary surplus of R\$0.5 billion.

The General Government Gross Debt (GGGD) reached 76.7% of GDP in January 2019, the same level observed in December 2018, expanding 2.7 p.p. of GDP compared with December 2017. The comparison between 2017 and 2018 reveals that accrued nominal interests (+5.9 p.p.) and other exchange adjustments on the GGGD (+0.7 p.p.) contributed to the GGGD expansion (as a proportion of GDP), partially offset by the net debt redemption (-0.5 p.p.) and the effect of GDP nominal growth (-3.4 p.p.).

PSND closed 2018 at 53.8% of GDP, compared with 51.6% at the end of 2017, reaching 54.0% in January 2019. The expansion observed in 2018 reflected rises of 1.5 p.p. of GDP in the central government's debt and 0.6 p.p. of GDP of regional governments debts.

As mentioned in previous Inflation Reports, the reversion of the public debt upward trajectory observed over the last years is still conditioned by the progress of structural reforms and adjustments in the framework of fiscal policy, especially the reform of social security.

## External demand and the Balance of Payments

The country's external accounts are still solid, as the current account deficit is comfortably financed by inflows of foreign direct investments (FDI).

The current account deficit in the first two months of the year dropped to US\$7.7 billion, according to preliminary data<sup>21</sup>, compared with US\$8.3 billion in

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21/ In view of the cut-off date of this Report the external sector deficit data for February are preliminary.

**Table 1.3 – Balance of Payments**

Itemization	US\$ billion				
	2018			2019	
	Feb	Jan- Feb	Year	Feb*	Jan- Feb*
Current account	-2.0	-8.3	-14.5	-1.1	-7.7
Balance on goods	2.7	5.1	53.6	3.2	4.8
Exports	17.3	34.2	239.0	16.2	34.7
Imports	14.6	29.1	185.4	13.1	29.9
Services	-2.6	-5.4	-34.0	-2.1	-4.6
of which: Travel	-0.8	-2.0	-12.3	-0.8	-1.7
of which: Transportation	-0.6	-1.1	-6.2	-0.4	-1.0
of which: Equipment rental	-1.1	-2.4	-15.0	-0.9	-1.7
Primary income	-2.3	-8.4	-36.7	-2.4	-8.2
of which: Interest	-0.9	-5.5	-20.0	-0.8	-5.1
of which: Dividends	-1.4	-2.9	-16.9	-1.7	-3.2
Secondary income	0.2	0.4	2.5	0.2	0.3
Capital account	0.0	0.1	0.4	0.0	0.0
Financial account	-2.1	-6.7	-7.7	-0.7	-6.3
Investments – assets <sup>1/</sup>	2.8	13.6	73.2	9.7	16.9
DI assets	-0.1	2.4	14.1	1.9	4.0
Portfolio invest.	1.1	2.9	0.5	0.3	0.7
Other invest.	1.9	8.3	58.7	7.5	12.2
of which: Banks' assets	-2.5	0.5	0.4	2.9	3.8
Investments – liabilities	8.6	24.9	86.6	12.5	25.8
DI liabilities	4.7	13.1	88.3	8.4	14.3
Equity	4.2	9.6	56.0	4.3	7.5
Intercompany lending	0.5	3.5	32.3	4.1	6.8
Total shares <sup>2/</sup>	0.1	4.2	-5.6	-1.5	2.0
Debt sec. in Brazil	0.5	6.4	-4.3	6.0	9.1
Loans and debt securities					
abroad long term <sup>3/</sup>	-1.3	-1.5	-7.4	-1.1	-3.9
Trade credit and other <sup>4/</sup>	4.6	2.8	15.7	0.8	4.3
Financial derivatives	0.4	0.6	2.8	0.2	-0.3
Reserve assets	3.3	4.0	2.9	2.0	2.8
Errors and omissions	-0.0	1.5	6.3	0.5	1.3
Memo:					
Current account/GDP (%)			-0.8		
DIL/GDP <sup>5/</sup> (%)			4.7		
Rollover rate (%)	67.7	78.1	92.9	49.1	65.4

1/ Includes direct investment, portfolio investment and other investments.

2/ Includes equities traded in stock exchanges in Brazil and abroad.

3/ Includes banks', buyers', bilateral and multilateral loans.

4/ Includes loans and debt sec. abroad short term.

5/ DIL: Direct Investment Liabilities.

\* Preliminary data.

the same period of 2018. This favorable performance mainly reflected lower net expenditures on the account of services and a slight increase in trade balance. In the 12-month period up to February, the current account deficit closed at 0.7% of GDP, against 0.5% of GDP in February 2018. According to a box presented in this Inflation Report, the estimated current account deficit for December 2019 is of 1.6% of GDP.<sup>22</sup>

The trade balance dropped by US\$0.3 billion in the first two months of 2019 when compared with the same period in 2018. Exports totaled US\$34.7 billion, increasing 1.6% against the first two months of 2018, while imports reached US\$29.9 billion, an expansion of 2.7% in the same comparison basis.

The service account deficit in the first two months of 2019 dropped 14.8% in the YoY comparison. Of note, the decline of net expenses on international travel (US\$0.3 billion) and equipment rental (US\$0.6 billion), reflecting the depreciated exchange rate and imports of platforms within the scope of Repetro, respectively.

The primary income deficit reached US\$8.2 billion in the first two months of the year, a slight decline of 2.1% compared with the same period in 2018. This trajectory mostly reflected lower net interest outflows, partially offset by higher net outflows of profits and dividends.

As for the financial accounts, net FDI inflows totaled US\$14.3 billion in the first two months of the year, compared with US\$13.1 billion in the same period of 2018. It should be mentioned that the volume of FDI inflows in the 12-month period continues at a level significantly above the current account deficit (US\$89.5 billion and US\$13.9 billion, respectively).

Direct investments abroad reached US\$4.0 billion in the first two months of 2019, compared with US\$2.4 billion in the same period of 2018. Foreign investments in stocks, funds and securities traded in the country registered net inflows of US\$10.7 billion (US\$10.6 billion in the same period of 2018).

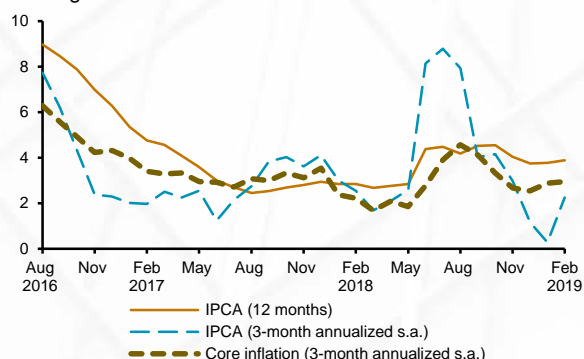
The long-term foreign credit, considering operations with private sector's bonds and direct loans on the international market, generated disbursements

22/ For further details about the balance of payments projection, see the box "Balance of Payments projections for 2019".

of US\$5.0 billion in the first two months of 2019, leading to a rollover rate of 65.4%, lower than the rate of 78.1% observed in the same period in 2018.

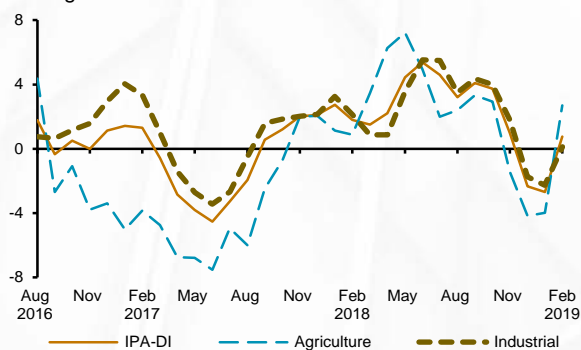
The estimated stock of external debt reached US\$317.8 billion in February, compared with US\$320.6 billion at the end of 2018. The ratio of the stock of international reserves to 12-month external debt maturities reached 348.9% in February (339.3% in December 2018). The stock of international reserves (US\$378.5 billion) reached 20.2% of GDP in February, a volume equivalent to 24 months of imports of goods.

**Figure 1.29 – IPCA trajectory**  
% change



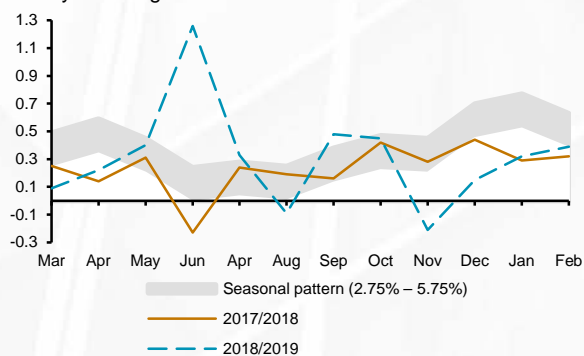
Sources: IBGE and BCB

**Figure 1.30 – IPA-DI**  
% change in 3 months



Source: FGV

**Figure 1.31 – IPCA – Seasonal pattern**  
Monthly % change



Sources: IBGE and BCB

## 1.3 Inflation and market expectations

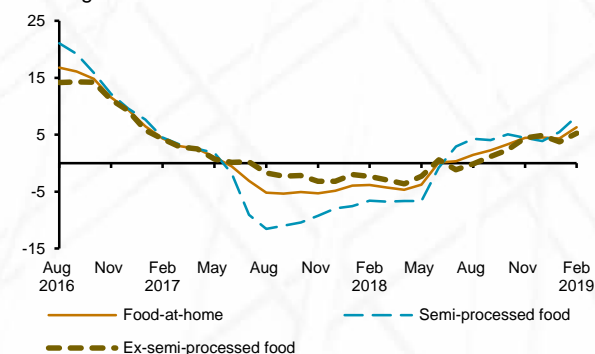
In the quarter ended in February, consumer inflation remained below the historical median compatible with the target, mainly reflecting the benign evolution of the components more sensitive to the economic cycle and the sharp decline in fuel prices. Underlying inflation measures continued at adequate or comfortable levels, following a trajectory compatible with the target.

### Price indexes

The Producer Price Index (IPA) rose by 0.76% in the quarter ended in February, compared with 0.97% in the previous quarter, accumulating an increase of 9.68% in the 12-month period (against 10.82% in November). The quarterly high mainly reflected the increase of agriculture and livestock prices (2.70% after a decline of 1.43% in the previous quarter), highlighting increased prices of potatoes and beans, relevant items for the consumer price dynamics. The industrial segment registered a variation of 0.13% (against 1.78% in the previous quarter), with emphasis on increased prices of iron ore, offset by lower prices of oil products and soybeans.

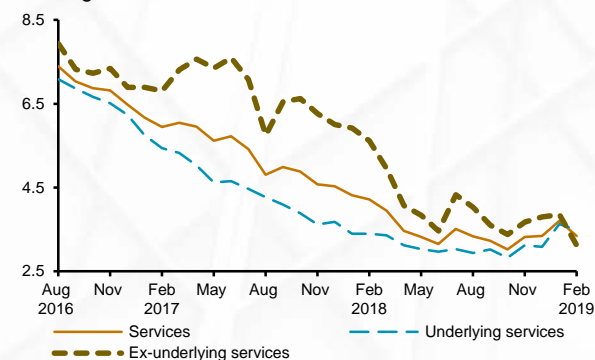
The Extended National Consumer Price Index (IPCA) rose from 0.72% in the quarter ended in November 2018 to 0.90% in February, remaining below the

**Figure 1.32 – IPCA – Food-at-home**  
% change in 12 months



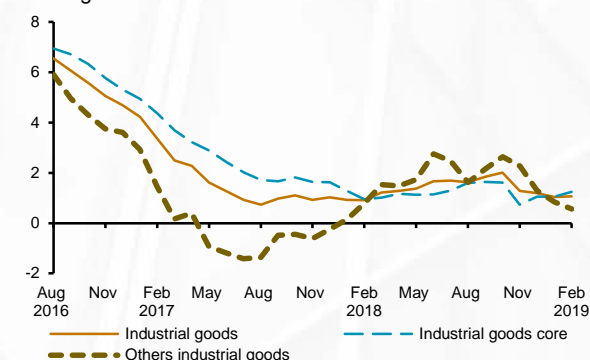
Sources: IBGE and BCB

**Figure 1.33 – IPCA – Services**  
% change in 12 months



Sources: IBGE and BCB

**Figure 1.34 – IPCA – Industrial goods**  
% change in 12 months



Sources: IBGE and BCB

historical median compatible with the target<sup>23</sup>. The 12-month cumulative inflation dropped to 3.89% in February from 4.05% in November.

Prices in the food-at-home segment rose by 2.73% in the quarter ended in February, against expansion of 1.25% in the previous quarter. This acceleration reflected the increase of semi-processed food products, especially the 105.10% increase in the prices of beans. Conversely, prices of industrialized and fresh food decelerated, due to lagged effects of exchange appreciation observed at the end of 2018 and the rainfall level below the seasonal pattern, respectively. In 12 months, food inflation accelerated from 4.44% in November to 6.31% in February.

The high slack in productive factors, in a context of anchored inflation expectations, continues contributing for keeping services inflation at low levels. In the quarter ended in February, services prices rose by 1.53%, compared with 0.98% in the previous quarter, remaining below the historical median compatible with the target. The quarterly acceleration was to a great extent associated with the seasonal behavior of the education group. In 12 months, services inflation rose from 3.32% to 3.35%, highlighting the expansion for the underlying component, from 3.12% to 3.49%. This trajectory reflected the increased prices of snacks, car repair and residential rents, influenced by higher increase of the minimum wage and indexation mechanisms.

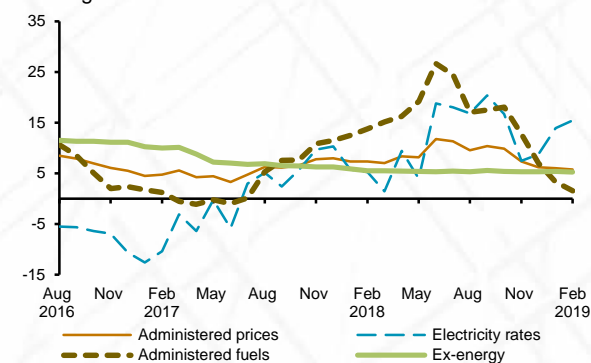
Prices of industrial goods rose from 0.22% in the quarter ended in November to 0.33% in the quarter ended in February. The partial price readjustment of items sold at discount prices in November, such as perfumes and cosmetic products, was offset by a sharp reduction in the prices of ethanol, in response to high stocks and decline in the price of gasoline, despite the unfavorable seasonality of the period. The 12-month high of prices of industrial products dropped from 1.28% in November to 1.06% in February, with acceleration in the underlying component and deceleration in the ex-underlying.<sup>24</sup>

Administered prices dropped by 0.55% in the quarter ended in February, compared with an

23/ Seasonal pattern obtained with trimmed monthly averages, excluding 20% of each tail for the period from 2012 to 2017, adjusted so as the accumulated index in the year reaches 4.25%. The seasonal range of Figure 1.31 was also calculated on the basis of the seasonal pattern in the period adjusted so as the accumulated index in the year lies between 2.75% and 5.75%.

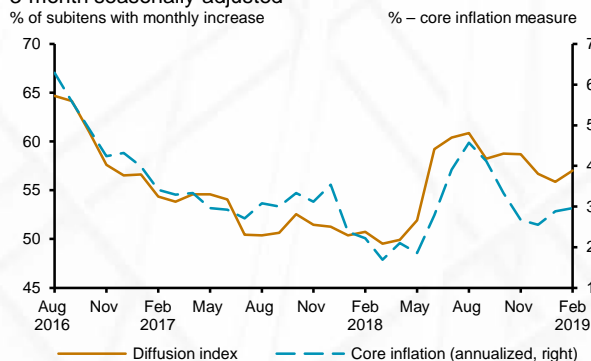
24/ The segmentation of industrial goods inflation was introduced in the box "New core inflation measures", published in the June 2018 Inflation Report.

**Figure 1.35 – IPCA – Administered prices**  
% change in 12 months



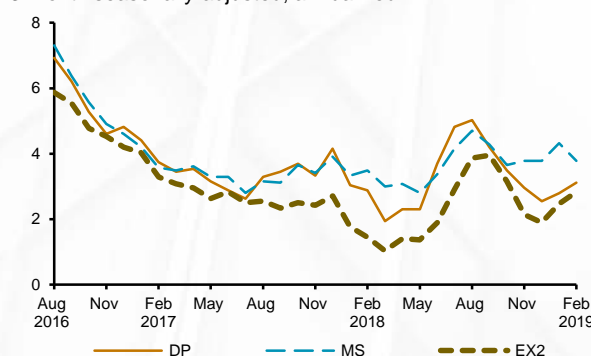
Sources: IBGE and BCB

**Figure 1.36 – Diffusion index and core inflation**  
3-month seasonally-adjusted



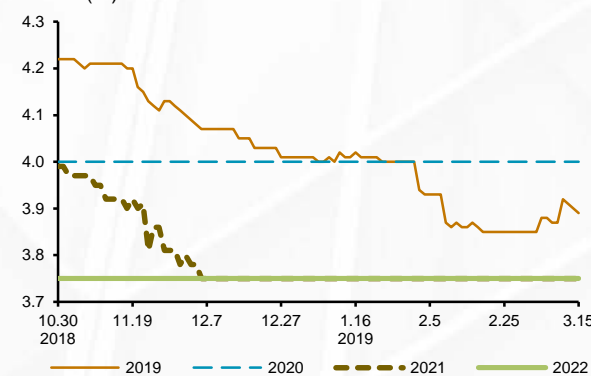
Sources: IBGE and BCB

**Figure 1.37 – IPCA – Core inflation**  
3-month seasonally-adjusted, annualized



Sources: IBGE and BCB

**Figure 1.38 – Market expectations – IPCA**  
Median (%)



expansion by 0.49% in the previous quarter. The favorable trajectory of industrial prices in the period was particularly due to the decline of gasoline prices, reflecting lower oil prices on the international market and the exchange appreciation. The slowdown of the effects of changes in the flag system of electricity rates and the seasonal increase in the urban bus fares only partially offset the lower gasoline prices in the quarter. The cumulative 12-month price variation of administered prices fell from 7.36% in November to 5.75% in February, with highs of 6.60% in the energy component (against 10.70%) and 5.25% in the ex-energy (against 5.33%).

## Diffusion index and core inflation measures

The diffusion index, which measures the proportion of IPCA components with positive monthly changes, registered an average of 60.66% in the quarter ended in February, compared with 59.01% in the quarter ended in November and 54.43% in the same quarter in 2018. In the seasonally adjusted series, the quarterly average of the diffusion index dropped from 58.71% in November to 57.03% in February. The current diffusion index level, although still above the one observed at the beginning of 2018, lies below the historical average.<sup>25</sup>

Overall, inflation cores measures monitored by the Banco Central signaled acceleration in the quarter ended in February. According to the annualized quarterly moving average, with seasonal adjustment, the average of the seven cores usually observed<sup>26</sup> rose from 2.67% in November to 2.96% in February. In the 12-month period, the average cores increased from 2.83% to 3.00% in February.

## Market expectations

According to the Focus Survey, the median of projections for the annual variation of the IPCA in 2019 fell from 4.07% on December 7 to 3.89% on March 15. The median of projections for 2020,

25/ Between January and May 2018, the seasonally adjusted diffusion index reached an average of 51.18%. The average of the series starting in January 2001 until December 2018 stands at 62.85%.

26/ Average of means Ex-0, Ex-1, Ex-2, Ex-3, trimmed means (MA), smoothed trimmed means (MS) and double-weighted (DP).

**Table 1.4 – Summary of market expectations**

	9.14.2018		12.7.2018		3.15.2019	
	2019	2020	2019	2020	2019	2020
In percentage						
IPCA	4.11	4.00	4.07	4.00	3.89	4.00
IGP-M	4.50	4.10	4.44	4.00	4.67	4.00
IPA-DI	4.50	4.50	4.20	4.50	5.18	4.00
Administered Prices	4.80	4.20	4.80	4.20	4.94	4.30
Selic (end-of-period)	8.00	8.13	7.50	8.00	6.50	7.75
Selic (average)	7.27	8.00	6.78	8.00	6.50	7.50
GDP growth	2.50	2.50	2.53	2.50	2.01	2.80
In BRL/US\$						
Exchange rate (end-of-period)	3.75	3.70	3.80	3.80	3.70	3.75
Exchange rate (average)	3.74	3.65	3.76	3.74	3.71	3.73

(continues)

2021 and 2022 remained stable at 4.00%, 3.75% and 3.75%, respectively. As for the smoothed inflation 12-months ahead, the median of projections rose from 3.77% to 3.99%.

The medians of expectations for the increase in administered prices in 2019 and 2020 reached 4.94% and 4.30% on March 15, respectively (4.80% and 4.20% on December 7). For 2021, the median of projections remained stable at 4.00%, but, for 2022, fell from 4.00% to 3.75%.

**Table 1.4 – Summary of market expectations**

(concluded)

	9.14.2018		12.7.2018		3.15.2019	
	2021	2022	2021	2022	2021	2022
In percentage						
IPCA	3.92	3.75	3.75	3.75	3.75	3.75
IGP-M	4.00	4.00	4.00	4.00	4.00	4.00
IPA-DI	4.50	4.25	4.50	4.38	3.75	3.75
Administered Prices	4.00	4.00	4.00	4.00	4.00	3.75
Selic (end-of-period)	8.00	8.00	8.00	8.00	8.00	8.00
Selic (average)	8.00	8.00	8.00	8.00	8.00	8.00
GDP growth	2.50	2.50	2.50	2.50	2.50	2.50
In BRL/US\$						
Exchange rate (end-of-period)	3.80	3.90	3.86	3.94	3.80	3.85
Exchange rate (average)	3.75	3.85	3.81	3.86	3.76	3.84



## Revision of the 2019 GDP projection

This box updates BCB'S projections for the growth of the Gross Domestic Product (GDP) in 2019, incorporating the results of the National Accounts for 2018 and the set of indicators available for the current quarter.

