Monetary Policy and Inflation Expectations in Brazil: From 2005 to 2022

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Abstract

The Focus Report prepared by the Central Bank of Brazil summarizes the statistics calculated from market expectations, such as inflation expectations for the next four years that are weekly collected. The report shows the evolution of these data using graphs and weekly projections for price indices, economic activity, and exchange rates. However, the expectations of households and firms regarding the future of inflation, which are determinants for current inflation, go beyond problems of theoretical and empirical foundation. Thus, the research question addressed in this study is as follows: Do expectations of inflation measured by the Focus Market Report explain inflation measured by the CPI in Brazil? To answer this question, we compare expected and actual inflation data and analyze the correlations between them. This research is important because part of the argument for increasing the basic interest rate in the Brazilian economy is based on data from the Focus Report, which may contain forecasting errors, thereby resulting in monetary policy mistakes. The research methodology consists of contrasting data on monthly expectations with actual inflation rates and assessing the correlations between them.

Keywords: monetary policy, inflation, expectations, Focus Market Report, Brazil

JEL codes: E12, E52

1. Introduction

The theoretical models developed by Phelps, Friedman, and Lucas are capable of intuitively demonstrating that expected inflation plays a fundamental role in the inflationary trajectory. The underlying reasons lie in the assumptions of the persistent monetary illusion and microfoundations, which are particularly grounded in the concept of price rigidity. This framework underpins the monetary policy in various economies worldwide (Rudd 2022).

The implications for economic policy management are that, based on expectations, the monetary authority can project future inflation and monitor the ability to combat sharp price fluctuations in line with the central objective. This theoretical framework plays a central role

in shaping expectations regarding inflation without necessarily explaining the constitutive elements in detail. Neither the optimal measurement method nor the agents to be consulted are discussed. Furthermore, whether expectations exhibit a uniform pattern and can affect inflation dynamics in any type of economy is not explored.

For example, the Focus Report prepared by the Central Bank of Brazil summarizes statistics calculated based on market expectations. Notably, the report highlights inflation expectations for the next four years collected weekly. This report illustrates the evolution of these data, such as through graphs and weekly projections of price indices, economic activity, and exchange rates.

As Rudd (2022) argues, the expectations of households and businesses regarding future inflation are among the main determinants of actual inflation. However, these expectations, which are crucial for current inflation, go beyond theoretical and empirical foundations. Thus, this study explores the following research question: Do inflation expectations measured by the Focus Market Report explain inflation measured taken by the IPCA (Broad National Consumer Price Index) in Brazil? Therefore, this study assesses the impact of expectations, as measured by the Focus Market Report, on actual inflation, as measured by the official Brazilian price index. We compare expected and actual inflation data and analyze the correlations between them.

This study is important because part of the argument in favor of raising the basic interest rate in the Brazilian economy relies on data from the Focus Report, which may contain prediction errors, potentially leading to misguided monetary policies. According to Vereda et al. (2020), between 2001 and 2019, the credibility of the monetary authority oscillated between two opposing poles. Deterioration was continuous between mid-2007 and 2016, at which point credibility was regained and has been retained since.

The remainder of this paper is organized as follows. Section 2 focuses on inflation expectations, while Section 3 presents historical context for the monetary policy in Brazil from 2005 to 2022. Section 4 presents an empirical exercise used to test the hypothesis that inflation expectations affect official inflation in Brazil. Finally, Section 5 provides the study's conclusions.

2. Inflation Expectations

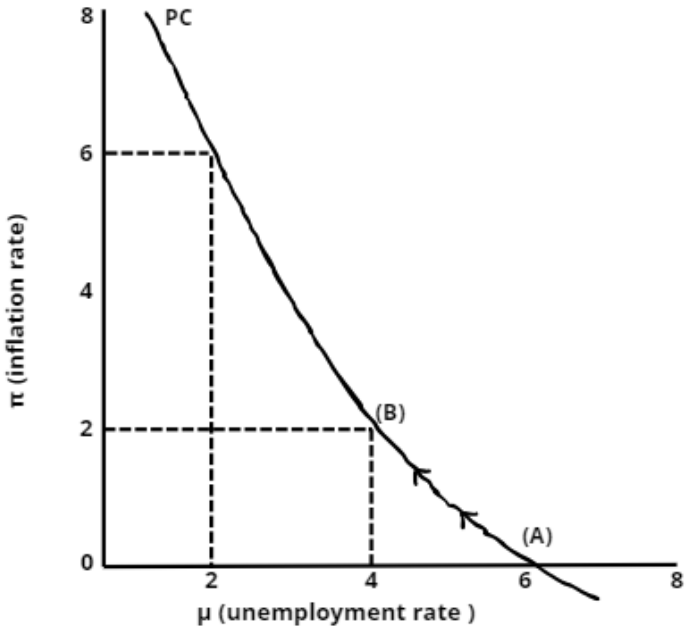
Considering the New Keynesian approach and, therefore, the inflation targeting model, the Phillips Curve in its accelerationist version is significant for understanding central bank actions regarding interest rates. In this section, we discuss the key aspects of the Phillips Curve, particularly in terms of its accelerationist version.

