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Relationship Between Inflation, Inflation Expectations, and the Mexican Stock Exchange Index (IPC) (2000-2019)

Relación entre la inflación, las expectativas de inflación y el Índice de Precios al Consumidor (IPC) de la Bolsa Mexicana de Valores (2000-2019)

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Abstract

This study examined the relationship between inflation, inflation expectations, and the Mexican Stock Exchange Index (IPC BMV) from 2000 to 2019. Using multiple linear regression models with monthly data, the results revealed a positive correlation between actual inflation and the IPC BMV and a negative relationship with expected inflation. High inflation expectations, represented by a dummy variable, indicated favorable adjustments. Despite the models' low R^2, the findings remain valid, emphasizing that inflation and its expectations are only part of the factors influencing the IPC BMV. The analysis highlights the importance of calculating inflation expectations for the Bank of Mexico and offers valuable insights for policymakers and investors in emerging markets.

Keywords: Inflation; Inflation expectations; Mexican Stock Exchange Index (IPC BMV); Financial markets; Mexican economy

Resumen

Este estudio examinó la relación entre la inflación, las expectativas de inflación y el Índice de Precios y Cotizaciones de la Bolsa Mexicana de Valores (IPC BMV) de 2000 a 2019. Mediante modelos de regresión lineal múltiple con datos mensuales, los resultados revelaron una correlación positiva entre la inflación observada y el IPC BMV, y una relación negativa con la inflación esperada. Las altas expectativas de inflación, representadas por una variable ficticia, indicaron ajustes favorables. A pesar del bajo R^2 de los modelos, los hallazgos siguen siendo válidos, lo que enfatiza que la inflación y sus expectativas son solo una parte de los factores que influyen en el IPC BMV. El análisis destaca la importancia de calcular las expectativas de inflación para el Banco de México y ofrece información valiosa para los responsables de la formulación de políticas e inversionistas en mercados emergentes.

Palabras clave: Inflación; Expectativas de inflación; Índice de Precios y Cotizaciones de la Bolsa Mexicana de Valores (IPC BMV); Mercados financieros; Economía mexicana

JEL Classification Codes: E31, E44, G12, G15, O54

Introduction

The relationship between inflation, inflation expectations, and financial assets is fundamental in monetary theory and economic decision-making. While numerous global studies analyze the connection between inflation and financial markets, there is a lack of research examining these variables specifically within the Mexican economy. This study aims to fill that gap, providing specific analyses that contribute to economic policies and market decisions in the Mexican context.

Using monthly data on inflation, expected inflation, and the IPC BMV, this analysis employed linear regressions to identify significant patterns in the interaction of these variables within an emerging market context like Mexico.

Problem Statement

The limited availability of studies on the relationship between inflation, inflation expectations, and the behavior of financial assets in Mexico represents a knowledge gap that restricts a deeper understanding of its mechanisms and dynamics. The lack of research impacts investment strategies, financial decision-making, and risk management in an emerging and relatively illiquid market like Mexico, which exhibited unique characteristics.

In response to this gap, this research focused on a detailed analysis of the relationship between inflation, inflation expectations, and financial assets in Mexico during the period 2000-2019. This approach not only contributed to academic knowledge but also provided relevant insights for financial professionals, investors, and economic policymakers in Mexico.

Methodology

This study employed monthly data on inflation, inflation expectations, and the IPC BMV in Mexico for the period between 2000 and 2019. Inflation data were obtained from the Bank of Mexico, while inflation expectations were sourced from the survey of experts conducted by the Bank of Mexico. The IPC BMV values were extracted from the Investing.com database.

The analysis was conducted using a basic linear regression model (Draper & Smith, 1998), chosen for its ability to identify linear relationships between variables. In this case, the objective was to understand the relationship between actual inflation, expected inflation (independent variables), and the IPC BMV (dependent variable). The model was specified as follows:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Where $Y_i Y_i$ represents the dependent variable, β_0 β_0 is the intercept, $\beta_{1\ldots n} \beta_{1\ldots n}$ represents the coefficients of the independent variables, $X_{i_{\ldots n}} X_{i\ldots n}$ represent the independent variables, and $\varepsilon_i \varepsilon_i$ represents random errors with a mean of zero, common variance $\sigma^2 \sigma^2$, and independence from each other. In this model $Y_i Y_i$ is the IPC BMV, $X_1 X_1$ is inflation, and $X_2 X_2$ is expected inflation.