The central projection for GDP growth in 2019 was trimmed to 2.0%, slightly lower than the 2018 December Inflation Report projection (2.4%). The revision is associated with the reduction in statistical carry-over from 2018 to 2019, resulting from growth in the 2018Q4 at a lower magnitude than expected; to the unfolding of the tragedy in Brumadinho on the production of mineral extractive industry; to reductions in prognosis for the agricultural crop; and, residually, to the moderation in the pace of recovery of indicators released to this report's cutoff date.

On the supply side, agricultural and livestock production is expected to grow 1.0% in the year, compared to an increase of 2.0% in December, after a growth of 0.1% in 2018. The decline in projections reflects reductions in estimates for the 2019 agricultural crop, especially the lower production expected for soybeans — item with the highest weight in agriculture — due to the drought that occurred in important producing regions.

The projection for industry performance was reduced from 2.9% to 1.8% because of declines in growth expectations for the manufacturing and extractive industries. The manufacturing industry's growth estimate went from 3.2% to 1.8%, due to its lower-than-expected performance at the end of 2018 and the results of indicators related to manufacturing activity earlier this year. The forecast for the extractive industry fell from 7.6% to 3.2% due to expectations of a reduction in output following the collapse of a Brumadinho mining dam<sup>1</sup>. Growth estimates for construction and for the production and distribution of electricity, gas and water were kept at 0.6% and 2.3%, respectively.

An estimated 2.0% growth is expected for the tertiary sector in 2019. The reduction in projections compared to the estimate presented in December (2.1%) reflects impacts on activities that have a significant correlation with the behavior of the manufacturing industry. Additionally, there was a reduction in the projection of growth in financial intermediation and related services, from 2.6% to 2.0%, mainly due to the frustration in 2018Q4. On the other hand, the estimate for real estate and rental activities went from 2.0% to 2.9%, in line with the growth observed during 2018.

Regarding domestic components of aggregate demand, there was a decline in the projection for household consumption, from 2.5% to 2.2%, in line with related slowdown in the pace of labor market recovery at the end of 2018 and the beginning of 2019. The estimate for Gross Fixed Capital Formation (GFCF) showed a slight decline (from 4.4% to 4.3%), while the projection for government consumption remained unchanged at 0.6%.

Exports and imports of goods and services are expected to vary by about 3.9% and 5.6% in 2019<sup>2</sup>, compared to respective projections of 5.7% and 6.1% of the December Inflation Report. The reduction in export projections reflects a decline in estimates for the grain harvest, possible impacts on iron ore exports due

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1/ Although still with a high degree of uncertainty, the projection took into account the halt in the production of other mining units in the State of Minas Gerais.

2/ Prognoses for exports, imports and GFCF are subject to higher levels of uncertainty than usual due to uncertainties regarding the volume of exports and imports of equipment for the oil and gas industry, under the Special Customs Regime for the Export and Import of Goods used for Research and Development Activities of Oil and Natural Gas Deposits (Repetro).

to the Brumadinho tragedy, downward revisions in world growth forecasts and uncertainties regarding the recovery of Argentina's economy, which is an important destination of domestic manufactured goods, especially vehicles. The decrease in the import estimate is due to a reduction in the growth projections of the manufacturing industry and the GFCF, with a consequent decrease in the purchases of inputs and machinery and equipment, as well as the reduction in the projection for household consumption. In this scenario, the contributions of domestic and external demand to the evolution of GDP in 2019 are estimated at 2.2 p.p. and -0.2 p.p., respectively.

**Table 1 – Gross Domestic Product**  
4-quarter accumulated

	% growth	
	2018	2019
	IV Q	IV Q <sup>1/</sup>
Crop and livestock	0.1	1.0
Industry	0.6	1.8
Mining	1.0	3.2
Manufacturing	1.3	1.8
Construction	-2.5	0.6
Public utilities	2.3	2.3
Services	1.3	2.0
Commerce	2.3	2.3
Transportation and storage	2.2	2.4
Communications	0.3	1.9
Financial and related services	0.4	2.0
Other services	1.0	2.0
Real estate services	3.1	2.9
Public administration, health and education	0.2	1.0
Value added at basic prices	1.1	1.9
Taxes on products	1.4	2.2
<b>GDP at market prices</b>	<b>1.1</b>	<b>2.0</b>
Households consumption	1.9	2.2
Government consumption	0.0	0.6
Gross fixed capital formation	4.1	4.3
Exports	4.1	3.9
Imports	8.5	5.6

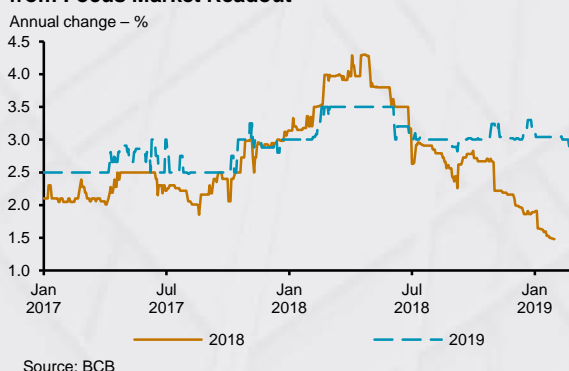
Source: IBGE

1/ Estimated

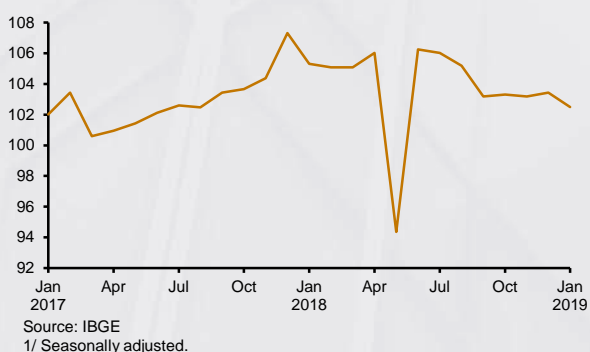
## 2018 industry performance

Industrial production – extractive and manufacturing industries aggregate – grew 1.2% in 2018, after the 2.5% increase in 2017, when the sequence of three years retraction ended, according to data from the Monthly Industrial Survey – Physical Production (PIM-PF) of the Brazilian Institute of Geography and Statistics (IBGE). A similar behavior was registered at IBGE's Quarterly National Accounts: changes of 1.9% and 1.3% in 2017 and 2018, respectively.

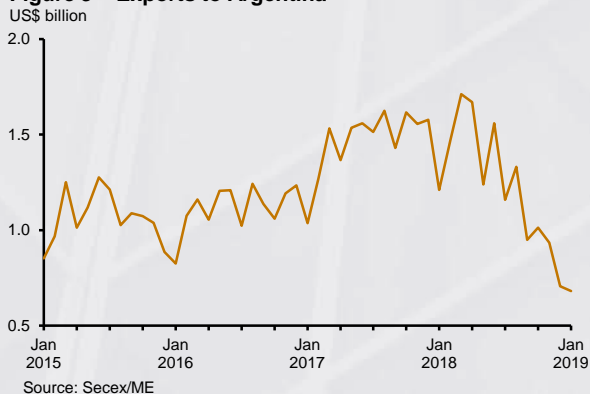
**Figure 1 – Median of industrial production forecasts from Focus Market Readout**



**Figure 2 – Industrial production<sup>1/</sup>**  
2012 = 100



**Figure 3 – Exports to Argentina**



The performance of industrial activity in 2018 thwarted the prospects for the sector registered at the beginning of the year, when the median of Focus projections for the annual variation of industrial production showed a growth of 4.3% (Figure 1). Up to April, industry performance, as measured by PIM-PF, corroborated this scenario, with a 4.5% expansion in the first four months of 2018 compared to the same period of the previous year. However, after the downturn in the cargo transportation sector in May (when industrial production fell by 11.0% in relation to April in the seasonally adjusted series) and the recovery recorded in June (variation of 12.6% over May), the manufacturing activity showed a tendency of contraction (Figure 2), with output in the fourth quarter 1.8% below the level recorded in the first one<sup>1</sup>.

In addition to the shutdown, whose impact roughly represented 1 p.p. in the industry's annual result, the trajectory of the PIM-PF *quantum* index in 2018 was affected by other factors, two of which are analyzed in this box. The first factor, of an economic nature, was the fall in exports to Argentina. The second factor, of a purely statistical nature, was the reduction of the proportion of raw material directed to the production of sugar as opposed to the production of alcohol.

### Economic nature factor: Exports to Argentina

In 2017, Argentina was the destination of 12.2% of Brazilian manufacturing industry exports and 1.6%

1/ In this comparison basis, the declining sectors represent approximately 65% of the PIM-PF, with emphasis on food (-7.1%), computer, electronic and optical (-16.4%), machinery and equipment (-3.6%) and motor vehicles (-2.6%).

of the gross production value<sup>2</sup> of the sector. In some segments, such as the automotive, this proportion is even more significant – in 2016, the year of the last available Resource and Use Table (TRU), the country was the destination of 71.9% of exports and 10.4% of the production gross value of this segment.

External sales to Argentina, which had been growing notably in recent years, have declined significantly since the peak reached in March 2018 (Figure 3), with implications for Brazilian economic activity that go beyond production that is no longer exported. The total impact must also account for the decline in the production of the inputs that are no longer demanded in the production that would be destined for export, as well as in the production of the inputs destined to those inputs, and so on. To estimate this effect, we used the Leontief multipliers<sup>3</sup>, obtained from the intermediate consumption structure of each activity<sup>4</sup>. As a proxy for the exogenous demand variation, the dollar-variation<sup>5</sup> per product of exports to Argentina in 2018 over 2017 was adopted<sup>6</sup>.

The exercise indicates that the decrease of 15.1% in exports to Argentina reduced the value added of the manufacturing industry by 0.38 p.p. (Table 1). Among the activities, we highlight the impact on vehicle production (-4.7 p.p.), followed by the production of auto parts (-2.0 p.p.). The former was the most directly affected by the decline in exports, equivalent to 4.5% of its production value, while the latter, despite not having its exports affected in the same magnitude, was impacted by the reduction in the production of the former – direct impact (-0.3 p.p.) and indirect impact (-1.7 p.p.). Mechanical machinery and equipment (-1.4 p.p.), ferrous metallurgy (-1.3 p.p.) and rubber and plastic (-0.7 p.p.) complete the list of the most affected activities.

**Table 1 – Impact of a 15.1% US\$ drop in exports to Argentina (2016 prices and 2018 realized drop)**

(%)

	Exports		Impact (Production)		Impact		Value added impact decomposition
	Weight 2017	Change 2018	Direct	Indirect	Prod.	Value added	
<b>Total</b>		<b>-15.1</b>	<b>-0.08</b>	<b>-0.09</b>	<b>-0.17</b>	<b>-0.09</b>	<b>100.0</b>
<b>Manufacturing</b>	<b>96.4</b>	<b>-17.4</b>	<b>-0.32</b>	<b>-0.16</b>	<b>-0.48</b>	<b>-0.38</b>	<b>52.5</b>
Vehicles	43.9	-25.8	-4.5	-0.2	-4.7		13.1
Auto parts	8.2	-5.1	-0.3	-1.7	-2.0		8.3
Machines	8.0	-30.9	-1.2	-0.2	-1.4		9.7
Metallurgy	4.7	-25.4	-0.7	-0.6	-1.3		4.0
Rubber and plastic	3.6	-12.4	-0.2	-0.5	-0.7		4.1
Others - manufacturing	28.0	-3.5	0.0	-0.1	-0.1		13.3
Retail	0.6	-6.4	0.0	-0.1	-0.1		17.7
Primary products	2.8	53.6	0.1	0.0	0.1		-7.4
Others	0.2	-48.2	0.0	-0.1	-0.1		37.2

2/ The average exchange rate of the year was adopted for comparison.

3/ Further details about the methodology can be found in Miller and Blair (2009).

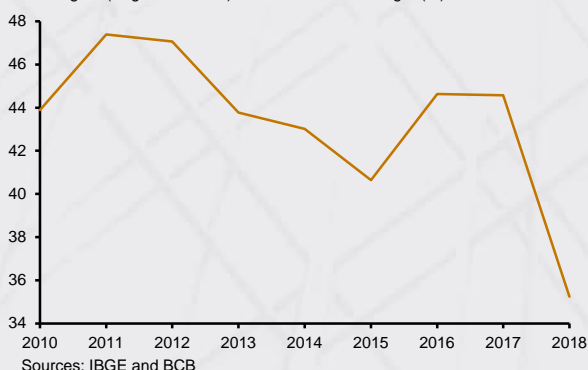
4/ The intermediate consumption structure was obtained from the Input-Output Matrix 2015 (IBGE), while gross production values and added values are derived from the 2016 TRU (IBGE).

5/ The dollar values of exports were deflated by the Gross Domestic Product (GDP) deflator for compatibility with the 2016 TRU.

6/ It is worth noting that in using the annual variations for 2018, the counterfactual for the year is the scenario in which exports to Argentina in 2018 would maintain the same level as in 2017.

## Statistical nature factor: Mix sugar/alcohol

**Figure 4 – Mix implicit in industrial production**  
Ratio Sugar / (Sugar + Ethanol) in total recoverable sugar (%)



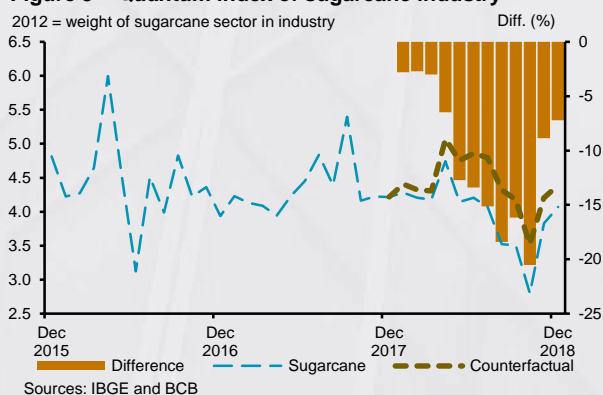
Favorable relative prices stimulated a record sugar cane allocation to alcohol production, in detriment to sugar production, in the 2018 harvest (Figure 4). The flexibility of the sector was important for the increase in ethanol production, in addition to the natural response of the quantity produced to the price of the product, since a large part of the production units can produce either product.<sup>7</sup>

The sugar/alcohol production mix has effects not only on the sectoral composition of the PIM-PF, but also on the aggregate index. The added value of the industrial transformation of each activity at PIM-PF is

measured by the evolution of its gross production, assuming that production and intermediate consumption show the same variation. The aggregates are constructed as Laspeyres indices that take as weight the value of the industrial transformation of 2010 (IBGE, 2015). It is implicit the hypothesis that the technologies (nominal ratio between value added and production value of each activity) and observed prices remained unchanged.<sup>8</sup> Thus, by setting a total sugarcane milling, it is possible that changes in prices and technology economically may justify a change in the mix by the sugar-alcohol industry, but that the impact measured by the PIM-PF is negative.

In order to quantify this effect, the substitution rate between the production of the two products<sup>9</sup> was used to define the industrial production of the sugar and alcohol sector as a function of the total grinding of sugarcane and the sugar/alcohol mix in each year<sup>10</sup>.

**Figure 5 – Quantum index of sugarcane industry**



A counterfactual is constructed in which the mix is kept constant in the value observed in 2017. The effect that the change of the mix had on aggregate industrial production in 2018 is estimated from its difference in relation to the observed series.

The exercise indicates that the lower proportion of sugar contributed with a reduction of 11.54 p.p. on the *quantum* index of the sugar and alcohol sector in 2018 and, consequently, 0.58 p.p. on the general industry (PIM-PF). Figure 5, which compares the

7/ In 2017, 71.8% of the 352 units were mixed, 25.3% were distilleries and 2.9% were sugar mills (Conab estimates, released in July 2017).

8/ From time to time, the IBGE updates the weights in order to minimize this problem.

9/ It takes 1.0495 kilograms of total recoverable sugars (TRS) to produce one kilo of sugar, while the production of one liter of anhydrous alcohol requires 1.7651 kilograms of TRS (Conab, 2013). The TRS represents the useful amount of sucrose in the sugarcane juice and depends on the crop and the location. Conversely, the relation between the final production and the quantity of inputs measured in TRS is constant, and it is a function of the technological standard used.

10/ Let  $X_{i,t} = \alpha_i Y_{i,0} I_{i,t} / I_{i,0}$  be the quantity, in TRS, for the production of good  $i \in \{\text{sugar, alcohol}\}$ , where  $\alpha_i$  represents the required amount of TRS for each unit produced,  $Y_{i,0}$  is the quantity produced of  $i$  in 2010 according to Annual Industrial Survey – Product (PIA-Produto, IBGE) and  $I_{i,t}$  is the respective fixed base index of the PIM-PF for year  $t$ , with year 0 representing the year base, 2010 ( $I_{i,0}$  is equal to the weight of good  $i$  in the base year). We used the evolution of the quantity in TRS by the PIM instead of direct data from other sources to concentrate the attention on the mix. However, the results are close, as can be seen in Figure 4. Thus, we derive the sector *quantum* index as a function of the mix,  $m_t = X_{a\&t} / \sum X_{i,t}$ :  $I_{a\&t} (I_{a\&t}, I_{al,t}) = I_{a\&t} + I_{al,t} = I_{a\&0} X_{a\&t} / X_{a\&0} + I_{al,0} X_{al,t} / X_{al,0} \Rightarrow I_{a\&al}(X_t, m_t) = m_t X_t \beta_{a\&} + (1 - m_t) X_t \beta_{al}$ , where  $X_t$  is the total of sugarcane in TRS destined for the sugar-alcohol sector and  $\beta_i = I_{i,0} / (\alpha_i Y_{i,0})$  is a scale factor that depends on the production of the base year.

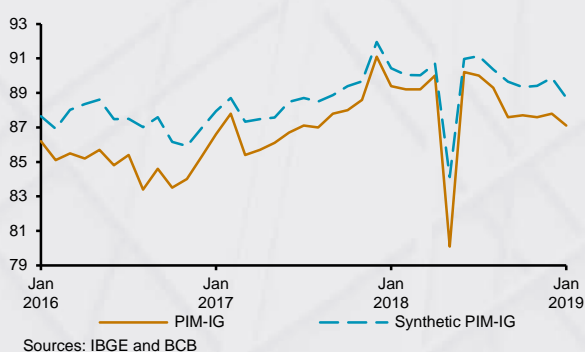
monthly evolution<sup>11</sup> of the sector index with its counterfactual, shows that the level effect has been growing throughout the year, reaching its maximum in October.

## Conclusion

In summary, this box analyzed the effects of two important factors affecting industrial production in 2018. It is estimated that the reduction in exports to Argentina contributed with -0.38 p.p. to the value added of the manufacturing industry. In addition, the record proportion of sugarcane destined to alcohol production decreased by 0.58 p.p. the general industry growth in 2018 (PIM-PF).

**Figure 6 – PIM-IG and synthetic PIM-IG**

2012 = 100



It is worth noting, however, that these two effects are not directly comparable because of the methodological nature of the latter. Unlike the PIM-PF, the Quarterly National Accounts (CNT-IBGE) are calculated on a moving basis, given the current values of the value added of the previous year, thus having, in theory, more updated weights in the most recent period of the series. It is estimated that the effect of the alteration of the mix of the destination of sugarcane on the GDP has been practically nil<sup>12</sup>.

Although relevant, the factors analyzed do not explain the entire industry deceleration in 2018.

Figure 6 shows the comparison of the general industry *quantum* index of the PIM-PF with its synthetic version, constructed by excluding the production of motor vehicles, sector most affected by the fall of exports to Argentina, and replacing the production of the sugar and alcohol sector by its previously presented counterfactual. Even controlling for these two effects, it should be observed that the general industry performed modestly in the year, with production in 2018Q4 being 0.7% lower than what would have been registered in 2018Q1. Therefore, additional factors also contributed to the industry slowdown, including the increased volatility of financial conditions that reflected both the international scenario and domestic uncertainties. The shocks that impacted the Brazilian economy throughout 2018 should still have their effects felt at the beginning of the current year.

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MILLER, R. E.; BLAIR, P. D. Input-output analysis: foundations and extensions. Cambridge: [w.n.], 2009.

11/ The monthly counterfactual was built starting from the average mix of each month in the period between 2013 and 2017. Then, a common multiplicative factor was applied every month so that the aggregate mix of 2018 coincided with that observed in 2017. The series obtained were seasonally adjusted with a generic specification based on that used by the IBGE in the PIM-PF deseasonalization.

12/ Estimated effect of -0.02 p.p. on the added value of the sugar and alcohol industry, implying an effect lower than 0.001 p.p. on the added value of general industry and the economy as a whole. To calculate the effect, we started from the 2016 TRU evolving the production by the PIM-PF data and the prices by the Escola Superior de Agricultura Luiz de Queiroz (ESALQ) data.