As Rudd (2022), Carlin and Soscкice (2005), and Arestis (2011) have shown, the variable of expectations regarding future inflation is a crucial component of the New Economic Consensus and New Keynesian models. Expectations regarding future inflation appear in the monetarist version of the Phillips Curve and are retained in the New Keynesian model. Central banks have embraced this, arguing that inflation expectations affect current inflation. Thus, central banks assess whether inflation expectations for the future align with inflation targets. If the expectations do not point towards the inflation target, the central bank attempts to anchor expectations by increasing the interest rate.

The Phillips Curve is based on the pioneering work published by A.W. Phillips in 1958. It addresses the inverse relationship between the inflation rate and unemployment, allowing a tradeoff to be established between these two variables (Figure 1). To illustrate the application of the Phillips Curve, let us assume an increase in the money supply from 3% to 5% (a 2% increase), which, consequently, will lead to an increase in aggregate demand and a subsequent rise in nominal wages.

According to Friedman (1968), an increase in income leads to a reduction in the unemployment rate because more individuals accept the offered nominal wages. The output of the economy responds to the growth in aggregate demand, compelling producers to augment their employee numbers, production, and working hours. This surge in aggregate demand also exerts an upward pressure on prices, thereby increasing the inflation rate. Thus, low unemployment rates signify increased inflation, whereas high unemployment rates diminish this effect.

Figure 1 – Phillips Curve (CP)



As Figure 1 above illustrates, at an inflation rate of zero, the unemployment rate is 6%. Moving along the curve, a 4% unemployment rate increases the inflation rate by 2%, demonstrating a trade-off between unemployment and inflation. According to Friedman, an increase in employment is only possible because agents have set wages and prices for the future, making it take some time for labor suppliers to realize that prices have risen more than nominal wages (i.e., real wages have not decreased). However, this model operates only in the short term.

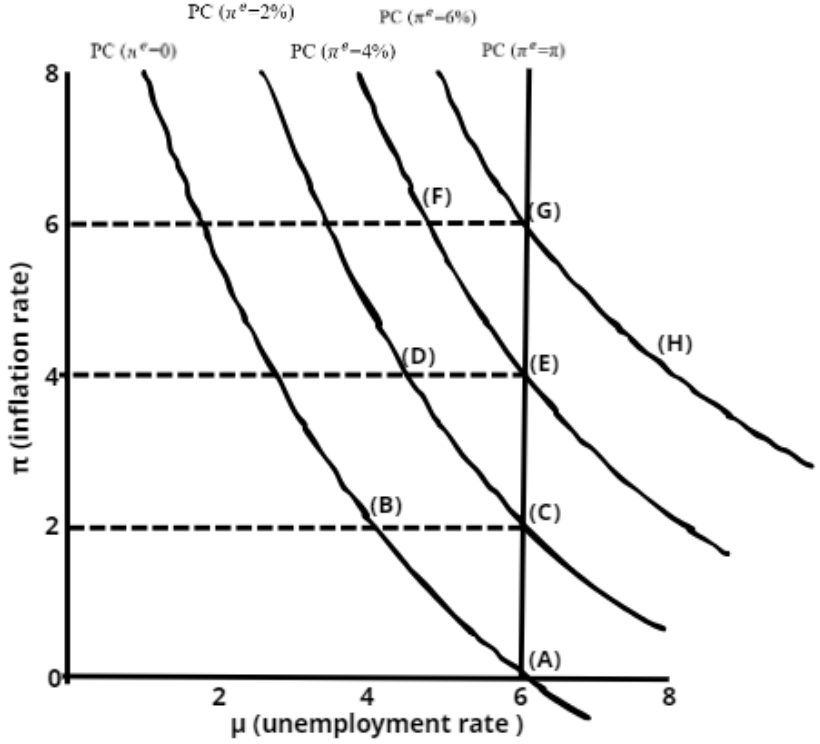
In the long term, the adaptive expectations hypothesis posits that individuals adjust their expectations to prevent repeating past errors. Therefore, if in a previous period, labor suppliers underestimated inflation in the subsequent period, they adapted their expectations by incorporating previously acknowledged expectations. Thus, the equation is as follows:

$$\pi_t^e = \pi_{t-1}^e + \beta\,(\pi_{t-1} - \pi_{t-1}^e) \quad (1)$$

where β is the speed of corrections to expectations. If we consider that β = 1, the result of the equation will be $\pi_t^e = \pi_{t-1}$. This demonstrates that labor suppliers assume that analyzing the past is the most effective method for speculating about the present and future. Therefore, for inflation to decrease, a deflationary shock becomes necessary, causing unemployment to rise at a rate above the natural rate and pressuring individuals to revise their expectations.

Thus, the Phillips Curve can be considered to become vertical in the long term as soon as agents anticipate the process of price increases, which demands higher real wages (Figure 2). Consequently, higher inflation and unemployment will return to their natural rates. Even if economic policymakers attempt to fix employment at a level lower than the natural rate by increasing the money supply, agents' expectations will always shift the curve upward and to the right until decision-makers realize that inflation has become a more serious problem than unemployment.

Figure 2 - Augmented Phillips Curve



In this scenario, actions to contain inflation by increasing unemployment do not have immediate effects. Similar to individuals taking some time to realize that real wages have decreased, it takes time for them to recognize that the inflation rate has decreased and accept lower nominal wages.