To verify the assumptions of normality, homoscedasticity, and independence in the model's residuals, specific statistical tests were applied. The Shapiro-Wilk test was first used to assess the normality of the residuals, revealing a significant deviation from normality (Shapiro & Wilk, 1965). To check homoscedasticity, the Breusch-Pagan (Breusch & Pagan, 1979) and White tests (White, 1980) were applied, with the White test indicating significant heteroscedasticity, along with skewness and kurtosis in the residuals. Additionally, the Durbin-Watson test was used to detect autocorrelation in the residuals, revealing positive autocorrelation (Durbin & Watson, 1950). Details of the tests are provided in the appendices.

To address these issues, a logarithmic transformation of the dependent variable (IPC BMV) was applied to stabilize variance and improve normality (Wooldridge, 2016). Despite this transformation, problems of heteroscedasticity and autocorrelation in the residuals persisted. Consequently, Newey-West robust standard errors were implemented to correct both issues, enabling reliable inferences by adjusting the standard errors (Newey & West, 1987).

Descriptive Graphical Analysis

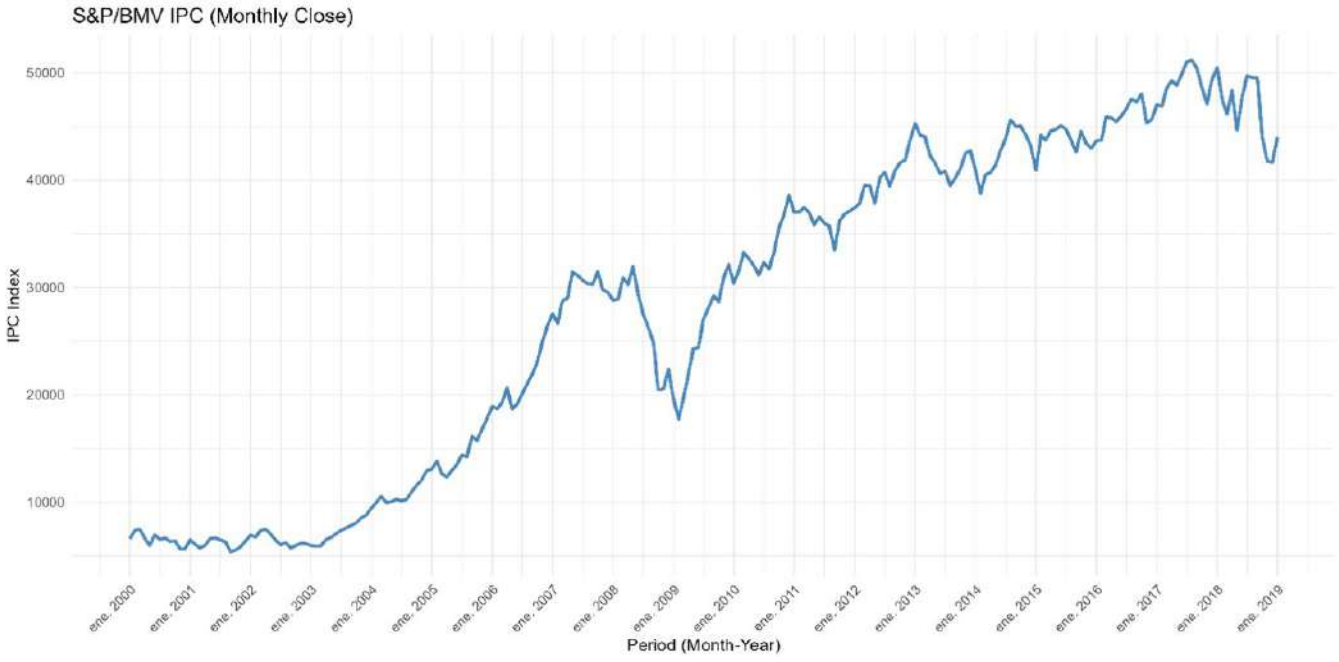
To support the statistical analysis, three graphics were created to explore how actual inflation, expected inflation, and the Mexican Stock Exchange Index (IPC BMV) have interacted between 2000 and 2019. These graphs offer a first look at possible patterns and connections among the variables.

This graph compares actual and expected monthly inflation rates. Overall, the two move closely together, especially during stable periods. However, during times of economic stress, like the 2008–2009 global financial crisis or the 2017 energy price surge, actual inflation significantly exceeded expectations. These deviations may reflect forecasting limitations and underscore the relevance of inflation surprises in financial decision-making.