## Import penetration and export ratio in manufacturing

As variations in the exchange rate induct changes in relative prices, they influence spending decisions of households and corporations between domestic and imported goods, consequently affecting the production level of domestic manufacturing. Moreover, they affect the competitiveness of domestic goods abroad, with potential impact on the destination of domestic production. The present box seeks to analyze the behavior of the penetration of imported goods, as well as the exports of domestic manufactured goods, from 2002 to 2018.

For this purpose, series were constructed with values of an import penetration ratio (PI) and an export ratio (EC), based on 2015, year of the last Input-Output Matrix (MIP) made available by Brazilian Institute of Geography and Statistics (IBGE). A breakdown analysis was performed, considering four categories of use: intermediate goods (BI), capital goods (BK), durable consumer goods (CD), non-durable consumer goods (ND) – and 47 typical manufacturing products.<sup>1</sup>

For each pair “product x use category”, the import penetration ratio, at constant prices, is calculated as

$$PI_{p,c,t} = \frac{M_{p,c,t} \mathcal{M}_{p,c}}{P_{p,c,t} \mathcal{P}_{p,c} - X_{p,c,t} \mathcal{X}_{p,c} + M_{p,c,t} \mathcal{M}_{p,c}},$$

Where  $PI_{p,c,t}$ , is the import penetration of the product  $p$  from use category  $c$  in the month  $t$  at constant prices, seasonally adjusted;  $P_{p,c,t}$ ,  $M_{p,c,t}$  and  $X_{p,c,t}$  are the volume indexes, seasonally adjusted<sup>2</sup>, of production, imports and exports, respectively, of pair  $p \times c$ ; and  $\mathcal{P}_{p,c}$ ,  $\mathcal{M}_{p,c}$  and  $\mathcal{X}_{p,c}$  are their respective values in 2015, as per MIP<sup>3</sup> 2015. The source of the volume indexes is the Monthly Industrial Survey – Physical Production (PIM-PF) from IBGE, while the imports and exports indexes were calculated based on data released by the Ministry of Economy<sup>4</sup>.

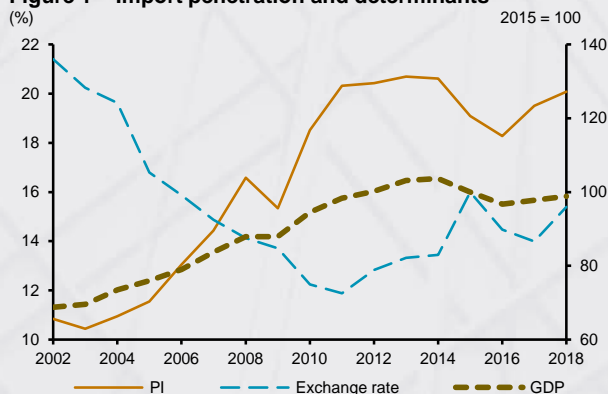
In a similar way, the export ratio  $CE_{p,c,t}$  was calculated as:

$$CE_{p,c,t} = \frac{X_{p,c,t} \mathcal{X}_{p,c}}{P_{p,c,t} \mathcal{P}_{p,c}}.$$

- 1/ The level of breakdown chosen was that which allowed compatibility between data available in the Input-Output Matrix and in the PIM. The account “aircraft, vessels and other petroleum equipment” was excluded from the calculation of the product, so as to avoid the contamination of the series, caused by changes in the customs tax regime “Repetro”, related to products destined for the petroleum industry.
- 2/ The adjustment on the production, imports, and exports series was calculated, for each pair, by the X13 method, controlling for business days, Easter, Carnival and Corpus Christi holidays. Therefore, the resulting import penetration and export ratio are indirectly seasonally adjusted. The totals by industry, product and use category were also indirectly adjusted, since the result was close to the one found when adjusting the series in a direct way, besides having the advantage of preserving the additivity of the basic series.
- 3/ As the MIP does not provide the produced and exported value of each product broken down into use categories but just data on the imports and demand, the portion of exports corresponding to each use category was calculated according to data about the values exported by the Common Nomenclature of the Mercosur (NCM), released by the Ministry of Economy. The value produced was calculated using the residue, ignoring variations in inventory.
- 4/ The imports and exports volume indexes were calculated implicitly, for each pair product x use category, given the variation on the unit price of each pair. Still, within each pair, it was allowed to classify the logarithms of price and weight indexes, observed in the pair, as outliers to the joint empirical distribution. Such outliers were disregarded when calculating the price indexes, but not when calculating the value index.

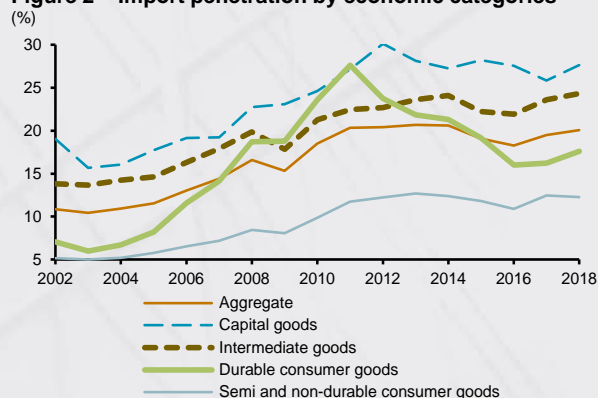
The evolution of the import penetration ratio relatively to the effective real exchange rate and the Gross Domestic Product (GDP) trajectories is displayed in Figure 1, whereas Figure 2 shows evolutions broken down into use categories. In general terms, the penetration of imports has presented two distinct phases since 2002. In the period up to 2013, when the Brazilian economy experienced consistent growth and significant valuation of the domestic currency, the penetration of imports spread through all use categories, rising from 10.8%, in 2002, to 20.7% in 2013. During this period, the upward trajectory of the share of imported products was interrupted by the 2008-2009 crisis. During the second phase, from 2013 up to the present, characterized by a devaluation of the domestic currency and lower economic dynamics, a relative stability was observed in the import penetration ratio, temporarily interrupted by the domestic recession of 2015 and 2016.

**Figure 1 – Import penetration and determinants**



Sources: Secex/ME, IBGE and BCB

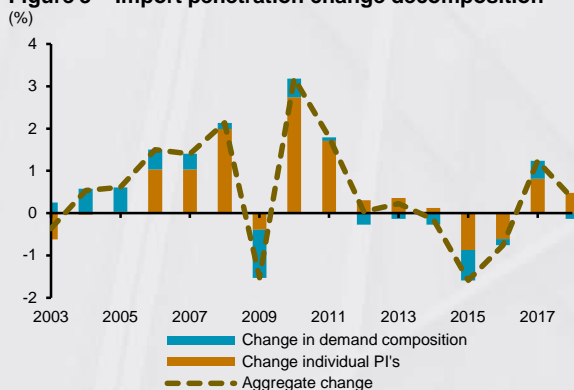
**Figure 2 – Import penetration by economic categories**



Sources: Secex/ME, IBGE and BCB

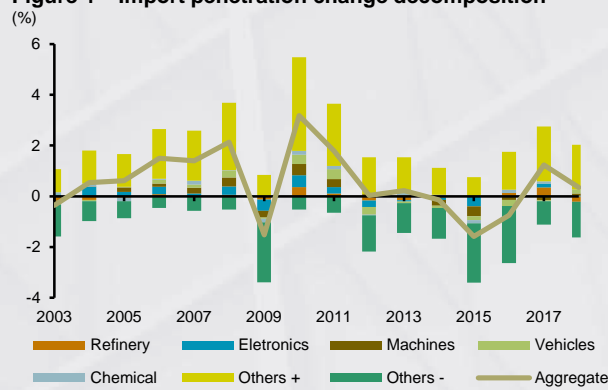
The variation in import penetration may be broken down<sup>5</sup> into a component related to the changes in the composition of domestic demand<sup>6</sup> and a component related to the changes in individual products penetrations. Figure 3 shows that most of the movements in the aggregate index result from changes in individual penetration indicators, with changes in the composition of domestic demand gaining relevance in times of falling aggregate penetration – in the crises of 2008-2009 and 2015-2016. In turn, the breakdown of the variation of import penetration into its several products<sup>7</sup> shows a significant pulverization of its movements (Figure 4). Of note, the individual contributions of “machinery and equipment”, “electronic and communication materials”, “petroleum derived products”, “automobiles” and “inorganic chemicals” products.

**Figure 3 – Import penetration change decomposition**



Sources: Secex/ME, IBGE and BCB

**Figure 4 – Import penetration change decomposition**



Sources: Secex/ME, IBGE and BCB

5/ As the aggregated import penetration ratio,  $PI(c, t) = \sum_p PI(p, c, t) D(p, c, t) / \sum_p D(p, c, t)$ , is not a linear function of individual penetrations and demands, there is no direct way of breaking it down into these two components. Therefore, the respective share in the aggregated differential penetration in time was adopted as the individual contribution of each component. Assuming that observations occur continuously over time, we have  $dPI(c, t)/dt = \sum_p \left[ (dPI(p, c, t)/dt) \left( D(p, c, t) / \sum_p D(p, c, t) \right) + \left( (dD(p, c, t)/dt) / \sum_p D(p, c, t) \right) (PI(p, c, t) - PI(c, t)) \right]$ .

6/ This is due to changes in the preference of the agents or basket of products with some degree of penetration, in detriment of a basic domestic supply.

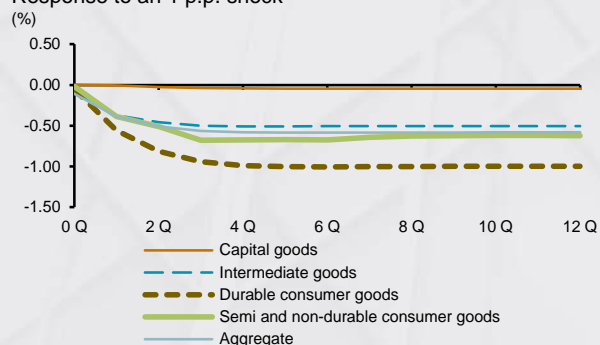
7/ In this case, the contributions of each product are added by varying their import penetration ratio and their domestic demand.

In order to identify the determinants of the dynamics observed in the import penetration, a VAR model was estimated for each category of use and for the aggregate indicator, relating the penetration of imports to the effective real exchange rate and the national GDP. The VAR was estimated in a quarterly frequency, relating the first logarithmic difference of each variable, besides a constant term. A dummy for the fourth quarter of 2008 was also included to control oscillations in the variables arising from the financial crisis of the period.

The results presented in Figure 5 indicate that a real effective devaluation of 1% generates a reduction of 0.6% in the penetration of imports in the aggregate after a year – a magnitude similar to the responses of intermediate and non-durable consumer goods.<sup>8</sup> The greater response to the exchange rate is found in the penetration of imports in response to the demand for durable goods, whose elasticity is unitary. In turn, the penetration of imported capital goods does not react to variations in the exchange rate<sup>9</sup>. Figure 6 shows the responses to domestic GDP, showing that economic growth favors the increase of import penetration – a 1% shock in GDP implies a 1.6% increase in the penetration of imports in the aggregate. Again, the exception is found in capital goods. The historical decomposition<sup>10</sup> of the accumulated variation of imports penetration is shown in Figure 7, indicating that the growth above the trend observed between 2007 and 2011 was influenced by both the more valued domestic currency and the national GDP.

**Figure 5 – Impulse response function of PI to exchange rate**

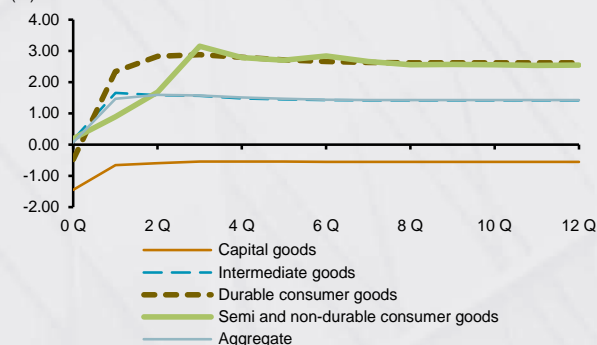
Response to an 1 p.p. shock



Sources: Secex/ME, IBGE and BCB

**Figure 6 – Impulse response function of PI to GDP**

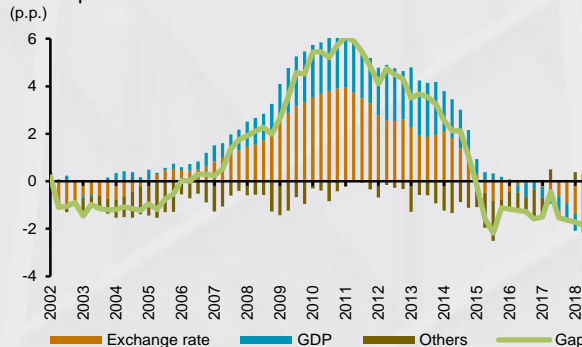
Response to an 1 p.p. shock



Sources: Secex/ME, IBGE and BCB

**Figure 7 – Import penetration historical decomposition**

Decomposition of accumulated variation relative to the trend



Sources: Secex/ME, IBGE and BCB

The evolution of the export ratio, shown in Figure 8, was more stable when compared to import penetration ratios. Of note the growth of the export ratio after 2014, a period marked by a significant growth of the world economy, a recession in the Brazilian economy and significant exchange rate fluctuations. The export

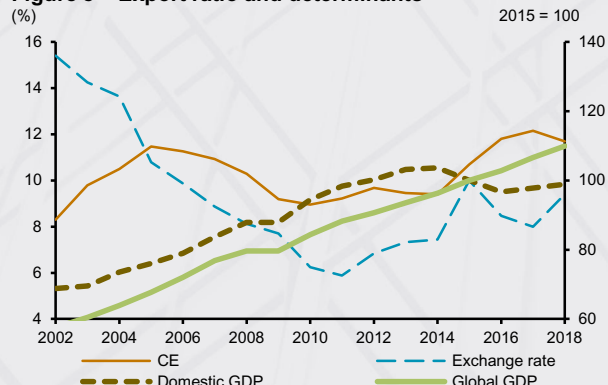
8/ The Cholesky decomposition was used for the analysis of the impulse-response functions, assuming that the order of the variables, from the most exogenous to the most endogenous, is the exchange rate, national GDP and imports penetration.

9/ Possibly, the import penetration of capital goods presents non-linearities, not captured by the model used to a greater degree than the other components due to the prospective character of its decisions.

10/ The historical decomposition used the same identification hypothesis used in the impulse-response functions.

ratio broken down into categories of use (Figure 9), broadly follows, in general terms, an evolution similar to that of the aggregate ratio, with the exception of durable consumer goods. Regarding the latter, the share of the external sector declined progressively between 2005 and 2014, but recovered in recent years, favored by the increase in exports of vehicles to Argentina.

**Figure 8 – Export ratio and determinants**



**Figure 9 – Export ratio by economic categories**

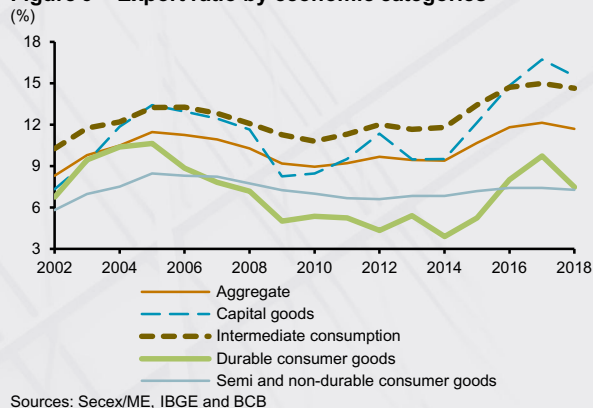
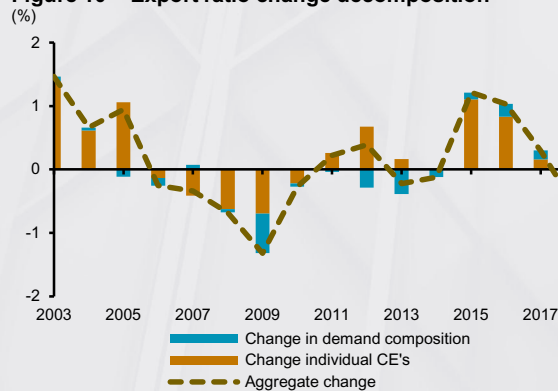
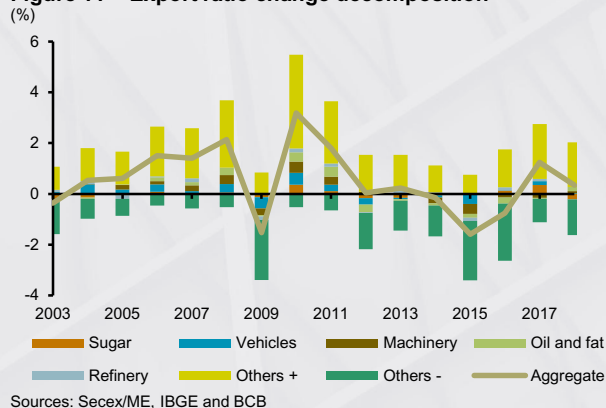


Figure 10 shows the cumulative twelve-month variation of the export ratio decomposed into the variation in the ratios of individual export products and in the sectoral composition of production. As in the case of import penetration, most of the variation is associated with individual movements, as opposed to variations associated with the share of each product. Figure 11 presents the breakdown of the export ratio into component products, showing that the evolution of the aggregate indicator reflects a movement even more pulverized than the import penetration ratio.

**Figure 10 – Export ratio change decomposition**



**Figure 11 – Export ratio change decomposition**



Similarly to the analysis performed on import penetration, the export ratio response was estimated using a VAR model, relating it to changes in the real effective exchange rate, the national GDP, and also a measure of global activity – the weighted GDP of the fifteen main destinations of Brazilian exports. The estimation also used a dummy for the fourth quarter of 2008 and a constant term<sup>11</sup>. The results show that the export ratio does not significantly reacts to variations in the exchange rate (Figure 12)<sup>12</sup>. In turn, the growth of the world economy leverages exports, while the export ratio responds negatively to the level of domestic activity. The importance of world demand is illustrated by the historical breakdown of the export ratio (Figure 13), pointing out to its important contribution to the growth of the ratio up to 2008. It is also noteworthy the

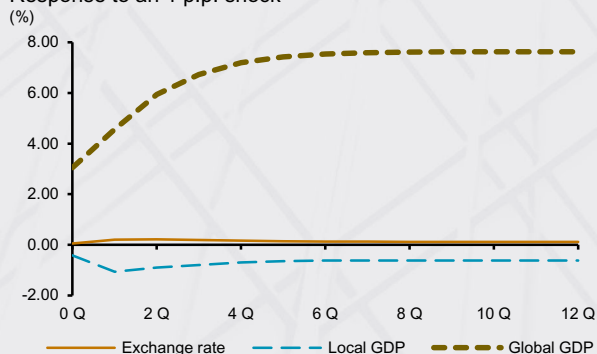
11/ The impulse-response functions considered the following hypothesis about the ordering of endogenous variables (from the most exogenous to the most endogenous): exchange rate, world GDP, national GDP, export ratio.

12/ The lack of response persists even when using alternative arrangements in the VAR. Even by repeating the product breakdown analysis, in only 3 out of 47 products a currency depreciation increased the export ratio in a statistically significant way. A possible explanation for this counter intuitive fact of insensitivity of the export ratio to the exchange rate are nonlinear effects, such as the presence of hysteresis in exports, which linear models like VAR are not able to identify.

contribution of some components in this period, signaling a greater trade openness not explained by the remaining components of the model – an effect reversed since 2006.

**Figure 12 – Impulse response function of CE**

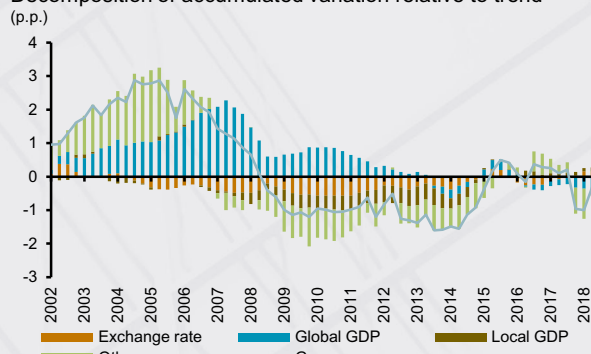
Response to an 1 p.p. shock



Sources: Secex/ME, IBGE, BCB and OCDE

**Figure 13 – Export ratio historical decomposition**

Decomposition of accumulated variation relative to trend



Sources: Secex/ME, IBGE, BCB and OCDE

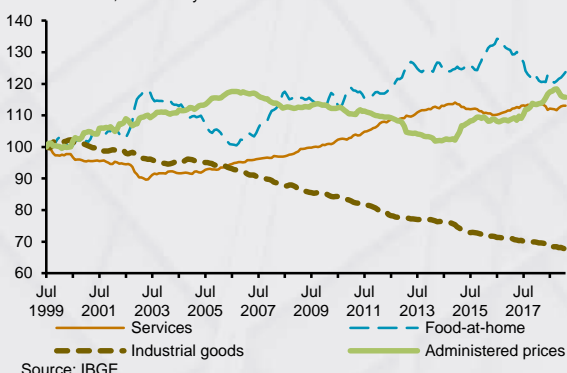
In short, this box showed that the share of imports in domestic demand for manufacturing products has grown significantly in the last decade, in a widespread manner, apparently due to the domestic currency appreciation and local economic growth, but has remained relatively stable over the last years. In turn, the participation of the foreign market in the destination of the domestic manufacturing production showed no significant response to changes in the exchange rate. Variations in the share of exports were mainly driven by the external economic cycle.