The theoretical models of Phelps, Friedman, Lucas, Rapping, and the post-Keynesians highlight the importance of considering expected inflation as a key determinant of actual inflation. These arguments contribute to explaining the Phillips Curve and inflationary experiments from 1960 to 1980 in the United States.

The full utilization of these economists' theoretical models has policy implications. According to Rudd (2022), for an inflation analyst, expected inflation measures can explain the evolution of past inflation and project inflation measures. For a monetary authority such as the Central Bank, successfully controlling inflation expectations is fulfilling its objectives.

Edmund Phelps' model states that the intercept of the Phillips Curve would shift one-to-one with expected inflation, as labor supply would be independent of the interest rate and, consequently, independent of expected inflation. Thus, according to Phelps (1967), nominal variables do not permanently affect real variables. Therefore, Phelps's model ignores the consequences that anticipation of inflation may have on current real income.

However, Friedman (1968) has asserted that labor suppliers accept work based on *ex-post* real wages. Labor suppliers would take some time to perceive an increase in general price

levels. In this model, increased employment is possible only when prices increase, thereby reducing real wages. However, when workers anticipate price increases, the result is reflected in nominal wages, leaving real wages unchanged.

According to Rudd (2022), the theories of both Phelps and Friedman consider that nominal disturbances cannot have permanent real effects on the economy and that the market will always return to its natural equilibrium. Furthermore, both theories assert the existence of a real side of the economy that exerts its influence, regardless of nominal variations.

Fisher (1983) criticizes this, stating that no convincing evidence exists on the stability of economic equilibrium. According to Friedman's derivation of the Phillips Curve, wages are countercyclical and companies are always on their demand curve. For Friedman, the selling prices of products react more quickly than wages. However, US data have shown that wages are procyclical because conventional equations indicate that the trade-off between wage inflation and employment is more pronounced than price inflation.

Lucas and Rapping have proposed another theory that emphasizes the relationship between expected and real inflation. In their model, real (expected) interest rates affect the current labor supply, thereby influencing the tradeoff between goods and leisure. The model also reinforces the existence of adaptive expectations and one-to-one adjustments in nominal interest rates.

This model assumes that an increase in the current inflation rate will increase the expected inflation rate, which is valid only through a specific formulation of adaptive expectations. This assumption suggests that inflation converges to a steady state. Furthermore, significant employment fluctuations cannot be assumed without correspondingly large intertemporal substitution fluctuations.

In 1973, Lucas developed a model to analyze market prices and determine whether a specific price disturbance was an absolute or relative change. This was because producers could not distinguish between such changes, leading to price variations. Criticisms of this Lucas surprise model include the significant difficulty in determining whether price levels have an absolute variation. Moreover, the assumption that political shocks alone can affect production seems exaggerated. Ball et al. (1988) argue that the standard deviation of inflation, which is crucial in the output-inflation trade-off, lacks empirical support.

Finally, the Keynesian Phillips Curve models integrate rational expectations into a model in which adjustment costs produce nominal rigidity, which makes current inflation dependent on expected inflation. One criticism of this model is that the producers are forced to provide the quantity demanded at a fixed contract price. Therefore, companies are always concerned with real prices. A future decrease in their prices will make the additional generated demand less profitable when the contractually agreed upon nominal price is satisfied. Empirically, Keynesian Phillips Curve models also have assumptions that do not make sense. According to Rudd (2022), standard tests of the new Phillips Curve have so many problems that they do not provide sufficient arguments to prove that expectations truly matter.

Firms' behavioral patterns show that they rarely increase their prices in anticipation. Most firms raise prices only when their costs are affected. In addition, a perfect competitive structure in which everyone competes against each other seems somewhat unlikely, as worker and customer competition have a strong local or industry-specific influence. Rudd (2022) argues that the models presented show that short-term expected inflation is the only argument in which expectations matter. Most arguments are based on limited evidence and completely disagree with the available empirical results.

One important observation that supports the argument that expected inflation is not crucial is worker behavior. According to Rudd (2022), in analyzing the post-1990 economic scenario, to claim that labor suppliers ignore increases in the cost of living when accepting work for lower real wages, believing that inflation will return to the long-term average, would

be incorrect. In the context of wage negotiations, employers tend to pay wages that match the cost of living for labor-supplier agents in exchange for their continued employment. Otherwise, a significant number of layoffs would force business owners to increase the wages of the remaining workers.

Similarly, when inflation remains low, employees' concerns about the cost of living decrease. However, as Rudd (2022) argues, 'this is a story about outcomes, not expectations' (p. 37). This theory asserts that labor suppliers expect inflation to return to its long-term average; however, in reality, workers simply do not consider recent wage increases to lag behind future changes in the cost of living. The current state of inflation dynamics shows that people do not leave their jobs because wages are not keeping pace with the cost of living, as inflation does not affect workers or wages.

For Rudd (2022), the concept of adaptive expectations is irrelevant because no evidence indicates that workers negotiate higher nominal wages to anticipate inflation. Rudd (2022) argues that when policymakers use inflation expectations to determine long-term inflation, they can generate excessive concerns regarding which path inflation will follow or whether it will return to a regime with high inflation persistence.