## Relative prices evolution in IPCA

The analyses of relative prices is important to understand inflation dynamics, by placing in perspective long run tendencies and fluctuations resulting from temporary shocks. This box evaluates relative prices evolution from the breakdown of the inflation of prices to consumer in the following components: food-at-home, industrial goods, services and monitored prices, considering the heterogeneous behavior of diverse price segments in the Brazilian economy in last two decades.

**Figure 1 – Relative prices – IPCA sectors**

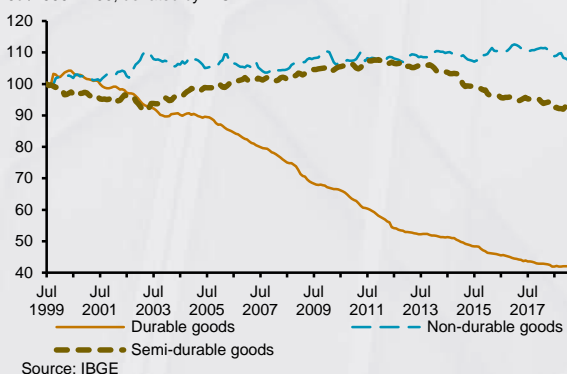
Jul/1999 = 100, deflated by IPCA



The breakdown by components – considering Extended National Consumer Price Index (IPCA) (Figure 1)<sup>1</sup> – highlights the upward trend of food and services relative prices, in contrast to industrial goods relative prices trajectory.<sup>2</sup> The monitored segment, in turn, alternate episodes of relative increase and decrease, reflecting regulatory and economic policy issues, besides the fluctuations attached to foreign exchange and climate adversities in the case of electricity prices.

**Figure 2 – Relative prices – Industrial goods**

Jul/1999 = 100, deflated by IPCA



The industrial segment shows, in general, greater capacity of incorporating technological advances that result in decrease of the cost of production and, therefore, reduction in its relative prices. Additionally, industrial goods are generally tradeable between distinct economies, which allows its prices to benefit from international and local trade expansion and reorganization. Among industrial goods, the relative prices reduction movement is more evident for durable goods, while non-durables and semi durables relative prices have a more stable standard, with a clear decreasing tendency of the last two in the most recent period (Figure 2). In general, the relative price reduction is more pronounced in categories of goods

in which there is greater frequency of technological innovation resulting in product creation or replacement of the existing ones by others of superior quality. This happens especially with electronic products.

The food-at-home segment, in the opposite direction, had an inflation trajectory above aggregate inflation<sup>3</sup> from mid-2000 until the end of 2016 (Figure 3)<sup>4</sup>. The growth in emerging economies economic activity, above global average, has contributed to this dynamics which pressed food demand by incorporating low-income individuals in the consumer markets. The increase in input prices, such as land, fertilizers and labor force,

1/ In this and in the others figures, the price indexes series of various inflation components were deflated by IPCA.

2/ Other analyses focusing the free prices segments can be find in the Inflation Report Boxes: "What determines the behavior of industrial goods inflation?", of December/2016; "Recent trajectory of food inflation", of June/2016; and "Services Sector Inflation", of September 2016.

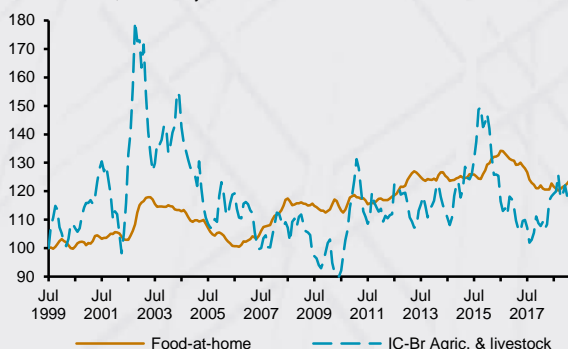
3/ Naturally, this trend has undergone higher cyclical variability due to supply shocks and foreign exchange fluctuations.

4/ Figure 3 compares food-at-home prices evolution to the Commodities Index – Brazil (IC-Br) for agriculture, in Brazilian reais, both deflated by the IPCA.

and the expressive increase in commodities prices have contributed in the same way. From 2017 on, there was lower pressure on food inflation, rebounding benign developments of agricultural commodities prices in a global economy slowdown environment, along with benign factors in the domestic food supply side. In general terms, it is observed that the behavior of food relative prices in Brazil is similar to other Latin America emerging countries (Figure 4).

**Figure 3 – Food and commodities**

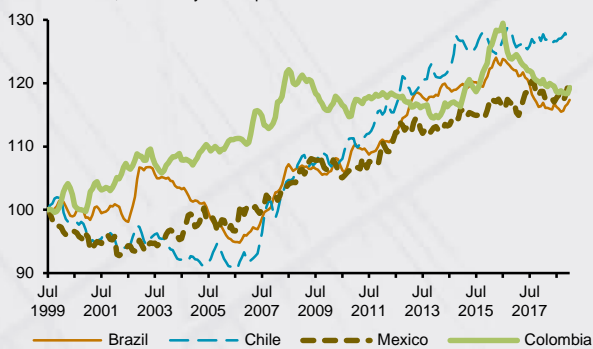
Jul/1999 = 100, deflated by IPCA



Sources: IBGE and BCB

**Figure 4 – Food relative prices**

Jul/1999 = 100, deflated by the respective CPI



Source: OECD

Relative prices in the services segment have increased from the beginning of 2003 to the end of 2014 and presented some stability in the last four years. This movement reflected, besides the smaller productivity gain and foreign competition, a more pronounced effect of the economic cycle on services prices. Figure 5 highlights how periods of increase in services relative prices are in line with admission real wage acceleration<sup>5</sup>, suggesting that the greater relevance of the labor factor in the sector cost structure enhances the economic cycle effects on services inflation.

**Figure 5 – Services and real wages**

Jul/1999 = 100, deflated by IPCA



Sources: IBGE and Secretaria de Trabalho/ME

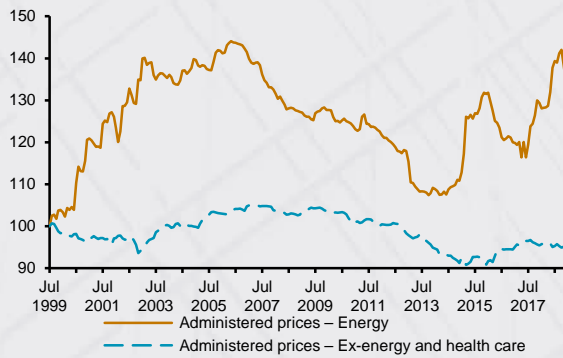
Energy items (fuels and electricity), that represent approximately 38% of the administered prices, contributed significantly to the path of prices in this segment (Figure 6). In the case of oil derived products, it is worth noting the impacts of foreign exchange, international prices and Petrobras prices policy. From 2005 to 2010, with exception of the second semester of 2008, foreign exchange appreciation mitigated the impact of the rise in fuels international prices. Infrequent price adjustments in refineries during the 2012-2014 period also contributed to this effect. In the period 2017-2018, the rise of fuels international prices had a significant impact on the increase in prices of energy items. Regulatory issues and irregularities in rainfall patterns between 2013 and 2015<sup>6</sup> considerably affected relative prices of energy segment, with impact still present on current prices.

5/ The average admission wages in the formal labor market series has been seasonally adjusted and deflated by IPCA.

6/ There was an average decrease of 19% in electricity prices in January and February 2013, in the context of the Provisional Measure 579/2012, converted in Law 12,783/2013. In March 2015, an increase of 22% was due to an extraordinary revision intended to ensure concessionaires an economic-financial balance, affected, among other factors, by an adverse hydrological scenario in the previous year. Additionally, in 2014, the exposure of distributors to the short term market, as a result the high degree of contract cancellations, led to the realization of credit operations and creation of the Regulated Contract Framework account (ACR-account), still present in the composition in electricity rates.

**Figure 6 – Relative prices – Administered**

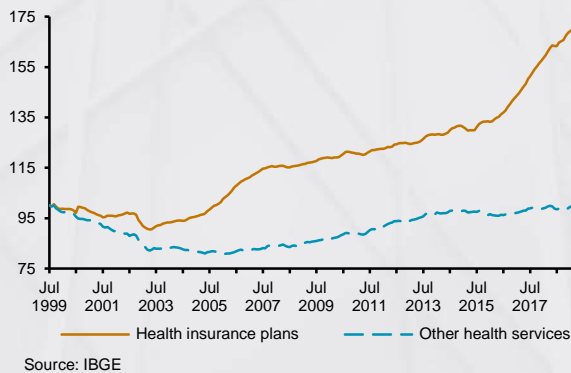
Jul/1999 = 100, deflated by IPCA



Besides the energy segment, but also with expressive participation in administered prices, it is worth noting item health plan, whose prices increased significantly above inflation and other health care services (Figure 7). The acceleration of health plan prices since 2016 is partially, related to the reduction in the number of beneficiaries (contributors), especially the youngest ones, a consequence of economic recession and the following period of gradual resumption of economic activity and the continuing growth of assistance expenditures.

**Figure 7 – Relative prices – Health services**

Jul/1999 = 100, deflated by IPCA

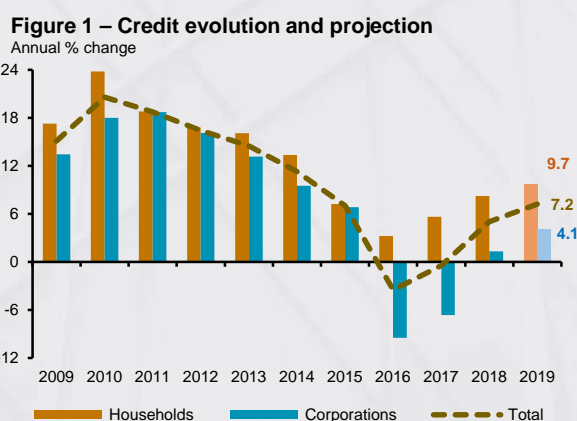


In summary, the analysis of the relative prices behavior of main IPCA segments highlights that the administered prices segment was an important source of relative prices fluctuations, compared with historical levels, due to structural changes that impacted the residential electricity item and fluctuations in fuel prices. Health plan prices were responsible for a significant pressure on the rise of administered prices, especially from 2016 on. Market prices presented distinct dynamics among its components, standing out the upward trend in food and services relative prices during the period, and the clear trend of reduction in industrial goods prices, particularly, durables.

## Credit projection for 2019

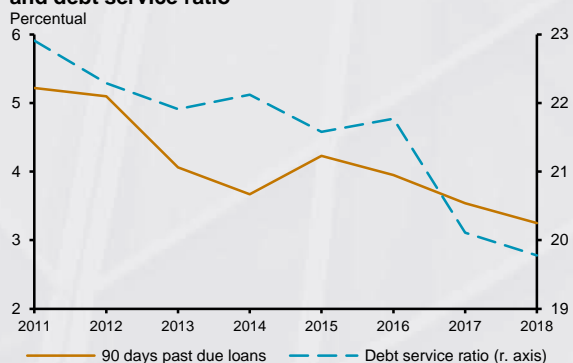
The balance of credit operations grew 5.1% in 2018, following a reduction of 0.5% in 2017. This trajectory mainly reflected the decline of interest rates, lower risk indicators and low delinquency rates. In this context, this box shows the estimated growth of the stock of credit operations in 2019, as well as the expected behavior of its key conditioning factors.<sup>1</sup>

For 2019, an acceleration in the pace of growth in the credit operations balance of the National Financial System (SFN) is expected to make it reach 7.2%, as a result of respective increases of 9.7% and 4.1% in the balances of household and corporate credit operations (Figure 1).

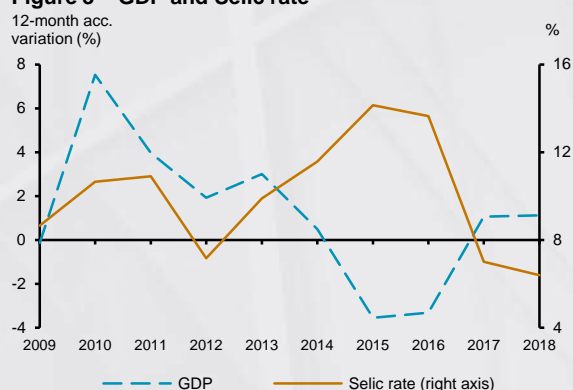


This projection is mostly sustained by the perspective of a greater Gross Domestic Product (GDP) expansion, in an environment of low and stable inflation, the maintenance of interest rates at low levels, the persistence of the favorable delinquency rates path, and the historically low income commitment of households with debts at the SFN. This favorable outlook conditioning the credit expansion is partially depicted by data shown in Figures 2 and 3.

**Figure 2 – Households: 90 days past due loans and debt service ratio**



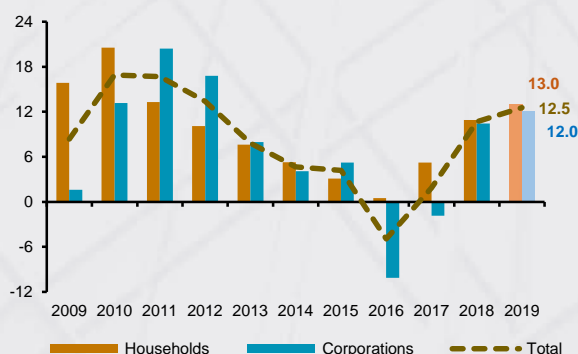
**Figure 3 – GDP and Selic rate**



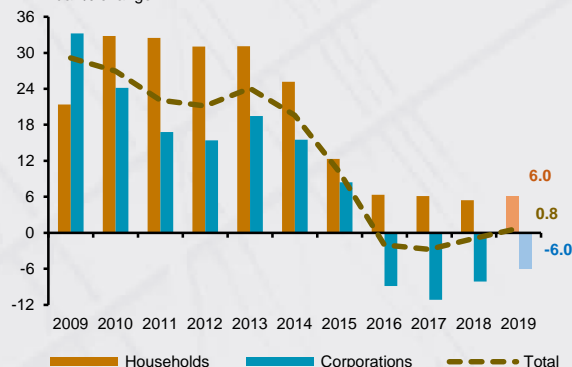
1/ Projections shown in this box are supported by several econometric models. Projections obtained through these models are based on a broad set of macroeconomic variables that synthesize the current state of the economy.

As observed over the last years, the pace of growth of credit operations by segments should persist on an heterogeneous trend. As for non-earmarked credit, for which an enhanced dynamics is observed since 2017, the expansion is projected at 12.5%, with respective increases of 13.0% and 12.0% for the balances of household and corporate segments. Of note, in the framework of household operations, the expansion expected for financing of vehicles and credit cards. With regard to the corporate segment, banking financing is expected to be still fueled by discount of receivables and the recovery of working capital.

**Figure 4 – Non-earmarked credit evolution and projection**  
Annual % change



**Figure 5 – Earmarked credit evolution and projection**  
Annual % change



The forecast for the evolution of the earmarked segment is the persistence of distinct dynamics for the household and corporate segments. Expansion is projected at 0.8% for earmarked operations in 2019, with respective variations of 6.0% and -6.0% for the household and corporate segments. In the household segment, it is noteworthy the projected acceleration of housing finance. As for the corporate segment, the pace of decline in the stock of Brazilian Development Bank (BNDES) credit operations is expected to slow down.

Table 1 summarizes the key projections shown in this box:

**Table 1 – Credit balance**

	12-month variation (%)			
	Occurred			Projection
	2017	2018	Feb 2019 <sup>1/</sup>	2019
<b>Total</b>	-0.5	5.1	5.6	7.2
<b>Non-earmarked</b>	1.8	10.9	11.5	12.5
Household	5.2	11.3	12.2	13.0
Corporations	-1.9	10.4	10.6	12.0
<b>Earmarked</b>	-2.7	-0.9	-0.7	0.8
Household	6.1	5.4	5.6	6.0
Corporations	-11.1	-8.1	-8.0	-6.0

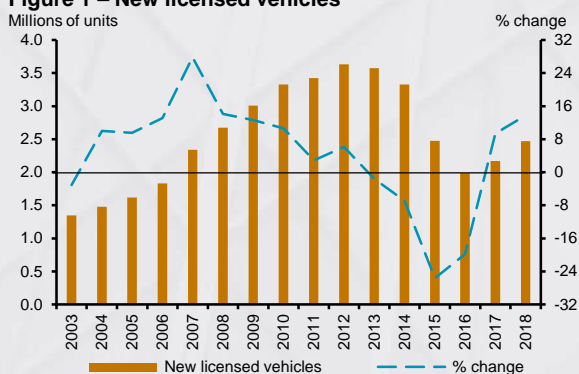
1/ Preliminary data.

## Credit and the recent dynamics of the automotive sector

The performance of the automotive sector has been a highlight in the recent process of economic activity recovery. Nearly 31.1% of the industrial output increase and 23.6% of the Gross Domestic Product GDP growth in the 2017-2018 period reflected the production and sales of vehicles.<sup>1</sup> This box analyses the underlying factors of the recovery of domestic sales of vehicles, particularly those related to its inherent financing processes.

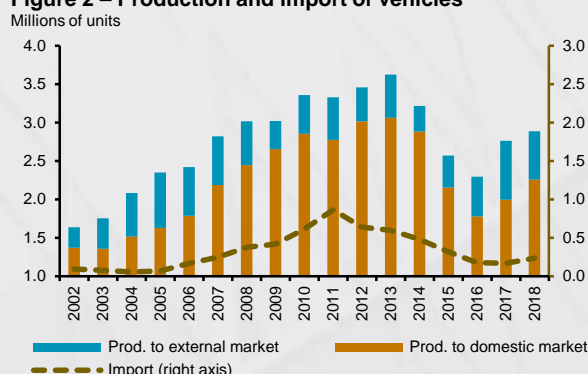
The market of automotive vehicles was one of the most severely impacted by the recent domestic economic crisis. From 2013 until 2016, the production of vehicles dropped by 46%, while the manufacturing output as a whole fell by 19%. As of 2017, sales and production of vehicles reacted to the gradual recovery of economic activity, followed by a significant monetary policy easing (Figures 1 and 2). The expansion of automotive sales in the 2017-2018 period reached 24.4%, compared with an expansion of 11.8% of broad retail sales, while the production of vehicles increased 32.0%, well above the growth rate of the manufacturing industry in the period (3.1%).

**Figure 1 – New licensed vehicles**



Source: Fenabrave

**Figure 2 – Production and import of vehicles**



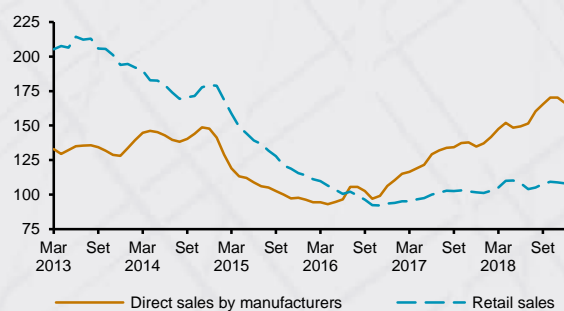
Sources: Anfavea and Ministry of Economy

A significant share of this reaction was due to the expansion of automakers' direct sales<sup>2</sup> in the total amount of new vehicles traded in the country. In 2018, direct sales reached 1,061 thousand vehicles, an expansion of 57.2% compared with those observed in 2016, while retail sales (authorized car dealers sales) reached 1,410 thousand units, an increase of 7.5% in the same period (Figure 3). Thus, the participation of direct sales reached 43.0% of the license plates of new cars and light commercial vehicles in 2018 (compared to 34.0% in 2016). The sales recovery observed as of 2017, much stronger with regard to direct sales, was driven by increased corporate demand, following two years of moderate investments in vehicles, especially in the car rental segment<sup>3</sup>.

- 1/ An estimate calculated on the basis of intersectoral relationships (coefficients) obtained from the input-output matrix of 2015. Out of the 3.1% expansion of the manufacturing industry in the 2017-2018 period, 0.4 p.p. is directly related to the increased production of vehicles and 0.6 p.p. reflected indirect effects. As for the 2.2% GDP growth in the period, the direct impact corresponds to 0.2 p.p., considering both production and sales, and the direct impact, 0.3 p.p.
- 2/ Direct sales refer to the license plates of new vehicles for which invoices were issued by the automakers, while retail sales refer to other new vehicles (for which invoices were issued by the manufacturer's authorized car dealers). Direct sales may originate from corporate sales, in which the automaker directly negotiates with large clients, as fleeters and/or car rentals, as well as from operations carried out by car dealers, for instance sales to taxi drivers, rural producers, handicapped persons, among others.
- 3/ Data from the Brazilian Association of Car Rental Companies (ABLA) show that car rental companies purchased 360 thousand cars and light commercial vehicles in 2017, corresponding to 16.6% of license plates in the country, compared with 218 thousand vehicles purchased in 2016.

**Figure 3 – Direct sales by manufacturers and retail sales**

Seasonally-adjusted – 3MMA – Average 2016 = 100



Sources: Fenabrave and BCB

**Figure 4 – Vehicles financing – Households**

% p.a.



With regard to credit operations for the financing of vehicles, the amount of new loans<sup>4</sup> (credit for the purchase of vehicles and leasing) contracted by individuals reached R\$102.9 billion in 2018, an expansion of 42.9% compared to 2016. The growth of household credit operations for the purchase of vehicles in the period took place in a scenario of declining interest rates and favorable delinquency trend (Figure 4). It is worth mentioning that the financing of new vehicles accounted for nearly 40% of loans for financing of vehicles.

Although in a significantly smaller volume, financing for the purchase of vehicles by corporations registered the sharpest growth rate in the 2017-2018 period, 118.4%, when compared to 2016, reaching a cumulative amount of R\$22.3 billion in 2018. In addition to the traditional types of vehicles financing, as of 2017 a sharp expansion in loans with receivables acquired from automakers<sup>5</sup> was observed, with terms of two to six months – from R\$1.7 billion in 2016, to R\$10.4 billion in 2018. Most of these operations resulted from automakers' sales to major car rental companies (nearly 95% in 2018). Thus, the volume of vehicles financing to corporations and receivables purchased from automaker reached R\$32.9 billion in 2018, increasing 174.4% when compared with operations contracted in 2016 (Figures 5 and 6).

**Figure 5 – Corporate financing and direct sales by manufacturers<sup>1/</sup>**

Average 2016 = 100

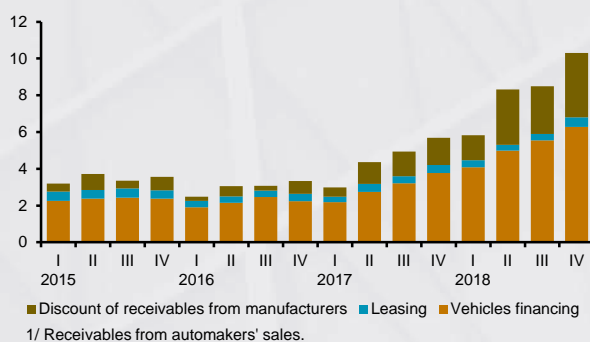


Sources: BCB and Fenabrave

1/ Vehicles financing, leasing and discount of receivables from manufacturers.

**Figure 6 – Corporate vehicles financing – New operations**

R\$ billion



1/ Receivables from automakers' sales.

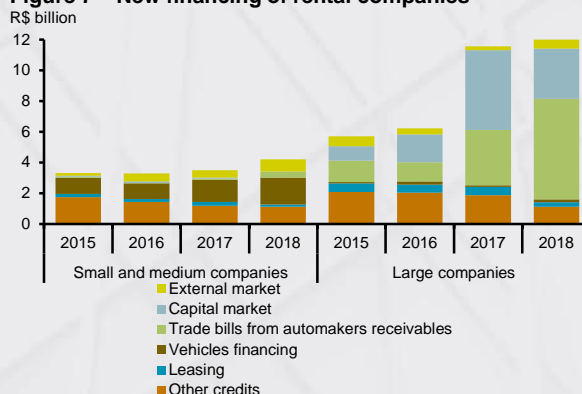
With particular regard to car rental companies, the volume of new credit operations within the National Financial System (SFN), comprising credit types for the purchase of vehicles, leasing and automakers-originated receivables) corresponded to 24.6% of total corporate financing in these credit types in 2015. The expansion of financing in this segment raised its participation to 33.5% in 2017 and 28.3% in 2018.

4/ It includes financing of cars, light commercial vehicles, trucks, buses and road implements, both new and used.

5/ These operations are characterized by lower tax burden, since they are exempt from Financial Operations Tax (IOF) on the acquisition of the financial flow, and no collaterals are associated to the vehicles, reducing the expenditures with the registration of liens and the release of the good for negotiation.

In addition to credit operations within the SFN, a sharp increase was observed in the funding of long-term resources in the capital market<sup>6</sup> by car rental companies. Car rental companies issued private securities in the capital markets worth R\$3.3 billion in 2018, expanding their funding by 72.8% when compared to 2016. In addition, they also funded R\$1.4 billion in the foreign market, 46.4% above the amount internalized two years before. Car rental companies have different financing strategies according to their size. Small and medium companies<sup>7</sup> operations are concentrated in traditional vehicle credit types (financing of vehicles and leasing operations accounted for 45.2% of all SFN loans in 2018 in both the external market and the domestic capital market by small and medium companies). In turn, 54.5% of large car rental companies financing operations are concentrated in receivables-related operations and only 4.0% in traditional credit types for vehicles financing (Figure 7).

**Figure 7 – New financing of rental companies**



Summing up, the performance of sales and production of vehicles has played a relevant role in the expansion of domestic economic activity over the last two years. This movement was significantly favored by the credit expansion in both household and corporate segments, in a scenario of declining interest rates, low inflation and favorable delinquency trend. The increased demand for vehicles observed in the period under analysis particularly reflected corporate purchases, especially direct sales, mostly related to automakers' negotiation of vehicles with large clients, for example, car rental companies. Credit market figures highlight the expansion of credit types (in addition to traditional credit lines for vehicles financing) associated with the dynamics of corporate sales, with emphasis on the expansion of receivables-related credit. Finally, as stressed in some boxes from previous Inflation Reports<sup>8</sup>, considering the broad corporate financing, it is noteworthy the significantly growing importance of capital markets as the source of financing for the automotive sector.

6/ Funding of resources in the domestic capital market by means of the issuance of debentures and promissory notes (issuances of debentures accounted for nearly 90% of these resources in 2018) were taken into account.

7/ For the purpose of this study, large companies are understood as those whose indebtedness in the SFN were higher than R\$100 million in some of their balance sheets in the period from 2015 to 2018.

8/ For further details, see boxes "Broad Corporate Financing", in the June 2018 Inflation Report, and "Corporate Financing Cost", in the September 2018 Inflation Report.

# Balance of Payments projections for 2019

**Table 1 – Balance of payments forecasts**

Itemization	US\$ billion					
	2018			2019		
	Feb	Jan- Feb	Year	Feb*	Jan- Feb*	Year <sup>1/</sup>
Current account	-2.0	-8.3	-14.5	-1.1	-7.7	-30.8
Balance on goods	2.7	5.1	53.6	3.2	4.8	40.0
Exports	17.3	34.2	239.0	16.2	34.7	247.0
Imports	14.6	29.1	185.4	13.1	29.9	207.0
Services	-2.6	-5.4	-34.0	-2.1	-4.6	-36.4
of which: Travel	-0.8	-2.0	-12.3	-0.8	-1.7	-15.0
of which: Transportation	-0.6	-1.1	-6.2	-0.4	-1.0	-7.5
of which: Operating						
leasing services	-1.1	-2.4	-15.0	-0.9	-1.7	-13.5
Primary income	-2.3	-8.4	-36.7	-2.4	-8.2	-37.2
of which: Interest	-0.9	-5.5	-20.0	-0.8	-5.1	-17.0
of which: Dividends	-1.4	-2.9	-16.9	-1.7	-3.2	-20.5
Secondary income	0.2	0.4	2.5	0.2	0.3	2.7
Capital account	0.0	0.1	0.4	0.0	0.0	0.4
Financial account	-2.1	-6.7	-7.7	-0.7	-6.3	-30.4
Investments – assets <sup>2/</sup>	2.8	13.6	73.2	9.7	16.9	72.5
DI assets	-0.1	2.4	14.1	1.9	4.0	10.0
Portfolio invest.	1.1	2.9	0.5	0.3	0.7	10.0
Other invest.	1.9	8.3	58.7	7.5	12.2	52.5
of which: Banks' assets	-2.5	0.5	0.4	2.9	3.8	-4.8
Investments – liabilities	8.6	24.9	86.6	12.5	25.8	123.2
DI liabilities	4.7	13.1	88.3	8.4	14.3	90.0
Total shares <sup>3/</sup>	0.1	4.2	-5.6	-1.5	2.0	5.0
Debt sec. in Brazil	0.5	6.4	-4.3	6.0	9.1	10.0
Loans and debt securities						
abroad long term <sup>4/</sup>	-1.3	-1.5	-7.4	-1.1	-3.9	-0.8
Loans and debt sec.						
abroad short term	3.4	-0.4	5.9	0.5	1.8	-
Trade credit and other	1.3	3.2	9.7	0.2	2.5	19.0
Financial derivatives	0.4	0.6	2.8	0.2	-0.3	-
Reserve assets	3.3	4.0	2.9	2.0	2.8	20.3
Errors and omissions	-0.0	1.5	6.3	0.5	1.3	-
Memo:						
Current account/GDP (%)	-1.4		-0.8			-1.6
DIL/GDP <sup>5/</sup> (%)	3.2		4.7			4.8
Rollover rate (%)	67.7	78.1	92.9	49.1	65.4	100.0

<sup>1/</sup> Forecast.

<sup>2/</sup> Includes direct investment, portfolio investment and other investments.

<sup>3/</sup> Includes equities traded in stock exchanges in Brazil and abroad.

<sup>4/</sup> Includes banks', buyers', bilateral and multilateral loans.

<sup>5/</sup> Direct Investment Liabilities.

\*Preliminary data.

This box presents revised projections for the 2019 balance of payments. The new estimates consider balance of payments statistics published since the December 2018 Inflation Report, domestic and international economic developments, and the most recent data on the stock and service of the country's external indebtedness.

The prospects for a slowdown in global growth and a reduction in the projection of the domestic Gross Domestic Product (GDP) in 2019, conditioned the revision – from US\$35.6 billion to US\$30.8 billion (1.6% of GDP) – of the current account deficit in 2019. The revision incorporates timely changes in the composition of the deficit, with the expectation of a slight increase in the trade surplus, and reductions in net expenses on primary income and services.

A trade surplus of US\$ 40.0 billion is projected for the year, with a 3.3% increase in exports and an 11.6% increase in imports. Exports are expected to reduce US\$3.0 billion to US\$247.0 billion, while imports are expected to reduce US\$5.0 billion to US\$207.0 billion, compared to the previous projection. The revision of the trade balance reflects a reduction in the projection of domestic economic growth, as well as the effects of the tragedy in Brumadinho on iron ore exports and the expectations of a smaller soybean crop this year. It is worth mentioning that, excluding the estimated effects on the acquisitions and sales of oil platforms under Repetro, exports and imports would increase, in the order of 5.3% and 8.9%. Of note the high uncertainty involving estimates of these values.

The service account deficit is projected at US\$36.4 billion – US\$2.0 billion lower than the previous Inflation Report, which is equivalent to a growth of 7.1% over 2018. The revision was due to the adjustment in the travel account, affected by the evolution of the exchange rate and the update of estimates of domestic income growth. Projections

for net transportation and equipment rental expenses were kept at US\$7.5 billion and US\$13.5 billion, respectively.

Net interest payments are projected at US\$17.0 billion, slightly below the previous projection (US\$17.7 billion), considering the most recent external debt schedule. Projections for net remittances of interest earnings and secondary incomes inflows were kept at US\$20.5 billion and US\$2.7 billion, respectively.

The projection for net inflows of Foreign Direct Investment in Brazil (FDI) stays at US\$90.0 billion (4.8% of GDP), compared to US\$88.3 billion recorded in 2018. Excluding the effects of oil platforms operations under Repetro, the indicator would reach 4.1% of GDP by the end of 2019, comfortably surpassing the expected financing requirement for current account transactions. Brazilian Direct Foreign Investment Abroad (DIA) projection was increased from US\$7.0 billion to US\$10.0 billion, considering the evolution of recent flows.

The projection of portfolio investment assets did not undergo revision, standing at US\$10.0 billion. Under portfolio investment liabilities, net inflows in stocks and mutual funds up to February have behaved in line with the gradual recovery of expectations in regard to the Brazilian economy, with a projection of US\$5.0 billion. The projection for securities net flows in the country increased to US\$10.0 billion, in line with the significant inflows observed at the beginning of the year.

Rollover rates calculated on long-term loans and securities traded on international markets were kept at 100%.

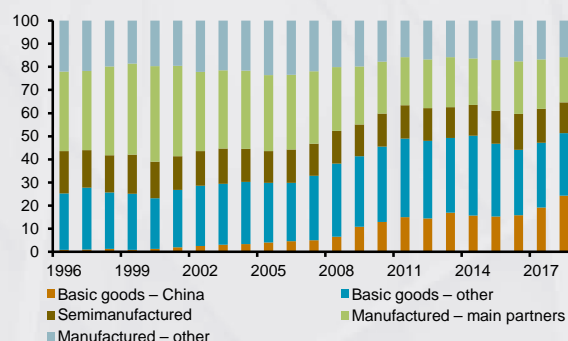
## Evolution of the Brazilian list of exports and its determinants

Over the last two decades, there has been a growing participation of emerging countries in the global economy, with significant impacts on trade relations between countries. In particular, a decline in the share of manufactured goods was observed in the international trade during the first decade of the 2000s. Brazil followed the world trend, registering a decline in the share of manufactured products in exports, but in a more intense way than in global terms. This box aims to evaluate the evolution of the Brazilian list of exports over the last ten years and its possible determinants.

During the period analyzed, a relevant change in the Brazilian list of exports was observed<sup>1</sup>. In 2008, the share of manufactured products in total exports (48%) was higher than the proportion of commodities (38%) and semi-manufactured goods (14%)<sup>2</sup>. The European Union was the main destination for Brazilian products, and, together with the United States, Argentina and China, accounted for 55% of the country's total foreign sales. This pattern changed in the 10-year period since 2008, as commodities became the leading product in the list of exports in 2018, with a 51% share, while the participation of manufactured products dropped to 35% of the exported value (Figure 1). As far as destinations are concerned, China gained relevance and became the main consumer of Brazilian products, followed by the European Union, the United States and Argentina.

**Figure 1 – Exports' decomposition<sup>1/</sup>**

As a % of the total



Source: Secex/ME

1/ Main partners: EU, Argentina, USA and Venezuela.

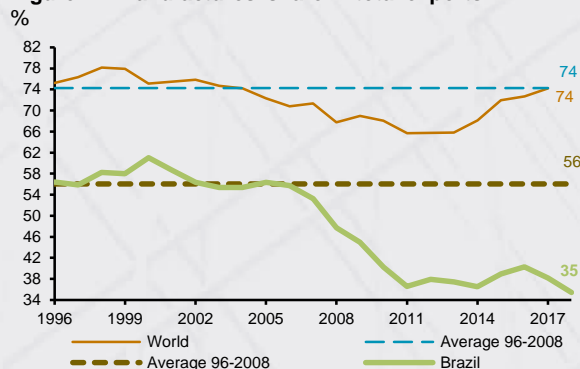
The fall in the share of manufactured goods in exports, after 2008, was not restricted to Brazil. According to data from the World Bank<sup>3</sup>, the share of manufactured goods in total world exports reached the peak of 78% in 1998 and then followed a downward trajectory until 2011, when it registered the series' minimum value, 66%. The Brazilian data indicate a behavior similar to that observed in the rest of the world, showing, however, more pronounced movements. Between 1998 and 2011, the decrease in the share of Brazilian manufactured goods in total foreign sales reached 0.22 p.p. (12 p.p. in the world). However, the reversal of the trajectory of loss of share of these goods in the flow of world exports, observed since 2012, has not yet materialized in the Brazilian case (Figure 2).

1/ The breakdown of the products that make up Brazil's list of exports followed the Aggregate Factor pattern, which was elaborated by the statistical area of the former Foreign Trade Department (Cacex) of Banco do Brasil, a department previously responsible for the administration of Brazilian foreign trade.

2/ All data used in this box excludes values related to exports of oil platforms and special operations.

3/ World Bank data was obtained from the World Integrated Trade Solution, available at: <https://wits.worldbank.org/>.

**Figure 2 – Manufactures' share in total exports <sup>1/</sup>**



Sources: SECEX/ME and World Bank (WITS)  
1/ Last world data: 2017.

Some factors may explain this detachment of Brazil in relation to the rest of the world. These include: i) China's strong growth and growing demand for Brazilian commodities<sup>4/</sup>; ii) the low economic growth of important consumer markets of Brazilian manufactured products; and iii) the reduction of the market share of Brazilian manufactures.

In order to infer the impacts of each of these factors, four possible counterfactual scenarios were created. For each of them, the corresponding trajectory of the share of manufactured products in the Brazilian list of exports is simulated, trying to illustrate what could have happened if the factors in question were not in operation. Table 1 summarizes the characteristics and methodology of each scenario.

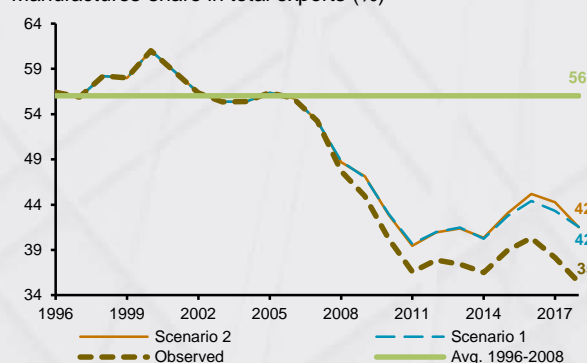
**Table 1 – Description of scenarios**

Scenarios	Description	Methodology
Scenario 1 – China	Evaluation of the high Chinese growth effect and its growing demand for the Brazilian commodities	<ol style="list-style-type: none"> <li>1. As of 2008, the IMF's global growth was used as the basis for China's real growth. Then, the official Chinese deflator was used and a new annual value of nominal GDP was obtained;</li> <li>2. With new nominal GDP value, a new annual value was found for Chinese imports (of Brazilian products), using the official Import/GDP ratio for the respective year;</li> <li>3. The new value of imports was distributed by aggregate factor using the average share of 1996-2006;</li> <li>4. The value of Brazilian exports to other countries was maintained and the new composition of the Brazilian list of exports was calculated.</li> </ol>
Scenario 2 – Economic slowdown in destination markets of Brazilian manufactured goods	Evaluation of low growth effect in main destinations of Brazilian manufactured goods	<ol style="list-style-type: none"> <li>1. As of 2008, the IMF's global growth was used as the basis for the European Union, Argentina and Venezuela real growth. Then, the official deflator for these countries was used and a new annual value of nominal GDP was obtained for each of them;</li> <li>2. With new nominal GDP value, a new annual value was found for imports of these countries (of Brazilian products), using the official Import/GDP ratio for the respective year;</li> <li>3. The value of Brazilian exports to other countries was maintained and the new composition of the Brazilian list of exports was calculated.</li> </ol>
Scenario 3 – Market share loss	Evaluation of the effect of reducing the market share of manufactured products worldwide	<ol style="list-style-type: none"> <li>1. As of 2008, the 2007 participation of Brazil in the total world exports of manufactured goods was maintained;</li> <li>2. The new composition of the Brazilian list of exports was calculated.</li> </ol>
Scenario 4 – "Optimistic"	Assessment of the effect of China's increased demand for commodities and the market share reduction of manufactured products worldwide. It corresponds to the most optimistic scenario in terms of the participation of manufactures in the list of exports, since, among all the scenarios, considers the lower value for commodities and the greater value for manufactured goods.	<ol style="list-style-type: none"> <li>1. Commodities and semi-manufactured products data from scenario 1 and manufactured products data from scenario 3 were used, and then the new composition of the list of exports was calculated.</li> </ol>

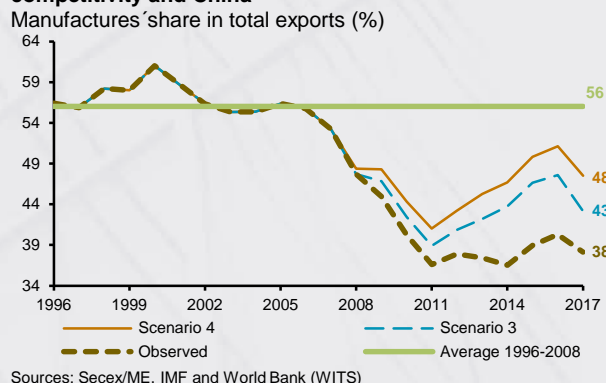
4/ In 2018, commodities accounted for 88% of the total value exported to China.

The results (Figures 3 and 4) show that the greatest change in the composition of the Brazilian list of exports derived from the asymmetric effect on commodities exportations in relation to manufactured products, due to the strong growth of the Chinese economy (Scenario 1). Without this effect, the share of manufactured products in the list of exports would be 7 p.p. above that observed in 2018. The reduction of the market share of manufactured products made in Brazil (Scenario 3) appears in second place, in terms of impact on the composition of the Brazilian list of exports<sup>5</sup>. Due to this factor, manufactured goods lost about 5 p.p. of the country's foreign sales in 2017. Finally, the economic slowdown in important destinations of Brazilian manufactured products (Scenario 2) had little effect on the composition of the list. It is also worth noting that even in the optimistic scenario (Scenario 4), the share of manufactured goods would not return to the average level of 1996-2008, thus suggesting that the country lost representation in the world trade of these products.

**Figure 3 – Counterfactuals scenarios – Main partners<sup>1/</sup>**  
Manufactures' share in total exports (%)



**Figure 4 – Counterfactuals scenarios – World competitiveness and China**  
Manufactures' share in total exports (%)



In order to identify which countries would have replaced Brazilian manufactured products, we analyzed data available from the World Bank (Table 2) to search for countries that had an increased share in world exports of their manufactured goods.