3. Monetary Policy in Brazil from 2005 to 2022

Monetary policy plays a crucial role in a country's economic stability and is a primary tool governments employ to control various financial factors. In Brazil, this responsibility falls upon the Central Bank, which seeks economic balance through regulating the money supply and determining interest rates.

To maintain stability and promote economic development, the government utilizes monetary policy to adjust the money supply according to market conditions. During growth periods, measures may be adopted to prevent economic overheating, such as raising interest rates to discourage excessive consumption and investment. Conversely, in recessions, the government may seek to stimulate economic activity by lowering interest rates and increasing the money supply.

The Central Bank is tasked with defining monetary policy and bases its decisions on a detailed analysis of economic data. To achieve the primary goal of inflation control, the National Monetary Council normalizes monetary policy, while the Central Bank's Monetary Policy Committee (COPOM) controls interest rates. Through COPOM, the government and Central Bank establish goals to control inflation and implement expansionary or contractionary policies as needed, depending on the behavior of the Brazilian economy (Ribeiro et al., 2023).

Monetary policy in Brazil has undergone various transformations throughout its history. This study analyzes the evolution of monetary policy in Brazil from 2004 to 2020, highlighting key moments and the main changes over time. In a scenario marked by skepticism, Luiz Inácio Lula da Silva won the presidency in the 2002 elections. Upon Lula beginning his first term in 2003, the government faced imminent challenges, including the urgent need to reduce inflation, which had reached approximately 12.5% in the previous year owing to significant devaluation in 2002.

Additionally, a pressing need existed to reduce the total net public debt, representing approximately 52% of the Gross Domestic Product (GDP), and increase international reserves, which totaled US$ 37.8 billion in 2002, including the US$ 20.8 billion borrowed from the International Monetary Fund (IMF) (Da Silva, 2017). Given the adverse conditions during the early months of the Lula administration, measures were implemented to reverse the situation. In February 2003, in response to the unfavorable environment, the Central Bank raised the Special System for Settlement and Custody (SELIC) interest rate and, consequently, the real interest rate, aiming to curb currency devaluation and its potential inflationary effects.

Government authorities deemed this action essential because of rising inflation, which exceeded 12%, surpassing the established target of 6.5%. Moreover, uncertainty regarding national economic policy demanded measures that reaffirmed the country's commitment to orthodox policies, such as price stability and fiscal responsibility (Barbosa and Souza 2010, cited in Da Silva 2017).

However, the interest rate increase proved insufficient to align inflation with the government's target. Inflation did not begin to decline until 2004, with an average appreciation of 4.95% in the exchange rate. Seizing this opportunity, the Central Bank initiated a gradual reduction in both the SELIC and real interest rates, reaching rates of 16.00% and 4.58%, respectively, in July. These decreases boosted consumption, resulting in significant economic growth, reaching a rate of 5.7%, while inflation averaged 0.4% below the upper limit of the target (Da Silva 2017).

This rapid economic recovery raised concerns among monetary authorities, who feared that inflation would increase. In response, the Central Bank again raised the SELIC and real interest rates in September 2004, to 16.25% and 11.59%, respectively. These measures were implemented to contain the expectation of rising inflation and ensure economic stability (Da Silva 2017), and these decisions had noticeable effects on exchange rates and GDP growth in 2005. The gradual increase in interest rates, with the average real interest rate reaching 12.72%, contributed to a significant appreciation in the exchange rate, averaging 16.77%. This appreciation maintained inflation at 5.7%, which was within the target range.

However, this resulted in a slowdown in export and investment growth, consequently affecting the GDP, which ended the year with a growth rate of 3.2%. The strong appreciation of the exchange rate did not have significant effects on net exports and, therefore, on aggregate demand because of the low GDP growth, limiting the increase in imports (Da Silva 2017).

From 2003 to 2006, the economic dynamics in Brazil were characterized by the need to converge the inflation trajectory. In the first year of the Lula administration, inflation exceeded the target, driven by the 'Lula effect,' a term used to reflect the concern that the new administration might abandon the inflation-targeting monetary policy regime. In response to these inflationary pressures, the authorities raised interest rates and increased the fiscal surplus.

From 2006 onwards, inflation began to converge towards the established target, reaching 3.14% (the target varied between 2.5% and 4.5%), compared to in 2003, 2004, and 2005, when it reached 9.3% (target 4–2.5%), 7.6% (5.5–2.5%), and 5.7% (4.5–2.5%), respectively. These measures contributed to stabilizing the inflation trajectory and promoting consistency with established targets (Ribeiro 2017). Consequently, the decrease in inflation during 2006 and 2007 was the result of not only currency appreciation but also the declines in the prices of agricultural products, indirect taxes on certain foods, and Contribution of Intervention in the Economic Domain (CIDE) on certain types of fuels. Consequently, the basic real interest rate could be reduced. At the end of 2007, the SELIC rate was 11.25%, and the real interest rate was 1.25% (average of 7.25%; Da Silva 2017).

In Lula's second term, the government faced the effects of the 2008 financial crisis by adopting Keynesian policies, aiming to overcome the negative effects on the country given the impact on the global economy. During this period, economic policy was noticeably relaxed, with measures implemented to expand consumer and borrower credit.