China was the country with the greatest increase in the participation of manufactured products in the global market in the period, going from 11%, in 2008, to 16% in 2017. It should be noted that countries with greater similarities with Brazil, such as Mexico and India, also gained space in the global exports of these products. One possible explanation for this discrepancy would be the greater level of integration of these countries into international trade flows. According to data from the World Trade Organization (WTO)<sup>6</sup>, while Mexico and India have, respectively, 13 and 9 free trade agreements, Brazil has only 1. It is also possible that the loss of space of manufactured products in the list of exports reflects differences in the evolution of its competitiveness in relation to other exported products.

**Table 2 – Main manufactured goods exporters**

In 2008		In 2017		Share variation 2008-2017	
Country/Block	Partic. (%)	Country/Block	Partic. (%)	Country/Block	Share partic. (p.p.)
European Union	12.9	China	16.0	China	4.9
China	11.1	European Union	13.0	South Korean	0.9
United States	8.1	United States	8.6	Mexico	0.7
Japan	5.8	Japan	4.6	Hong Kong	0.7
South Korean	3.0	South Korean	3.9	India	0.6

Source: WTIS/World Bank

5/ Almost half of the impact of the loss of market share is concentrated in the United States, the European Union and Argentina.

6/ Available at: [https://www.wto.org/english/tratop\\_e/region\\_e/rta\\_participation\\_map\\_e.htm](https://www.wto.org/english/tratop_e/region_e/rta_participation_map_e.htm).

In summary, the loss of share of manufactured products in export flows between 2008 and 2013 was a global phenomenon, but occurred in a more pronounced way in Brazil – without a reversal of this trend, as observed at a global level. Factors such as the increased China participation in the world economy, as well as the loss of market shares of Brazilian manufactured goods help to explain much of the behavior of the country's list of exports. Finally, countries with similar characteristics to Brazil, specifically Mexico and India, have achieved better insertion in world trade, leading to the increase in the share of global sales of their manufactured goods over the last decade.



This chapter of the Inflation Report analyzes the inflation outlook up to 2021, thus covering all years for which the National Monetary Council (CMN) sets inflation targets.

The projections presented herein use data available up to the latest meeting of the Monetary Policy Committee (Copom) held on March 19th and 20th, of 2019 (221st Meeting). As for the conditioning data used in the projections, especially those from the Focus survey produced by the BCB, the cut-off date is March 15th 2019, unless otherwise stated.

Conditional projections for inflation are presented in four scenarios, depending on the conditioning path used for the exchange and Selic rates over the projection horizon. The conditioning paths may be derived from expectations extracted from the Focus survey or paths in which the values of these variables remain constant throughout the projection horizon.

The first scenario assumes Selic and exchange rates constant during the projection horizon, while the second scenario supposes paths extracted from the Focus survey for these two variables.

Two other scenarios – namely “hybrid” scenarios – are also presented. The first scenario assumes a constant Selic rate and exchange rate extracted from the Focus survey, while the second assumes the Selic rate from the Focus survey and a constant exchange rate.

It is worth noting that the conditional inflation projections disclosed in this Report include probability intervals that highlight the degree of uncertainty at the aforementioned cut-off date. The projections depend not only on the assumptions about interest rates and exchange rates but also on a set of assumptions about the behavior of exogenous variables.

In its decision-making process, the Copom analyzes a broad set of variables and models, in which it exercises judgments based on the available

information set. In presenting some scenarios that inform its deliberations, the Copom seeks to increase the transparency of monetary policy decisions, contributing to its effectiveness in controlling inflation, which is its primary objective.

## 2.1 Revisions and short-term projections

In the quarter ended in February, consumer inflation, as measured by the IPCA, stood at 0.04 p.p., below what was projected at the December 2018 Inflation Report baseline scenario (Table 2.1).

The exchange rate appreciation and the lower crude oil prices in the quarter contributed to a more intense than expected drop in fuel prices. In the same sense, the seasonal rise of the education group was lower than expected, as well as the restoration of the prices of personal hygiene products, after the strong fall related to promotional discounts in November. These factors were partially offset by a higher pressure on household food prices, highlighting a significant increase in the price of beans, reflecting climatic adversities, and a lower drop in the electricity rates, affected by an irregular component of the Social Integration Program (PIS)/Contribution for Financing of Social Security (Cofins).

The short-term projections from the Copom's baseline scenario assumed changes of 0.55%, 0.48% and 0.41% for the IPCA, in March, April and May, respectively (Table 2.2). Should this trajectory occur, the increase of 1.45% for the IPCA in the quarter would be higher than the unusual variation observed in the same period of 2018 (0.71%), implying an increase in the 12-month inflation rate from 3.89% in February 2019 to 4.65% in May.

The higher inflation rates in the March-April-May quarter reflect, above all, the behavior of administered prices – gasoline and electricity. Recent rises in gasoline prices at refineries, following international prices, tend to be passed on to consumers over the projection horizon. At the same time, the baseline scenario considers that the end of the rainy season raises the probability of changes in electricity rates flag system in April and May.<sup>27</sup>

**Table 2.1 – IPCA – Inflationary Surprise**

	2018	2019		% change	
	Dec	Jan	Feb	In the quarter	12-month up to Feb
Copom scenario <sup>1/</sup>	0.15	0.37	0.42	0.94	3.93
IPCA observed	0.15	0.32	0.43	0.90	3.89
Surprise	0.00	-0.05	0.01	-0.04	-0.04

Sources: IBGE and BCB

1/ Scenario at December 2018 Inflation Report cut-off date.

**Table 2.2 – IPCA – Short-term projections**

	2019				% change
	Mar	Apr	May	Quarterly	12-month up to May
Copom scenario <sup>1/</sup>	0.55	0.48	0.41	1.45	4.65

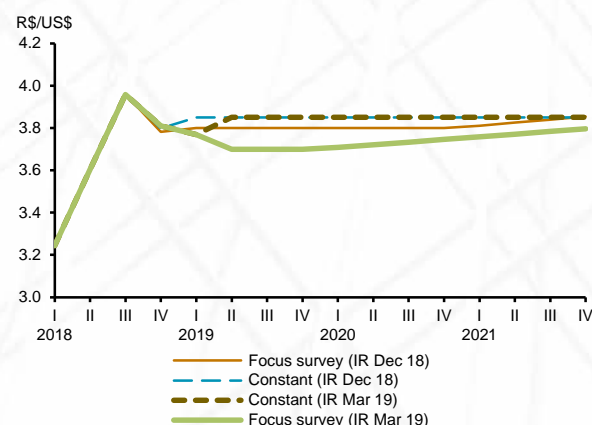
Sources: IBGE and BCB

1/ Scenario at cut-off date.

27/ The flag system scenario incorporates changes proposed by the Brazilian National Electricity Regulatory Agency (Aneel) in public hearing 008/2019: increase in additional values and change in triggering criteria.

## 2.2 Conditional projections

**Figure 2.1 – Exchange rate assumptions for projections**

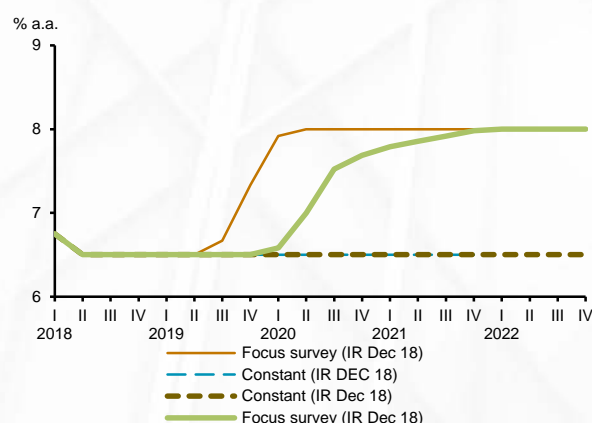


Note: Values refer to quarterly averages.

The exchange rate used in the scenarios that assume a constant path for this variable is R\$3.85/US\$<sup>28</sup>, the same value assumed in the December 2018 Inflation Report (Figure 2.1). The median of expectation values for the year-end exchange rate, extracted from the Focus survey of March 15th, 2019, points to a decrease in 2019, followed by an increase in the two following years. Compared to the values of 12.7.2018 assumed in the December 2018 Inflation Report, the year-end exchange rate dropped from R\$3.80/US\$ to R\$3.70/US\$ for 2019, from R\$3.80/US\$ to R\$3.75/US\$ for 2020 and from U\$3.86/US\$ to R\$3.80/US\$ for 2021 (Figure 2.1).

As for the Selic rate, the value used in the scenarios that assume a constant rate was kept at 6.50% p.a. (Figure 2.2). Consistent with this Selic rate path and the risk premia behavior, the projected 360-day Pre-DI swap rate, after a decline in 2018Q4, shows lower values in the following quarters, stabilizing from the mid-2019 onwards.

**Figure 2.2 – Selic rate target assumptions for projections**



Note: Values refer to quarterly averages.

The median of expectations for the Selic rate extracted from the Focus survey – under the same comparison basis between December 7th, 2018 and March 15th, 2019 – declined from 7.50% to 6.50% p.a. for the end of 2019, and from 8.00% p.a. to 7.75% p.a. for the end of 2020, remaining at 8.00% for 2021 and 2022 (Figure 2.2)<sup>29</sup>. Under this path, the Selic rate increases from March 2020 onwards; 0.25 p.p. in 2020Q1, 0.50 p.p. in 2020Q2, and 0.25 p.p. in 2020Q3 and 2020Q4. Following the same movement, the rate increases another 0.25 p.p. in 2021. Consistent with this Selic rate path and the risk premia behavior, the projected 360-day Pre-DI swap rate – in scenarios that assumed this path – shows a decline in 2019Q1, increasing for the remaining of the projection horizon.

The projections presented herein also depend on considerations about the evolution of the necessary reforms and adjustments in the economy. Their effects on projections are captured through asset prices, the degree of uncertainty, the expectations from the Focus survey, and their effect on the

28/ Value obtained according to the usual procedure of rounding the average R\$/US\$ exchange rate observed during the five business days ending on the Friday prior to the Copom meeting.

29/ As described in the box “Small-scale aggregate model – 2017” (June 2017 Inflation Report), the trajectory of the 360-day Pre-DI swap rate depends on the Selic rate trajectory used as a constraint for the same period and the premium trajectory (difference between the swap rate and the expected rate for the Selic). Therefore, the swap rate over 2021 also depends on the Selic trajectory over 2022.

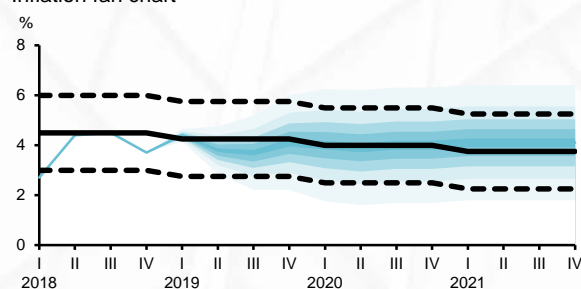
**Table 2.3 – Central inflation projections in different scenarios**

Year	Q	Inflation target	Constant Selic and exchange rates	Selic and exchange rates from Focus survey	Selic rate from Focus survey and constant exchange	Exchange rate from Focus survey and constant Selic rate
2019	I		4.4	4.4	4.4	4.4
2019	II		3.8	3.7	3.8	3.7
2019	III		3.7	3.5	3.7	3.5
2019	IV	4.25	4.1	3.9	4.1	3.9
2020	I		4.0	3.7	4.0	3.7
2020	II		3.9	3.7	3.9	3.8
2020	III		4.0	3.9	3.9	3.9
2020	IV	4.00	4.0	3.8	3.8	4.0
2021	I		4.1	3.9	3.9	4.1
2021	II		4.1	3.9	3.8	4.2
2021	III		4.1	3.9	3.8	4.2
2021	IV	3.75	4.1	3.9	3.8	4.3

Note: Year-on-year IPCA inflation (%).

**Figure 2.3 – Projected inflation – Scenario with constant Selic and exchange rates**

Inflation fan chart



Note: Year-on-year IPCA inflation (%).

**Table 2.4 – Projected inflation – Scenario with constant Selic and exchange rates**

Central projection and probability intervals

Year	Q	50%						
		30%			10%			
				Central				
2019	I	4.3	4.3	4.4	4.4	4.4	4.5	4.5
2019	II	3.4	3.6	3.7	3.8	3.9	4.0	4.2
2019	III	3.1	3.4	3.6	3.7	3.8	4.0	4.3
2019	IV	3.3	3.7	4.0	4.1	4.2	4.5	4.9
2020	I	3.1	3.5	3.8	4.0	4.2	4.5	4.9
2020	II	3.0	3.4	3.7	3.9	4.1	4.4	4.8
2020	III	3.1	3.5	3.8	4.0	4.2	4.5	4.9
2020	IV	3.1	3.5	3.8	4.0	4.2	4.5	4.9
2021	I	3.2	3.6	3.9	4.1	4.3	4.6	5.0
2021	II	3.2	3.6	3.9	4.1	4.3	4.6	5.0
2021	III	3.2	3.6	3.9	4.1	4.3	4.6	5.0
2021	IV	3.2	3.6	3.9	4.1	4.3	4.6	5.0

Note: Year-on-year IPCA inflation (%).

structural interest rate of the economy. In addition to these channels, fiscal policy influences the conditional projections for inflation through its effects on aggregate demand.

These projections also embed the understanding that the process of structural reforms – such as fiscal and lending reforms – contributes to the gradual reduction of the structural interest rate.

The projections for the IPCA variation accumulated in four quarters were based on the combination of the above short-term projections and conditioning paths. These projections are based on a set of models and information available, combined with the exercise of judgment.

The central projection associated with a scenario that combines constant Selic and exchange rates over the entire projection horizon indicates that the inflation accumulated in four quarters, after reaching 3.75% at the end of 2018, increases to around 4.4% in 2019Q1, declines in the following two quarters, ending the year at around 4.1% (Figure 2.3 and Tables 2.3 and 2.4). In this trajectory, inflation drops to 4.0% in 2020 and increases to 4.1% in 2021. In this scenario, inflation projections for administered prices are around 5.4% for 2019, 4.8% for 2020, and 4.5% for 2021.

In this scenario, the estimated probabilities of inflation exceeding the upper and lower limits of the target tolerance range in 2019 are around 8% and 12%, respectively. For 2020, probabilities are around 14% for both limits. For 2021, probabilities are around 21% for the upper limit and 9% for the lower limit.

In comparison with the December 2018 Inflation Report (Table 2.5), in the scenario with constant Selic and exchange rates, projections for 2019 increased by around 0.1 p.p., remaining at the same value for 2020 and 2021.

The projections were affected by an increase in oil prices at the beginning of the year and by changes in the evolution of the electricity rates flag system, which particularly impacted inflation projections of 2019Q2, whose effects are propagated by inertial mechanisms.

In the same sense, the constant trend of the Selic rate used in this scenario, stimulative throughout

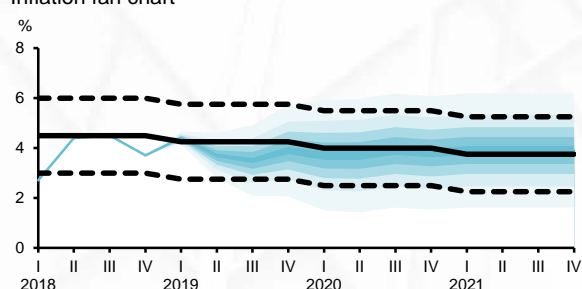
**Table 2.5 – Projections in the previous and current Inflation Reports – Scenario with constant Selic and exchange rates**

Year	Q	December Inflation Report	March Inflation Report
2019	I	4.1	4.4
2019	II	3.2	3.8
2019	III	3.3	3.7
2019	IV	4.0	4.1
2020	I	4.1	4.0
2020	II	4.1	3.9
2020	III	4.0	4.0
2020	IV	4.0	4.0
2021	I	4.0	4.1
2021	II	4.0	4.1
2021	III	4.0	4.1
2021	IV	4.1	4.1

Note: Year-on-year IPCA inflation (%).

**Figure 2.4 – Projected inflation – Scenario with Selic and exchange rates from Focus survey**

Inflation fan chart



Note: Year-on-year IPCA inflation (%).

**Table 2.6 – Projected inflation – Scenario with Selic and exchange rates from Focus survey**

Central projection and probability intervals

Year	Q							
		50%						
		30%						
		10%			Central			
2019	I	4.3	4.3	4.4	4.4	4.4	4.5	4.5
2019	II	3.3	3.5	3.6	3.7	3.8	3.9	4.1
2019	III	2.9	3.2	3.4	3.5	3.6	3.8	4.1
2019	IV	3.1	3.5	3.8	3.9	4.0	4.3	4.7
2020	I	2.8	3.2	3.5	3.7	3.9	4.2	4.6
2020	II	2.8	3.2	3.5	3.7	3.9	4.2	4.6
2020	III	3.0	3.4	3.7	3.9	4.1	4.4	4.8
2020	IV	2.9	3.3	3.6	3.8	4.0	4.3	4.7
2021	I	3.0	3.4	3.7	3.9	4.1	4.4	4.8
2021	II	3.0	3.4	3.7	3.9	4.1	4.4	4.8
2021	III	3.0	3.4	3.7	3.9	4.1	4.4	4.8
2021	IV	3.0	3.4	3.7	3.9	4.1	4.4	4.8

Note: Year-on-year IPCA inflation (%).

the considered horizon, contributes to the increase in inflation projections over time.

Conversely, the reduction of inflation expectations for 2019 and a gradual pace of economic activity growth favor the decrease of inflation projections.

Compared to the inflation projections of the February Copom meeting (220th meeting), there was an increase of approximately 0.2 p.p. for 2019, while it was kept constant for 2020 (see Minutes of the 220th Meeting). In this comparison, in addition to the aforementioned factors, it is worth noting the increase in the exchange rate assumed in this scenario, which rose from R\$3.70/US\$ to R\$3.85/US\$.

In the scenario with Selic and exchange rates from the Focus survey, the central projection indicates that the inflation accumulated in four quarters, after reaching 4.4% in 2019Q1, ends 2019 around 3.9%, 2020 at 3.8%, and 2021 at 3.9% (Figure 2.4 and Table 2.6). In this scenario, inflation projections for administered prices are around 5.1% for 2019, 4.7% for 2020 and 4.6% for 2021.

In this scenario, in relation to the December 2018 Inflation Report (Table 2.7), 2019 inflation projection did not change. The appreciation path of the exchange rate from the Focus survey offset inflationary factors, such as the increase in the price of oil and the changes in the evolution of the electricity rates flag system considered. For 2020 and 2021, projections increased 0.2 p.p. for both cases. For these longer horizons, two aspects were fundamental: the shift from the beginning of the Selic rate increase from September 2019 to March 2020 (extracted from the Focus survey); and the exchange rate depreciation trajectory over these years.

It may be noted that inflation projections in the scenario with Selic and exchange rates from the Focus survey, starting in 2019Q2, are always lower than the scenario that uses constant Selic and exchange rates. For 2019, the difference stems from the appreciation of the exchange rate from that survey, whereas for 2020 and 2021 the disinflationary effect of the Selic rate increase more than offsets the inflationary effect of the exchange depreciation, both extracted from the same survey.

In the scenario with Selic and exchange rates from the Focus survey, the estimated probabilities of inflation exceeding the upper and lower limits of the target

**Table 2.7 – Projections in the previous and current Inflation Reports – Scenario with Selic and exchange rates from Focus survey**

Year	Q	December Inflation Report	March Inflation Report
2019	I	4.0	4.4
2019	II	3.1	3.7
2019	III	3.2	3.5
2019	IV	3.9	3.9
2020	I	4.0	3.7
2020	II	3.9	3.7
2020	III	3.7	3.9
2020	IV	3.6	3.8
2021	I	3.6	3.9
2021	II	3.6	3.9
2021	III	3.6	3.9
2021	IV	3.7	3.9

Note: Year-on-year IPCA inflation (%).

**Table 2.8 – Projected inflation – Scenario with Selic rate from Focus survey and constant exchange rate**  
Central projection and probability intervals

Yea	Yea	50%						
		30%						
		10%						
		Central						
2019	I	4.3	4.3	4.4	4.4	4.4	4.5	4.5
2019	II	3.4	3.6	3.7	3.8	3.9	4.0	4.2
2019	III	3.1	3.4	3.6	3.7	3.8	4.0	4.3
2019	IV	3.3	3.7	4.0	4.1	4.2	4.5	4.9
2020	I	3.1	3.5	3.8	4.0	4.2	4.5	4.9
2020	II	3.0	3.4	3.7	3.9	4.1	4.4	4.8
2020	III	3.0	3.4	3.7	3.9	4.1	4.4	4.8
2020	IV	2.9	3.3	3.6	3.8	4.0	4.3	4.7
2021	I	3.0	3.4	3.7	3.9	4.1	4.4	4.8
2021	II	2.9	3.3	3.6	3.8	4.0	4.3	4.7
2021	III	2.9	3.3	3.6	3.8	4.0	4.3	4.7
2021	IV	2.9	3.3	3.6	3.8	4.0	4.3	4.7

Note: Year-on-year IPCA inflation (%).

tolerance range in 2019 are 5% and 15%, respectively. The probabilities for the upper and lower limits for the following years are around 11% and 17% (2020), and 17% and 12% (2021).

In the hybrid scenario with constant exchange and Selic rates from the Focus survey, inflation projections are around 4.1%, 3.8% and 3.8% for 2019, 2020 and 2021, respectively (Table 2.8). Alternatively, in comparison with the scenario that uses constant Selic rate, projections stand at lower levels from 2020Q3 onwards, reflecting the upward Selic rate trajectory (and swap pre-DI rate).