The government adopted direct income transfer programs, granted real increases in the minimum wage, launched the Growth Acceleration Program (PAC), and expanded the role of the National Bank for Economic and Social Development (BNDES) to stimulate investment in the public and private sectors. Additionally, countercyclical measures were implemented beginning in 2009 to combat the effects of the global financial crisis (Teixeira and Pinto 2012).

During his term, the government had more leeway within the inflation-targeting system, allowing for a slightly more expansionary monetary policy than in the first term. Although

inflation increased, it remained at around 4.5%, which was within the range around the target set by COPOM. Compliance with inflation targets allowed the Central Bank to adopt a more flexible approach to monetary policy.

Meeting the inflation targets resulted in high interest rates, although these decreased considerably in the second term. According to economic orthodoxy, inflation control requires the use of a basic interest rate in an inflation-targeting regime (Da Silva 2017). Thus, during Lula's second term (2007–2010), the economic landscape was marked by two significant events: the impact of Chinese demand on national commodities and the 2008 financial crisis. Throughout most of this period, inflation remained within the range established by the inflation-targeting regime, with only a 5.8% inflation rate in 2010 exceeding the target of 4.5%, with a tolerance range of 2% (Ribeiro 2017).

After the countercyclical measures adopted in 2009 facilitated the rapid recovery of the Brazilian economy, the Central Bank initiated a new cycle of interest rate hikes starting in April 2010, when inflation began to rise. The main reasons for this movement were related to the rapid growth of commodities imported and exported by Brazil.

Although the SELIC rate experienced some fluctuations, it showed an upward trend during this period, increasing from 8.5% in April 2010 to 12.5% in July 2011. A priority at the beginning of the Dilma administration was to contain this upward movement of inflation, which reached 6.5% in March 2011, matching the upper limit of the established target (Da Silva, 2017).

During Dilma Rousseff's first term, economic scenarios were heavily influenced by the intensified international financial crisis. After the initial phase of contractionary policies, the government selected a counter-crisis approach, focusing on reducing interest rates and promoting credit expansion for investments (Ribeiro 2017).

Similar to the Lula administration, the Dilma administration (2011–2014) faced a recurring dilemma in the Brazilian economy: reconciling inflation targets without exceeding the ceiling and while boosting economic growth. From this perspective, a gradualist strategy was adopted, with interest rate increases and macroprudential measures implemented. Upon realizing that these measures affected growth more than inflation, the government began to reduce interest rates systematically.

However, inflation did not allow the sustained decline in interest rates to last long. In late 2014, faced with stagnant economic growth, the government returned to a gradualist policy, raising interest rates and adjusting reserve requirements to stimulate credit and, consequently, aggregate demand. Thus, it resumed an approach similar to the monetary policy of the previous government, characterized by high interest rates with credit expansion (Da Silva 2017).

In December 2014, at the end of Dilma Rousseff's first term, annual inflation reached 6.41%, with housing expenses being the most affected. At the end of 2014, the annual SELIC rate was 11.75%. Despite the monetary policies adopted during Lula's administration managing to please both bondholders and industrial sector entrepreneurs, Dilma Rousseff did not succeed in striking this balance and leaned more towards the interests of industrial entrepreneurs through an economic approach known as the New Economic Matrix or the Fiesp Agenda.

Although the government outlined strategies that aimed to increase the GDP and reduce inflation, this attempt was unsuccessful. Under intense pressure, the impeachment process began in Dilma Rousseff's second term, which was grounded in allegations of ‘fiscal maneuvers’ and was ultimately approved by the Senate in 2016 (Viana 2022).

During Michel Temer's administration, inflation control emerged as a priority, and a monetary policy was implemented that allowed the population's purchasing power to recover. Temer's administration prioritized inflation control and adopted various measures, including the release of funds from the Severance Pay Guarantee Fund (FGTS). These actions were implemented to stimulate national economic recovery.

The first projection for inflation under the new government indicated a rate of 6.75%, which was higher than the 4.5% target set by the National Monetary Council (CMN). The ability to achieve this inflation target was initially met with optimism. Faced with this scenario, monetary policy was relaxed, resulting in a reduced SELIC rate.

Despite global uncertainties, such as the direction of the Chinese economy, 2017 was marked by positive signs of Brazil's economic recovery, with falling inflation and remerging economic activity growth throughout the period. The inflation slowdown in 2017 occurred due to a combination of factors, including real appreciation, high unemployment, falling wages, and the end of the effects of administered price and food shocks (Viana 2022).

During Temer's administration, monetary policy measures were adjusted as needed to control interest rates and stimulate inflation to approach established targets. Reducing uncertainties related to implementing fiscal reforms was emphasized, in addition to initiatives being highlighted that aimed to increase productivity and promote economic development in Brazil. At the end of the Temer administration in December 2018, the inflation rate recorded for the year was 3.75% (Viana 2022).

In summary, during Temer's government, there was a significant shift in both the monetary and fiscal policy directions. Measures to control public spending, such as the Public Spending Ceiling Constitutional Amendment (PEC do Teto dos Gastos) and pension reform, have been implemented, progressively creating more room for interest rate reductions (Galery 2022).

In early 2018, interest rates were at near-historical lows, with the Central Bank indicating the end of the downward cycle. However, uncertainties marked the economic situation, including the electoral period, crises such as the truckers' strike, and the situations in Turkey and Argentina. Faced with the need to boost the economy, which had already gained control over inflation, the SELIC rate was reduced until the end of 2018 (Galery 2022).

At the beginning of Jair Bolsonaro's administration, expectations were optimistic, with favorable projections for GDP growth, controlled inflation, and stable interest rates. However, throughout Bolsonaro’s presidential term, political instabilities affected economic agents’ confidence of economic agents, which was coupled with the beginning of the COVID-19 pandemic before structural recovery from the 2015–2016 recession had been achieved. The SELIC rate reached historic lows in 2020 following successive reductions, which contributed to a smaller GDP decline than predicted (Galery 2022).

During Bolsonaro's administration, monetary and fiscal policies faced significant challenges, including the lack of a clear strategy for fiscal reforms and public debt control. Reducing the SELIC rate to stimulate the economy during the COVID-19 pandemic may have contributed to increased inflation, while the management of public debt generated economic uncertainties and instabilities (Ribeiro et al. 2023).

After being elected in 2018, Bolsonaro chose to maintain an approach similar to the fiscal control policy adopted by his predecessor, resulting in comparable outcomes regarding inflation control and interest rate reduction. However, economic growth was modest, hovering at approximately 1% during the first year of his term. With the outbreak of the pandemic in 2020, the global economy faced various supply shocks, which contributed to increased inflation across the supply chain (Pereira et al. 2022).

Between 2019 and 2020, Brazil’s monetary policy adopted an expansionary approach, as evidenced by reduced basic interest rates. In December 2018, the rates were at 6.50%, however, by the end of 2019, they had decreased to a historical low of 4.50%. This decrease in interest rates was aligned with the country’s inflationary behavior (Pereira et al. 2022).

However, despite these movements, economic activity reflected relatively low indices, with an annual product growth of only 1.22%. This scenario suggests that, although monetary policy sought to stimulate the economy by reducing interest rates, the results in terms of

economic growth were limited, indicating additional challenges in the economic landscape during this period. Implementing the expansionary monetary policy, which began in 2017, played a crucial role in mitigating the effects of the pandemic, as evidenced by the significant reduction in interest rates, from 6.50% in December 2019 to 2% in August 2021 (Pereira et al. 2022).

4. Empirical analysis

In this section, we analyze the relationship between inflation expectations (exinfl) and official Brazilian inflation. The results of the empirical exercise presented below corroborate Rudd's (2022) theoretical findings that inflation expectations have little influence on actual inflation. This may be related to the composition of the participants in the expectations system. As financial market institutions predominate, future inflation expectations from this sector can be assumed to be potentially distorting the Focus Bulletin indicator.

However, it appears that the product GAP is important in explaining inflation behavior in Brazil from 2005 to 2022. These results suggest that the real economy is a better guide for assessing inflation expectations than relying solely on the financial market. Agents on the real side of the economy encounter production costs and fluctuations in aggregate demand directly, and the dynamics of the interactions between supply and demand reveal inflationary behavior. Therefore, nonfinancial companies and households are important for understanding the inflationary trajectory.

The series used in the estimations covers the period from January 2005 to December 2022 and contains 216 observations. This period was selected because Vereda et al. (2020) found that, during this interval, marked movements in credibility occurred until September 2019, followed by a process of continuous deterioration. Furthermore, this period is marked by a diametrically opposed monetary policy orientation owing to the political factors in Brazil at that time.

Table 1 lists the variables used in this study. In particular, the variable referring to the product gap was obtained by applying the HP filter to the logarithm of the original series, and, after this procedure, the filtered series was subtracted from the log of the original series with lambda (λ) equal to 129,600, because this procedure is recommended for a monthly series (Costa Filho 2014). Thus, the difference between the logarithms of the original series and the HP filter applied was used to the logarithm of the series.

Table 1. List of variables

Variable	Description	Source
ipca	Broad Consumer Price Index	IPEADATA
exinfl	Inflation expectation	SGS/BANCEN
gap	Product gap calculated by seasonally adjusted IBC-Br	SGS/BANCEN
rer	Real exchange rate	IPEADATA
iec	Consumer Expectation Index	IPEADATA

Source: prepared by the authors

Thus, the general equation to be estimated is as follows:

$$ipca_t = exinfl + ipca10 + gdp + rer + iec \qquad (1)$$

where *ipca* is the consumer price index, *exinfl* is the inflation expectation obtained from the Focus Bulletin, *ipca10* is the consumer price index for the ten main products, *gdp* is the product gap, *rer* is the real exchange rate, and *iec* is the consumer expectation index (consumer feelings about the future economic situation). The letter '*D*' before the variable nomenclature indicates that the variable is in first difference.

The variable of interest (exinfl)[1] is an indicator constructed from the Market Expectations System, which is an online interface where previously authorized participants can provide their projections for various macroeconomic variables. Currently, 171 institutions participate[2], which are predominantly banks, asset managers, distributors, and brokerages, in addition to consulting firms and other nonfinancial companies.