Finally, in the hybrid scenario with exchange rate from the Focus survey and constant Selic rate, inflation projections are approximately 3.9%, 4.0% and 4.3% for 2019, 2020 and 2021, respectively (Table 2.9). In comparison with the scenario that alternatively uses constant exchange rates, the projections are generally lower for shorter horizons and higher for longer horizons. This behavior reflects the exchange appreciation movement in 2019 and then the depreciation trajectory, extracted from the Focus survey.

## 2.3 Monetary policy conduct and the balance of risks

Recent data on economic activity show a lower than expected pace. Nevertheless, the Brazilian economy remains on a gradual recovery path.

The global outlook remains challenging. On the one hand, the risks associated with normalization of interest rates in some advanced economies have receded since the previous Copom meeting. On the other hand, the risks associated with a slowdown in global growth, as a result of several uncertainties, are more elevated.

Inflation expectations for 2019, 2020 and 2021 collected by the Focus survey are around 3.9%, 4.0% and 3.75%, respectively.

The Committee judges that various measures of underlying inflation are running at appropriate or comfortable levels. This includes the components that are most sensitive to the business cycle and monetary policy.

**Table 2.9 – Projected inflation – Scenario with exchange rate from Focus survey and constant Selic rate**

Central projection and probability intervals

Year	Q							
		50%						
		30%						
		10%		Central				
2019	I	4.3	4.3	4.4	4.4	4.4	4.5	4.5
2019	II	3.3	3.5	3.6	3.7	3.8	3.9	4.1
2019	III	2.9	3.2	3.4	3.5	3.6	3.8	4.1
2019	IV	3.1	3.5	3.8	3.9	4.0	4.3	4.7
2020	I	2.8	3.2	3.5	3.7	3.9	4.2	4.6
2020	II	2.9	3.3	3.6	3.8	4.0	4.3	4.7
2020	III	3.0	3.4	3.7	3.9	4.1	4.4	4.8
2020	IV	3.1	3.5	3.8	4.0	4.2	4.5	4.9
2021	I	3.2	3.6	3.9	4.1	4.3	4.6	5.0
2021	II	3.3	3.7	4.0	4.2	4.4	4.7	5.1
2021	III	3.3	3.7	4.0	4.2	4.4	4.7	5.1
2021	IV	3.4	3.8	4.1	4.3	4.5	4.8	5.2

Note: Year-on-year IPCA inflation (%).

In its most recent meeting (221th Meeting), the Copom unanimously decided to maintain the Selic rate at 6.50% p.a. The Committee judges that this decision reflects its baseline scenario for prospective inflation and the associated balance of risks, and is consistent with the convergence of inflation to target over the relevant horizon for the conduct of monetary policy, which includes 2019 and, with a gradually increasing weight, 2020.

At the time, the Committee communicated that its baseline scenario for inflation encompasses risks factors in both directions. On the one hand, (i) the high level of economic slack may lead to a lower-than-expected prospective inflation trajectory. On the other hand, (ii) frustration of expectations regarding the continuation of reforms and necessary adjustments in the Brazilian economy may affect risk premia and increase the path for inflation over the relevant horizon for the conduct of monetary policy. Risk (ii) intensifies in case (iii) the global outlook for emerging economies deteriorates. The Committee judges that the balance of risks for inflation is symmetric.

The Committee reiterates that economic conditions prescribe stimulative monetary policy, i.e., interest rates below the structural level.

The Copom emphasizes that the evolution of reforms and necessary adjustments in the Brazilian economy is essential to maintaining low inflation in the medium and long run, for the reduction of its structural interest rate, and for sustainable economic recovery. The Committee also stresses that the perception of continuation of the reform agenda affects current expectations and macroeconomic projections.

In the Copom's assessment, the evolution of the baseline scenario and of the balance of risks prescribes keeping the Selic rate at its current level. The Committee deems important to observe how the Brazilian economy will behave over time, with lower uncertainty and without the effects of the various shocks that hit the economy last year. The Copom judges that this assessment takes time and should not be completed in the short run. The Copom emphasizes that the next steps in the conduct of monetary policy will continue to depend on the evolution of economic activity, the balance of risks, and on inflation projections and expectations.

The Copom asserts that caution, serenity, and perseverance in monetary policy decisions, even in the face of volatile scenarios, have been instrumental in pursuing its primary objective of keeping the inflation path towards the targets.

## 2018 inflation breakdown

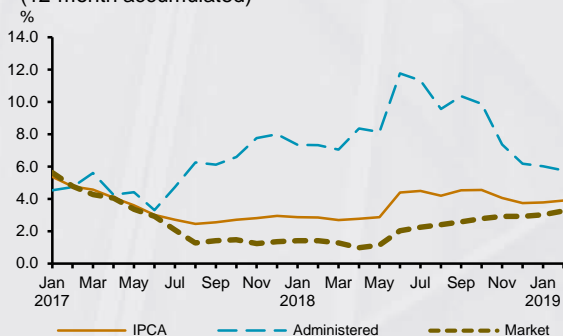
This box presents an estimate of the deviation of the 2018 inflation rate, measured by the National Extended Consumer Price Index (IPCA), against the target set by the National Monetary Council (CMN).<sup>1</sup> The objective is to map the main determinants of inflation, based on the semi-structural models of the Banco Central do Brasil (BCB).

The basis for the estimation of the components is a scenario in which all constraints are neutral, that is, they do not present impacts that lead inflation to deviate from the target. The contribution of each factor to the deviation of the inflation rate from target is obtained as these neutral conditioning factors are replaced by the actual observed values.

This breakdown incorporates methodological refinement, which consists in using the disaggregated price model to identify the share of supply shocks observed in the food-at-home segment. In the 2018 breakdown, the supply shock calculation was based on the combination of two elements. The first, which is also considered in this box, is computed from the term representing climatic factors in the Phillips curve of the small aggregate model.<sup>2</sup> The second was based on a linear projection of one-step ahead forecast errors on proxies for supply shock. In this box, this last procedure was replaced by calculation based on the forecast errors of the Phillips curve for food-at-home, using actual conditioning factors. To both elements is also added the inertial effect of these components for the following quarters of the same year.

Inflation deviation from the target is broken down into five components: (i) inertia of the previous year (deviation of inflation from the previous year against the target); (ii) expectations (the difference between agents' inflation expectations and the inflation target); (iii) imported inflation (difference from the target)<sup>3</sup>; (iv) supply shocks; and (v) other factors (obtained by residue). It is worth mentioning that these estimates are approximations based on models and, therefore, are subject to the uncertainties inherent in the modeling and estimation process.

**Figure 1 – IPCA inflation: total, administered and market prices**  
(12-month accumulated)



Inflation in 2018 was 3.75%, 0.80 percentage points (p.p.) higher than that of 2017, 2.95% (Figure 1 and Table 1). Market prices inflation rose from 1.35% in 2017 to 2.91% in 2018, while administered prices inflation fell from 7.99% to 6.18%. Inflation in 2018 was 0.75 p.p. below the 4.5% inflation target set by the CMN.

1/ The inflation breakdown based on projection models has been presented annually in previous Inflation Reports. See, for example, box "Decomposition of 2017 Inflation" of the March 2018 Inflation Report. For methodological procedures details, see box "Decomposition of 2017 Inflation", March 2018 Inflation Report, and Cusinato et. to (2016).

2/ See, for example, box "Small-scale aggregate model – 2017", June 2017 Inflation Report.

3/ External price contributions were constructed assuming deviations in relation to 2.0% p.a. for commodity price changes in US\$, consistent with long-term external inflation at the same level, and 2.5% p.a. for the exchange rate, consistent with long-term modeling conditions of the Phillips curve for free prices.

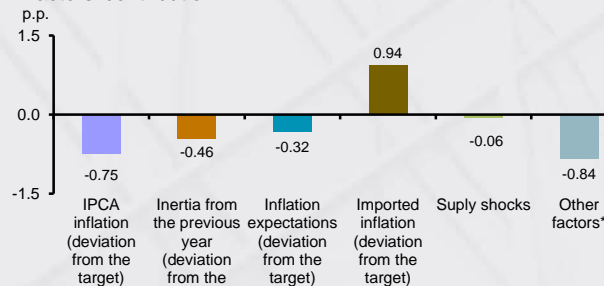
**Table 1 – IPCA inflation: total, market and administered prices**

	% change in the period				
	2018				
	I	II	III	IV	Year
Total	0.70	1.89	0.72	0.39	3.75
Market prices	0.60	0.99	0.28	1.01	2.91
Administered prices	0.98	4.52	1.98	-1.35	6.18

The 2018 breakdown is presented in Graph 2. The main results are as follows:

**Figure 2 – Decomposition of the inflation deviation from the target in 2018**

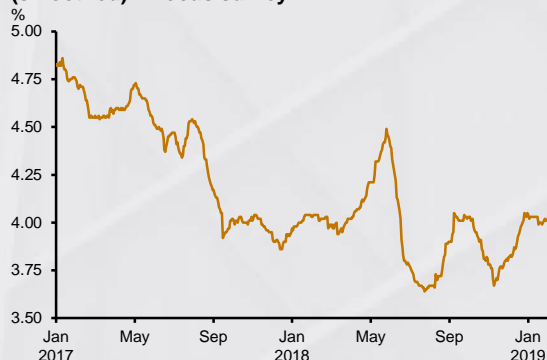
Factors' contribution



\* Contribution of IPCA inflation as a deviation from the target after excluding the following factors: inertia associated with the portion of the previous year inflation that deviated from the target; expectations as a deviation from the target; imported inflation as a deviation from the target; and supply shocks.

- i. Inertia from the previous year (as a deviation from the target) contributed to inflation falling below the target (contribution of -0.46 p.p.) due to the low levels of inflation observed during 2017;
- ii. Inflation expectations (as a deviation from the target) also contributed to inflation falling below the target (contribution of -0.32 p.p.). During 2018, inflation 12-month ahead expectations (smoothed) of the Focus survey (Figure 3), although fluctuating, were below the target for the entire period considered. In the same sense, inflation expectations for 2018 also fluctuated, but between 3.4% and 4.4%;

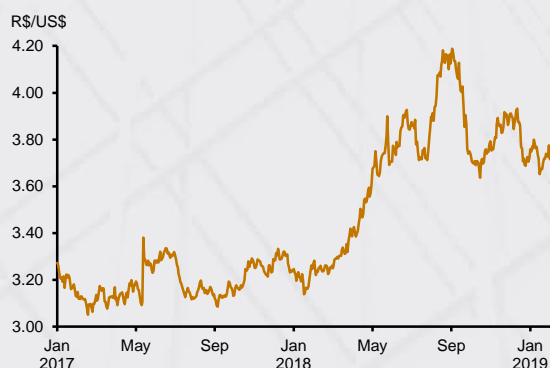
**Figure 3 – Inflation expectations 12 months ahead (smoothed) – Focus survey**



- iii. Conversely, imported inflation (as a deviation from the target) had a positive contribution to the deviation of inflation from the target (+0.94 p.p.). The factor responsible was the exchange rate depreciation observed in the 2018Q2 and 2018Q3 (Figure 4), mainly reflecting the process of normalization of monetary policy in the United States and domestic uncertainties. Considering the whole year, the exchange variation (as a deviation to the value of 2.5%) contributed with 1.01 p.p. to the deviation of inflation from the target. On the other hand, the dollar commodities prices variation (as a deviation to a 2% value), measured by the Commodities Index – Brazil (IC-Br) and by oil prices, although with negative contribution to the deviation of

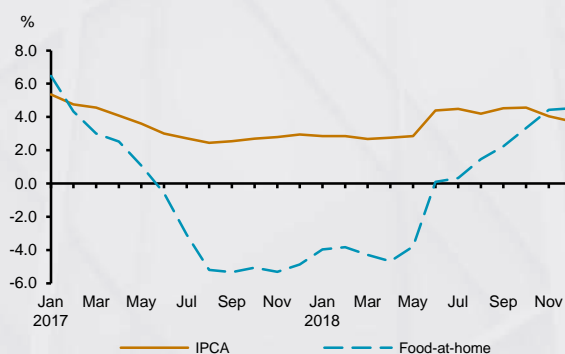
inflation<sup>4</sup>, only partially offset the inflationary effect of the exchange rate (contribution of -0.07 p.p.). It is noteworthy that the sharp drop in the price of oil in the last months of 2018 more than offset the inflationary effect of its trajectory over the first three quarters of the year;

**Figure 4 – Nominal exchange rate**



iv. Supply shocks fluctuated throughout the year and presented a slightly negative contribution to the deviation of inflation from the cumulative target of the year (contribution of -0.06 p.p.), thus not having a relevant role in the decomposition of 2018. This result is consistent with food price inflation, in line with the target. After recording the greatest deflation in the historical series in 2017 (-4.86%), food-at-home price inflation closed 2018 at 4.52% (Figure 5).<sup>5</sup> In terms of dynamics throughout the year, the shock in the second quarter, due to the shutdown of the transport sector, stands out.

**Figure 5 – Food-at-home and IPCA inflation (12-month accumulated)**



In summary, this box showed estimates of the breakdown of the deviation of the 2018 inflation rate in relation to the target. According to this breakdown, among the factors that explain the negative deviation from inflation to the target, the inflation inertia of the previous year and inflation expectations stand out. Imported inflation acted in the opposite direction. Finally, supply shocks had a negligible impact, unlike 2017, when they had been the main disinflationary factor.

## References

CUSINATO, R. T., FIGUEIREDO, F. M. R., MACHADO, V. G., MELLO, E. P. G. and PEREZ, L. P. (2016). "*Decomposição de Inflação: revisão da metodologia e resultados para 2012 a 2014*", Banco Central do Brasil, Working Papers nr. 440.

4/ Although oil prices do not fall directly into the Phillips price curve, this is an important variable in administered pricing models.

5/ Of note that, according to data from *Companhia Nacional de Abastecimento* (Conab), the agricultural production of grains of the 2017/2018 harvest (227.8 million tons) represented the second highest harvest in the historical series, although it was lower than in the previous period (varying -4.1%).

## Revising a medium-sized structural model – Samba

This box presents the changes made to the medium-sized structural model Samba<sup>1</sup>, since the release of its last revision.<sup>2</sup> Samba is part of a set of models used in the construction of scenarios and projections underlying the decision-making process of the Monetary Policy Committee (Copom) of the Banco Central do Brasil (BCB).

This box firstly introduces the changes in the model's structure, in the treatment of variables observed and in the estimation process. Throughout the box, some exercises with the new version of the model are presented, mainly aiming at justifying the changes made. We show the Samba impulse response functions, comparing results with the 2015 version, and the historical decomposition of inflation and product based on the structural shocks simulated by the model. In addition, the text justifies the changes made in the observables measuring equations with two exercises: first, with an analysis of the volatility of inflation and product projections; second, by means of a specific example observed in the publication of official information, by calculating the effects on projections of the change in the observation equations.

### Changes to the model

The model underwent significant changes, both in the treatment of observed variables and estimated parameters, as well as in its equations. In terms of treatment of observed and estimated variables, the changes were as follows:

- 1) Components of domestic demand – household consumption, government investment and consumption – are still observed in terms of growth rate. However, instead of subtracting a sample average of the growth of the Gross Domestic Product (GDP) from the observations for the construction of the gap, we subtract a common linear trend, estimated from the GDP series;
- 2) The treatment applied to the imported goods prices has changed. Previously, the trend was obtained from a linear regression. Now, the Hodrick-Prescott (HP) filter is used. The gap is formed from the difference between the observed series and the trend;
- 3) The model's parameters were re-estimated with data updated until the third quarter of 2018. It should be noted that the parameter describing the inverse of the Frisch elasticity has now been estimated with a normal *a priori* distribution, with higher average and variance.<sup>3</sup> The result is a final parameter of higher magnitude compared to the initially calibrated value in *Castro et al.* (2011).

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1/ See *Castro et al.* (2011).

2/ See box “*Revisão do Modelo Estrutural de Médio Porte – Samba*”, of September 2015.

3/ The higher average *a priori* distribution was calibrated according to the observations in Chetty (2012), which shows evidence of the mismatch between the recent microeconomic estimates of Frisch's elasticity and the results of macroeconomic models. The higher distribution's variance, on the other hand, allows a better adjustment of the model to Brazilian data.

Regarding the model's equations, the changes were as follows:

1) The equation of the inflation target's law of movement was changed to allow an anticipated shock in six quarters, according to the equation below, where  $\bar{\pi}_t^C$  is the inflation target for the period "t" and  $\varepsilon_t^{\bar{\pi}^C}$  are exogenous shocks occurring in "t" that deviate the goal from steady state. Previously, the used shock followed a traditional AR(1) autoregressive process. This new formulation is consistent with the announcement of the target a year and a half before its effectiveness, which is in line with the period of notice observed for most of the period of the inflation targeting regime.

$$\bar{\pi}_t^C = (\bar{\pi}^C)^{1-\rho_{\bar{\pi}^C}} (\bar{\pi}_{t-1}^C)^{\rho_{\bar{\pi}^C}} \exp \{ \varepsilon_{t-6}^{\bar{\pi}^C} \}.$$

2) The cost of adjusting imports originally took into account the import-product ratio of the respective sector and now depends only on the quantity imported, as illustrated by the equation below. The previous formulation forced, in the short term, a unitary elasticity between product and imports, which conflicts with the results of empirical studies for Brazil.<sup>4</sup> In the formulation below, subscript "H" refers to the sector of the economy (household consumption, investment, government consumption or exports),  $\Gamma_{H,t}^M$  is the cost of adjusting imports of sector "H" in the period "t",  $\tilde{M}_t^H$  is the quantity imported by the "H" sector,  $Z_t^Z$  is the aggregate productivity of the economy, and  $Z_{H,t}^M$  is a shock in the demand for imports.

$$\Gamma_{H,t}^M = \frac{\vartheta_H^M}{2} \left( (Z_{H,t}^M)^{-\frac{1}{\vartheta_H^M}} \frac{\tilde{M}_t^H Z_t^Z}{\tilde{M}_{t-1}^H} - Z^Z \right)^2.$$

3) The sector referring to the rest of the world in Samba was restructured, going from individual AR(1) processes to an autoregressive vector (VAR) with five variables and two lags. Its estimation was made using Bayesian methods with shocks identified by the imposition of signal restriction on the impulse response functions. The variables observed in the estimation were: Fed funds rate, global GDP gap (same series used in the semi-structured models<sup>5</sup>), USA consumer price index (CPI), CBOE volatility index (Chicago Board Options Exchange Volatility Index – VIX) and Index of Commodities – Brazil (IC-Br) in dollars. Four shocks are identified in the system: monetary policy, supply, demand and financial shock (in this case, the restriction is to associate increases in VIX to falls in the global product gap).

4) Originally, only the equations of observation of GDP and the National Extended Consumer Price Index (IPCA) presented exogenous shocks in their formulation (called "errors of observation or measurement" in the literature). This methodology was extended to nominal wages, household consumption, gross fixed capital formation, government consumption, exports and imports. These shocks follow a moving average process MA(1), as described in the equation below for a generic variable "X". For estimation purposes, the volatility of the shocks was restricted to a ceiling of 75% of the observed volatility of each series.

$$\Delta X_t^{obs} = \log X_t - \log X_{t-1} + \varepsilon_t + \theta \varepsilon_{t-1}.$$

5) The indexation of administered prices inflation was based on accumulated inflation in the previous four quarters and is now based only on the immediately previous quarter.

6) The indexation of the nominal wage variation was based on the variation of the immediately preceding quarter and is now based on the average variation of the previous four quarters.

7) Mark-ups shocks of market prices, administered prices, wages and exports prices were previously treated as AR(1) processes and now follow the ARMA(1.1) model, in line with the specification in Smets and Wouters

4/ Minella and Souza Sobrinho (2013) estimate short-term income elasticity of 1.98 in a semi-structural model. Morais and Portugal (2005) and Gouvêa and Schettini (2015), both with Markov-Switching models, find a short-term income elasticity significantly larger than one.

5/ See, for example, the box "Small-scale model of disaggregated prices – 2018", published in the June 2018 Inflation Report.

(2007). The equations that characterize mark-ups shocks are described below, where the superscripts “p” and “w” refer to mark-ups of prices and wages:

$$\log \hat{Z}_t^{p,w} = \rho \log \hat{Z}_{t-1}^{p,w} + \epsilon_t - \delta \epsilon_{t-1}$$

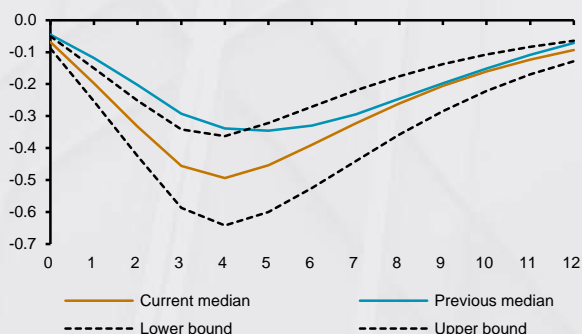
8) The process that characterizes the monetary policy shock, which was previously defined as white noise, is now described as an MA(1).

## Model properties

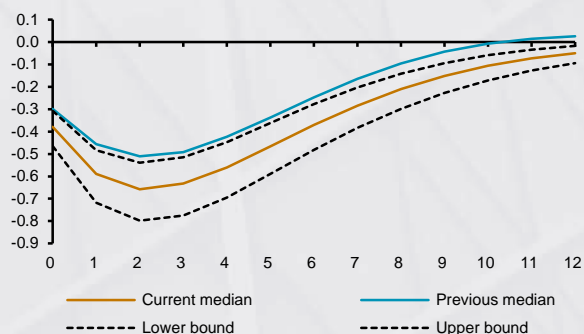
In this section, two topics are explored: (i) Samba’s impulse response functions compared to the 2015 version of the model, and (ii) the historical decomposition of inflation and product according to the structural shocks of the model.