Table 2. Equation estimates

Constant	0.10
	(3.77)
$DEXINF$ (-1)	-0.19
	(-1.22)
$DIPCA10$ (-1)	-0.06
	(-4.50)
$DGAP$ (-1)	-0.01
	(-2.68)
$DRER$ (-1)	0.01
	(1.10)
$DIEC$ (-1)	0.01
	(0.94)
$ARMA$	(2,1)
Dummy	Yes
Adj. R^2	0.25
SE	0.26
D.W	1.99
F-stat.	10.00
prob>F	0.00
obs.	212
Period	2005-2022

Note: The estimation method was least squares corrected by heteroscedasticity and autocorrelation consistent covariance standard errors and covariance (Bartlett kernel, Newey–West fixed for all equations). The t–t-statistics are in parentheses below each coefficient. SE is the standard error. D.W. is the Durbin–Watson statistic. F is the F-statistic, and prob > F is the probability associated with observing an F-statistic. For the equation it was applied an ARMA (2,1).

In principle, any entity (e.g., banks and other financial institutions, non-financial companies, consulting firms, professional associations, and universities) can request to participate in the survey, with the only requirements being that they have a team that specializes

[1] For more information, see: https://www.bcb.gov.br/en/monetarypolicy/marketexpectationsfaq
[2] Position of 12/22/2023.

in macroeconomic projections and regularity in the provided projections. Thus, the institutions that predominate the Expectations System are assumed to be connected to the financial market.

The equation was estimated using an ordinary least squares (OLS) model corrected by a heteroscedasticity and autocorrelation consistent covariance (HAC) matrix. An autoregressive (ARMA) matrix (2,1) was also applied. Hence, issues related to autocorrelation and heteroscedasticity were resolved. As Hamilton (1994) has noted, whether the time series are co-integrated or integrated of order one, the OLS method is a superconsistent estimator. In addition, the independent variables were lagged to avoid simultaneity.

Given this equation, the *exinfl* variable is expected to reflect a positive but not significant, relationship. The results of the empirical exercise show that the variable is not significant, as argued by Rudd (2022) and Carvalho (2012). Thus, the empirical exercise is consistent with the hypothesis that the relationship between expected and actual inflation is fragile. However, this study's results conflict with those of Gomes (2023), Dos Reis et al. (2020), Egorov et al. (2006), and Kilian et al. (2003), who previously found that inflation expectations are related to actual inflation.

For the variable *ipca10*, which is a preview of IPCA, a positive and significant relationship was expected; however, the estimation result showed a negative but significant relationship. Regarding the *gdp* variable, a negative relationship was expected because the greater the product gap, the lower the inflation should be, and the estimation results were as expected. The product gap presented the expected sign and was statistically significant.

Considering the control variables *rer* and *iec*, the greater the exchange rate depreciation, the higher the price index tends to be, suggesting a positive relationship, as well as the variable iec, which was expected to show a positive relationship (i.e., the greater the consumption, the greater the demand, and the higher the price index). However, these variables were not statistically significant despite both showing the expected signs.

These results are important because they eliminate the pressure that the Focus Bulletin exerts on the interest rate. In recent years, the minutes of the Economic Policy Committee of the Central Bank of Brazil have indicated the importance of inflation expectations in making monetary policy decisions. However, this study's findings indicate that the best option would be to increase the weight of the Product GAP variable.

5. Conclusion

As highlighted in the Introduction, the Focus Report prepared by the Central Bank of Brazil summarizes statistics derived from market expectations. As Rudd (2022) argues, the expectations of households and businesses regarding future inflation are among the primary determinants of actual inflation. This argument served as the motivation for the investigation conducted in this study. This study aimed to address the following research question: Do inflation expectations as measured by the Focus Market Report explain inflation as measured by the IPC in Brazil? In response to this question, the results of the empirical exercise support Rudd's (2022) theoretical conclusions, suggesting that inflation expectations have little power to determine actual inflation.

This may be related to the Focus Report's collected sample, which carries a greater weight for entities connected to the financial market. Thus, the sensitivity of financial market agents to future inflation may not be a reliable guide for formulating monetary policy. Agents associated with the real side of the economy tend to have a more nuanced analysis of price development and be more acutely affected by monetary policy effects. However, these agents do not appear to have a significant influence on gathering insights into the future behavior of inflation.

However, the output gap appears crucial in explaining inflation behavior in Brazil from 2005 to 2022. This finding is significant, as it may alleviate the pressure that the Focus Bulletin

exerts on interest rates, given that, in recent years, the minutes of the Economic Policy Committee of the Central Bank of Brazil have emphasized the importance of the inflation expectation variable in making monetary policy decisions.

The results obtained in this study suggest that the optimal approach would be to increase the weight of the Output Gap variable and broaden the participant base of the survey, especially for those affiliated with the real side of the economy. Through this change, the results of the Focus Bulletin could present a more balanced reflection of agents' perceptions of the future behavior of inflation.

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Appendices

Table A1: The KPSS.