The first exercise considers a monetary policy shock equivalent to 1 percentage point (p.p.) in annualized terms, with the interest rate path following a Taylor rule in the following periods. Figures 1 and 2 show the four-month accumulated inflation and product trajectories, simulated from the median of the estimated parameters (solid line), as well as confidence intervals for them based on the uncertainty regarding the estimated values for the parameters of the model.<sup>6</sup> The new Samba estimation suggests a greater impact of monetary policy on activity and prices. Regarding especially prices, it is also noted that the maximum effect of monetary policy is reached four quarters after the shock, against an effect of five to six quarters estimated in the previous version of the model.

**Figure 1 – Inflation response to monetary policy shocks**  
4-quarter accumulated IPCA (p.p.)



**Figure 2 – Economic activity response to monetary policy shocks**  
Product gap (%)



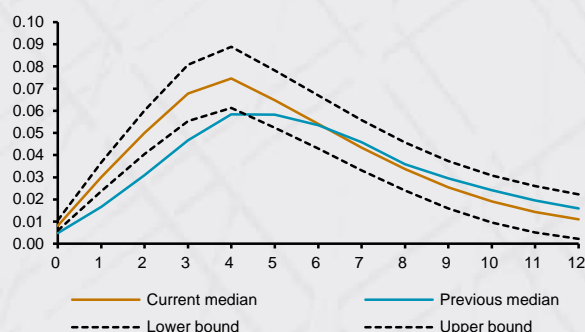
The second exercise considers a shock of 1 percentage point (p.p.) in the real exchange rate in the first period, with the other variables following the endogenous responses of the model. Figures 3 and 4 show, respectively, the trajectories of accumulated inflation in four quarters and the product in this scenario. The new estimates suggest an increase in the pass-through of the exchange rate to prices, in addition to characterizing a slight expansion in the economy over a one-year horizon. In both the old and the current versions, over a long-term horizon, unexpected depreciations in the real exchange rate generate a reduction in the level of activity, due to the increase in marginal costs of production of companies, where the imported intermediate good is an important component of their structure.

The historical decomposition of shocks seeks to interpret the behavior of deviations of a variable in relation to its long-term value in terms of the shocks of the model. The figures below show historical breakdowns for the period between the first quarter of 2014 and the fourth quarter of 2021 (up to where the inflation target is defined by the National Monetary Council – CMN), starting the projection horizon in 2019. The

6/ The 68% confidence intervals were calculated using simulations from the *a posteriori* distribution of the estimated parameters.

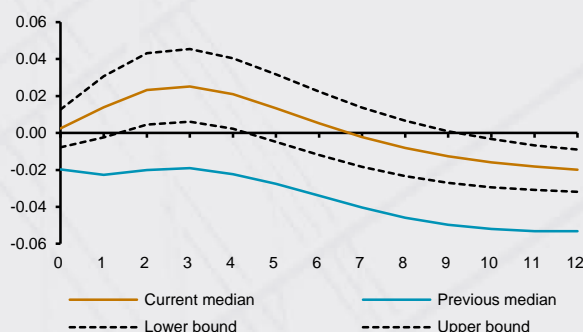
**Figure 3 – Economic activity response to effective exchange rate shocks**

4-quarter accumulated IPCA (p.p.)



**Figure 4 – Economic activity response to effective exchange rate shocks**

Product gap (%)

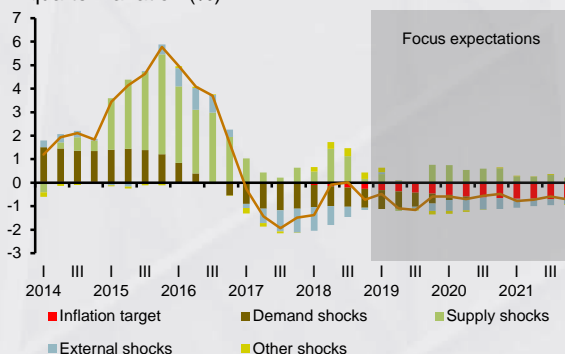


expectations of the Focus survey for IPCA, the Selic rate target, exchange rate and GDP growth rate<sup>7</sup> were used as constraints on the model until the end of 2021, with the objective of extracting consistent shocks with the scenario expected by market analysts. The decomposition of inflation, shown in Figure 5, highlights the recent negative effects of demand shocks, contributing to the variable being below its long-term equilibrium value. This occurs in spite of supply-side negative surprises, mostly observed around mid-2018.

It is also noteworthy the role of the definitions of the last two years on the inflation target. By hypothesis, the historical decomposition of inflation is carried out around a value of 4.5%, corresponding to the most frequent inflation target since the implementation of the regime. The presence of inflation expectations anchored on the targets established for the period between 2019 and 2021 – hence below 4.5% – allows the construction of an estimate of the impacts caused by the announcements of new targets. The new structure of the model, with anticipated shocks about the change on the inflation target, also characterizes contemporary effects of events that will still occur in the future. Thus, the setting, in 2017, of lower targets for 2019 and 2020, compared to the levels established for 2018, displayed disinflationary effects and reduction of the nominal interest rate already in 2018. This effect has been potentiated for longer horizons, with the announcement in 2018 of the target for 2021 at an even lower level. Regarding specifically nominal interest rates between 2019 and 2021, it is estimated that the average performance of surprises with reductions in the risk target announced in 2018 and 2019 is a decrease of 0.4 p.p. in annualized terms.

**Figure 5 – IPCA historical breakdown**

4-quarter variation (%)

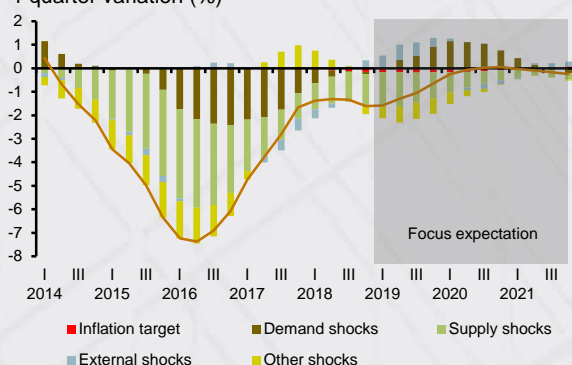


In the historical decomposition of GDP shown in Figure 6 along with the projections presented in the Focus Report for 2019 onwards, external shocks, first, and demand, later, contribute to the economy showing a gradual recovery trajectory. An important sequence of supply shocks, especially those defined as related to productivity, represent a persistent force in reducing the potential growth of the Brazilian economy.<sup>8</sup> The Figure also shows negligible effects of changes in inflation targeting on the GDP growth rate.

7/ Focus projections medians on March 15th 2019.

8/ It should be noted that the productivity shocks cited already appeared in the historical GDP decomposition presented in the previous box, containing an update of the Samba model and published in the September 2015 Inflation Report.

**Figure 6 – GDP historical breakdown**  
4-quarter variation (%)



## Changes in observation equations

The introduction of shocks exogenous to the model in the observation equations aims to capture possible high frequency fluctuations in the construction of series that do not reflect, precisely, the moment of the economic cycle.<sup>9</sup> Such fluctuations, when not properly dealt with in the model, could have two undesirable effects: i) implausible economic fluctuations resulting from a possible interpretation by the model that they are structural shocks; and, ii) unnecessary amplification of the volatility of the model projections. In the first case, the literature already recognizes the need to include exogenous shocks in nominal wage observation equations, since their absence results in significant fluctuations in wage markups and an impact on the economic cycle that is much more than reasonable.<sup>10</sup> This section of the box brings two exercises to better characterize the second effect.

In the first exercise, projections are made with the information set of recent Copom meetings, using the re-estimated model. The comparison of the volatility of the projections for inflation and product in relation to the volatility of the projections actually presented at Copom meetings is an approximate measure of the reduction in the variability of the projections obtained with the new specification.<sup>11</sup> The calculations suggest that projection volatility is reduced by almost half over a three year horizon. The same reduction is observed in the projections for inflation two years ahead. In turn, the reduction in volatility for GDP projections is around 30%. Regarding short-term projections, the reduction in volatility for GDP projections reaches 20%, while the volatility of inflation projections presents a slight increase, mainly due to other changes in the model of greater importance to this dimension, such as lower indexation of administered prices.

In a second exercise, it is used a real case of distortion in the model projections resulting from a purely accounting and temporary effect in the National Accounts statistics. In an official note dated November 30<sup>th</sup> 2018, the Brazilian Institute of Geography and Statistics (IBGE) points out that the accounting of gross fixed capital formation was affected in the third quarter of 2018 “due to the incorporation of goods destined for the oil and gas industry, resulting from changes in the Special Customs Regime of Export and Import of Goods destined to the Activities of Research and Mining of Reserves of Oil and of Natural Gas (Repetro)”<sup>12</sup> That is, machinery and equipment that were already in operation had their property transferred from subsidiaries abroad to companies headquartered in Brazil, positively impacting the investment account in the third quarter of 2018, despite no investments had been effectively made.<sup>13</sup>

9/ Technically, these shocks are known in literature as “measurement errors” or “observation errors”. Please note that these are technical terms which do not reflect any evaluation of the quality of the statistics in question.

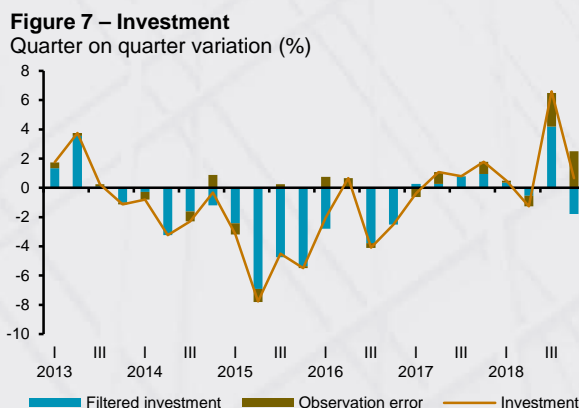
10/ See, for example, Justiniano, Primiceri and Tambalotti (2011) and Galí, Smets and Wouters (2012).

11/ As it should be emphasized, this measure is only approximate, since the replications of previous meetings consider all the structural changes listed at the beginning of this box, and not just the inclusion of exogenous shocks in observation equations.

12/ <https://agenciadenoticias.ibge.gov.br/agencia-sala-de-imprensa/2013-agencia-de-noticias/releases/23251-pib-cresce-0-8-e-chega-a-r-1-716-trilhao-no-3-tri-de-2018>.

13/ <http://agenciabrasil.ebc.com.br/economia/noticia/2018-11/indicador-de-investimentos-tem-crescimento-de-96-no-3o-trimestre>.

By modifying the structure of the observation equations of the model, one may simulate<sup>14</sup> the trajectory of gross fixed capital formation (GFCF) consistent with the other information included, filtering from the data the exogenous effect of the “shock” associated with the Repetro. Figure 7 shows the GFCF until the end of 2018 according to the IBGE data (solid line), the contribution of the effects of the exogenous shocks (darker bars) and the part “explained” by the model (blue bars). As can be seen, in the third quarter of 2018, there was a significant increase in the contribution of observation errors in the model.



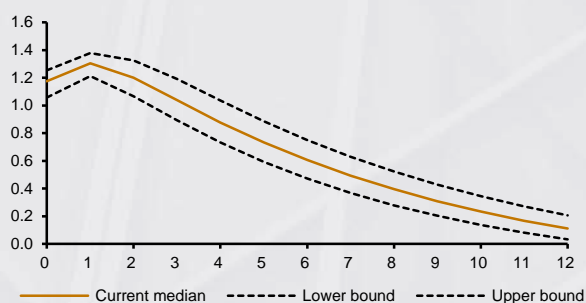
This exercise considers a counterfactual scenario where the effect of exogenous shocks is treated by the Samba model as an effective increase in gross fixed capital formation. For this purpose, the exercise assumes that all investment variation resulting from the exogenous shock would be transformed, in the model, into an investment-specific technological shock<sup>15</sup>, in case no change is made to the observation equation. With this approach, the possible consequences on the projections of investment, product and prices are simulated. This procedure is equivalent to calculating the impulse response functions of the investment shock for an initial variation equal to the simulated value of the exogenous shock.

As Figures 8 and 9 show, the effects on investment and product projections are quantitatively relevant, with significant effects up to 12 quarters after the shock occurs. The effects on prices are of small magnitude, as can be seen in Figure 10, but statistically significant over a horizon of up to two years.

In summary, in order to maintain the level of transparency that characterizes monetary policy actions, this box updates information on the BCB Samba model. The changes implemented seek to improve the predictive and analytical capacity of the model in all its dimensions, not restricting it to an instrument of inflation

**Figure 8 – Investment response to investment shock\***

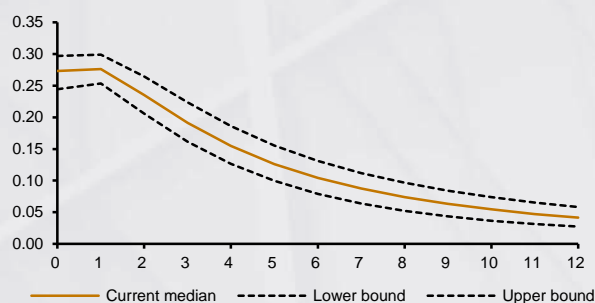
Investment gap (%)



\* In the magnitude of the observation error of the 2018Q3.

**Figure 9 – Economic activity response to investment shock\***

Product gap (%)

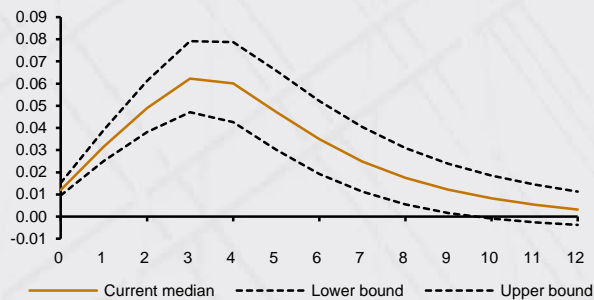


\* In the magnitude of the observation error of the 2018Q3.

14/ According to the IBGE, in comparison with the same period of 2017, GFCF grew by 7.8%, including the information on Repetro. Excluding this factor, GFCF growth would be 2.7%, on the same basis of comparison. These estimates could be incorporated into the exercise shown here. However, we prefer to show here the model’s ability to detect this type of high-frequency variation in data.

15/ In the terminology of model in *Castro et al.* (2011), the exogenous shock is simulated as a variation in shock  $Z_t^I$ .

**Figure 10 – Inflation response to investment shock\***  
4-quarter accumulated IPCA (p.p.)



\* In the magnitude of the observation error of the 2018Q3.

projection. This model is part of the set used by Copom in its decision-making process, and is constantly being reviewed and improved.

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## Appendix

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### **Banco Central do Brasil Management Monetary Policy Committee (Copom)**

# Banco Central do Brasil Management

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Board of Governors

**Roberto Oliveira Campos Neto**  
Governor

**Bruno Serra Fernandes**  
Deputy Governor for Monetary Policy

**Carlos Viana de Carvalho**  
Deputy Governor for Economic Policy

**Carolina de Assis Barros**  
Deputy Governor for Administration

**João Manoel Pinho de Mello**  
Deputy Governor for Licensing and Resolution

**Maurício Costa de Moura**  
Deputy Governor for Institutional Relations and  
Citizenship

**Otávio Ribeiro Damaso**  
Deputy Governor for Regulation

**Paulo Sérgio Neves de Souza**  
Deputy Governor for Supervision

**Tiago Couto Berriel**  
Deputy Governor for International Affairs and  
Corporate Risk Management

# Members of the Monetary Policy Committee (Copom)

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## Members

### Governor

**Roberto Oliveira Campos Neto**

### Deputy Governor

**Bruno Serra Fernandes**

### Deputy Governor

**Carlos Viana de Carvalho**

### Deputy Governor

**Carolina de Assis Barros**

### Deputy Governor

**João Manoel Pinho de Mello**

### Deputy Governor

**Maurício Costa de Moura**

### Deputy Governor

**Otávio Ribeiro Damaso**

### Deputy Governor

**Paulo Sérgio Neves de Souza**

### Deputy Governor

**Tiago Couto Berriel**

## Heads of Department Participating in the Copom Meetings (Circular nr. 3,868/2017)

### Department of Banking Operations and Payments System – Deban

**Flávio Túlio Vilela**

### Department of Economics – Depec

**Tulio José Lenti Maciel**

### Department of Foreign Reserves – Depin

**Alan da Silva Andrade Mendes**

### International Affairs Department – Derin

**João Barata Ribeiro Blanco Barroso**

### Open Market Operations Department – Demab

**André de Oliveira Amante**

### Research Department – Depep

**André Minella**

# Acronyms

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<b>3MMA</b>	3-Month Moving Average
<b>ABLA</b>	Brazilian Car Rental Companies Association
<b>ACR</b>	Regulated Contracting Framework Account
<b>ACSP</b>	São Paulo Trade Association
<b>Aneel</b>	Brazilian Electricity Regulatory Agency
<b>Anfavea</b>	National Association of Automotive Vehicle Manufacturers
<b>ARMA</b>	Autoregressive Moving Average
<b>ATR</b>	Total Recoverable Sugars
<b>BCB</b>	Central Bank of Brazil
<b>BI</b>	Intermediate Goods
<b>BK</b>	Capital goods
<b>BNDES</b>	Brazilian Development Bank
<b>Cacex</b>	Banco do Brasil Foreign Trade Department
<b>Caged</b>	General Registry of Employed and Unemployed Persons
<b>CCI</b>	Consumer Confidence Index
<b>CD</b>	Durable Consumer Goods
<b>CE</b>	Exports ratio
<b>CMN</b>	National Monetary Council
<b>CND</b>	Non-Durable Consumer Goods
<b>Cofins</b>	Contribution for Social Security Financing
<b>Conab</b>	National Supply Company
<b>Conta-ACR</b>	Regulated Contracting Framework Account
<b>Copom</b>	Monetary Policy Committee
<b>CPI</b>	Consumer Price Index
<b>Depec</b>	Department of Economics
<b>Depep</b>	Research Department
<b>Derin</b>	International Affairs Department
<b>DIA</b>	Direct Investment Abroad
<b>Dstat</b>	Department of Statistics
<b>DW</b>	Double Weigthing
<b>ECB</b>	European Central Bank
<b>ESALQ</b>	Luiz de Queiroz College of Agriculture
<b>FDI</b>	Foreign Direct Investment
<b>Fenabrave</b>	National Federation of Automotive Vehicle Distribution
<b>FGV</b>	Getulio Vargas Foundation
<b>Funcex</b>	Foreign Trade Studies Center Foundation
<b>GDP</b>	Gross Domestic Product
<b>GFCF</b>	Gross Fixed Capital Formation
<b>GGGD</b>	Gross General Government Debt
<b>HICP</b>	Harmonized Consumer Price Index
<b>HP</b>	Hodrick e Prescott

<b>IBGE</b>	Brazilian Institute of Geography and Statistics
<b>IC-Br</b>	Commodities Index – Brazil
<b>ICC</b>	Average Cost of Outstanding Loans
<b>ICI</b>	Industrial Confidence Index
<b>ICS</b>	Services Confidence Index
<b>IGP-M</b>	General Price Index – Market
<b>INC</b>	National Confidence Index
<b>INSS</b>	National Social Security Institute
<b>IOF</b>	Financial Operations Tax
<b>IPA-DI</b>	Broad Producer Price Index – Domestic Supply
<b>IPCA</b>	Extended National Consumer Price Index
<b>MIP</b>	Input-Output Matrix
<b>MP</b>	Provisional Measure
<b>NCM</b>	Common Mercosur Nomenclature
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>p.a.</b>	Per annum
<b>p.p.</b>	Percentage points
<b>PCD</b>	Persons with Disabilities
<b>PF</b>	Individual person
<b>PI</b>	Imports Penetration
<b>PIA-PRODUTO</b>	Annual Industrial Survey – Product
<b>PIM</b>	Monthly Industrial Survey
<b>PIM-PF</b>	Monthly Industrial Survey – Physical Production
<b>PIS</b>	Social Integration Program
<b>PJ</b>	Corporations, Corporate entities
<b>PMI</b>	Purchasing Managers Index
<b>PMS</b>	Monthly Survey of Services
<b>PNAD Contínua</b>	Continuous National Household Sample Survey
<b>PSND</b>	Public Sector Net Debt
<b>PTC</b>	Quarterly Credit Conditions Survey
<b>QNA</b>	Quarterly National Accounts
<b>Repetro</b>	Petroleum and Natural Gas Research and Production Activities
<b>Secex</b>	Foreign Trade Secretariat
<b>Selic</b>	Special System for Clearance and Custody
<b>SFN</b>	National Financial System
<b>SM</b>	Smoothed Mean
<b>STM</b>	Smoothed Trimmed Mean
<b>TRU</b>	Table of Resources and Uses
<b>USA</b>	United States of America
<b>VAR</b>	Autoregressive Vector
<b>VIX</b>	Chicago Board Options Exchange Volatility Index
<b>WTO</b>	World Trade Organization