Variables	t test	Critical value			H0	Result
		1% level	5% level	10% level		
$IPCA$	0.13	0.74	0.46	0.35	no reject	stationary
$EXINF$	0.15	0.74	0.46	0.35	no reject	stationary
GDP	1.15	0.74	0.46	0.35	Reject	no stationary
RER	1.00	0.74	0.46	0.35	Reject	no stationary
IEC	0.34	0.74	0.46	0.35	no reject	stationary
$DIPCA$	0.06	0.74	0.46	0.35	no reject	stationary
$DEXINF$	0.04	0.74	0.46	0.35	no reject	Stationary
DGPD	0.18	0.74	0.46	0.35	no reject	Stationary
DRER	0.25	0.74	0.46	0.35	no reject	Stationary
DIEC	0.06	0.74	0.46	0.35	no reject	Stationary

Table A2: Breusch-Godfrey Serial Correlation LM.

Equation	
$RESID(-1)$	-0.01
	(-0.13)
$RESID(-2)$	-0.01
	(0.07)
F-statistic	0.025469
Obs*R-squared	0.052884
Prob. F(2,208)	0.9749
Prob. Chi-Square(2)	0.9739
Adj. R	0.00
Durbin-Watson stat	1.99
Period	2004-2022

Table A3: Heteroskedasticity Test ARCH.

F-statistic	1.667299
Obs*R-squared	8.247285
Prob. F(1,49)	0.1438
Prob. Chi-Square(2)	0.1431
Adj. *R*	0.03
Durbin-Watson stat	2.07
Period	2004-2022

Table A4: Multiple breakpoint tests

Sequential F-statistic determined breaks:			1
Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	4.276651	25.65991	20.08
1 vs. 2	1.554433	9.326596	22.11
Break dates:			
	Sequential	Repartition	
1	2020M05	2020M05	

Bai-Perron tests of L+1 vs. L sequentially determined breaks; Sample: 2004 2020; Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05; Test statistics employ HAC covariances (Bartlett kernel, Newey-West fixed bandwidth) assuming common data distribution; * Significant at the 0.05 level;
** Bai-Perron (Econometric Journal, 2003) critical values.

Table A5:Autocorrelation test

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.00...	-0.00...	0.0192	0.890
		2	0.012	0.012	0.0527	0.974
		3	0.024	0.024	0.1808	0.981
		4	-0.13...	-0.13...	4.1929	0.381
		5	-0.00...	-0.01...	4.2073	0.520
		6	0.008	0.011	4.2213	0.647
		7	-0.06...	-0.05...	5.0686	0.652
		8	0.054	0.036	5.7349	0.677
		9	-0.05...	-0.05...	6.4337	0.696
		1...	-0.00...	-0.00...	6.4430	0.777
		1...	-0.01...	-0.02...	6.4788	0.840
		1...	-0.11...	-0.10...	9.5936	0.652
		1...	-0.02...	-0.03...	9.7332	0.716
		1...	0.034	0.031	10.005	0.762
		1...	0.046	0.054	10.510	0.786
		1...	-0.03...	-0.07...	10.827	0.820
		1...	0.035	0.025	11.109	0.851
		1...	0.055	0.062	11.816	0.857
		1...	0.023	0.029	11.946	0.888
		2...	0.090	0.081	13.876	0.837
		2...	-0.03...	-0.03...	14.088	0.866
		2...	-0.03...	-0.02...	14.398	0.887
		2...	-0.01...	-0.02...	14.450	0.913
		2...	-0.12...	-0.10...	18.128	0.797
		2...	0.026	0.013	18.297	0.830
		2...	-0.04...	-0.04...	18.783	0.845
		2...	0.012	0.038	18.817	0.877
		2...	-0.03...	-0.08...	19.056	0.896
		2...	0.086	0.107	20.901	0.863
		3...	-0.04...	-0.04...	21.450	0.873
		3...	-0.01...	-0.01...	21.531	0.897
		3...	-0.01...	-0.00...	21.565	0.919
		3...	-0.07...	-0.08...	22.974	0.904
		3...	-0.00...	-0.01...	22.985	0.924
		3...	0.008	-0.03...	23.002	0.940
		3...	-0.10...	-0.11...	25.765	0.897

Table A6: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-4654.908	NA	1.17e+12	44.81643	44.91270	44.85535
1	-2897.479	3396.570	75895.50	28.26422	28.93815*	28.53672*
2	-2848.193	92.41172	66848.66	28.13647	29.38805	28.64254
3	-2808.878	71.44644	64886.98	28.10460	29.93383	28.84425
4	-2772.902	63.30542	65157.77	28.10482	30.51170	29.07804
5	-2737.362	60.48510	65868.27	28.10925	31.09378	29.31604
6	-2707.177	49.63086	70323.28	28.16517	31.72735	29.60553
7	-2657.949	78.10333*	62754.25*	28.03797*	32.17780	29.71190
8	-2630.368	42.16722	69269.88	28.11892	32.83640	30.02643

* indicates lag order selected by the criterion LR: sequential modified LR test statistic (each test at 5% level) FPE: Final prediction error AIC: Akaike information criterion SC: Schwarz information criterion HQ: Hannan-Quinn information criterion

Table A7: Cointegration Test

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	3	3	3	3	3
Max-Eig	3	3	3	3	2

Note: Selected (0.05 level*) Number of Cointegrating Relations by Model. *Critical values based on MacKinnon-Haug-Michelis (1999).