Figure 1. Monthly Inflation vs. Expected Inflation (2000–2019)

Source: Own elaboration using R software

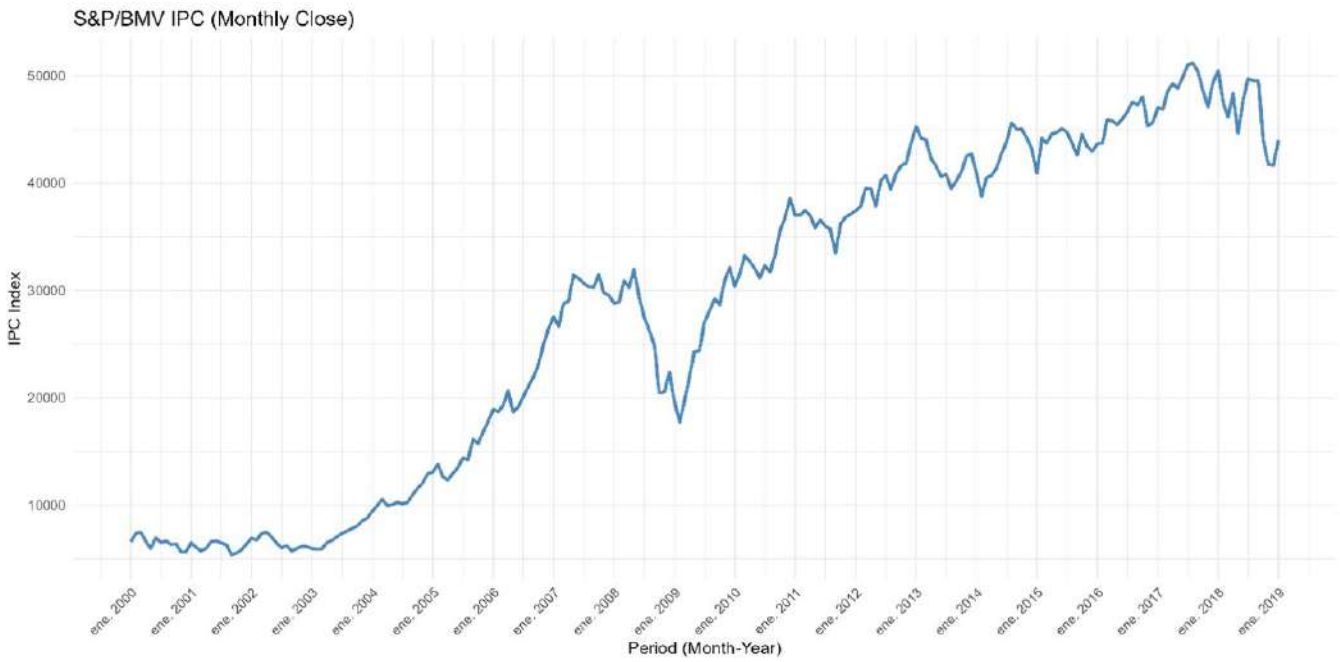
Figure 2. S&P/BMV IPC Monthly Closing Values (2000–2019)



Source: Own elaboration using R software

The IPC BMV shows a general upward trend over the period, with sharp drops during known shocks like the 2008 crisis, market reactions to the 2013 U.S. Federal Reserve policy shifts, and the volatility of late 2018. These downturns often align with sudden inflation changes or growing gaps between expected and actual inflation, suggesting that markets respond to rising uncertainty around prices.

Figure 3. Standardized Series: Inflation and IPC BMV (2000–2019)



Source: Own elaboration using R software

Standardizing the series allows a direct comparison across different scales. The chart reveals that peaks in actual inflation and inflation expectations often preceded downturns in the IPC BMV, whereas periods of convergence between both inflation variables are generally associated with market stability.

Development

The relationship between inflation and financial asset returns has been a central topic in economic and financial theory. Various studies have examined this connection, exploring how inflation dynamics influence markets and affect investor decisions.

Barnes, Boyd, and Smith (1999) found that in economies with low to moderate inflation, stock returns exhibit a negative or negligible correlation with inflation. However, in high-inflation environments, this correlation with nominal returns becomes positive. Similarly, Cieslak and Pflueger (2023) observed that inflation expectations particularly affect fixed-payment assets, such as Treasury bonds, which experience declines in high-inflation scenarios, increasing risks for investors.

Marshall (1992) identified an inverse relationship between expected returns and expected inflation, with this relationship being more negative when inflation stems from variations in real economic activity rather than monetary fluctuations. Engsted and Tanggaard (2002) also found links between inflation and both short and long term returns, noting that for U.S. bonds and stocks, the relationship between inflation and returns is stronger in the long term, while remaining weak in the short term.

Other studies have observed a negative relationship between expected inflation and stock returns. For instance, Stulz (1986) and Kim and In (2005) suggest that this relationship may vary depending on the time scale analyzed. Using a wavelet analysis, Kim and In found a positive correlation at short and long scales, but a negative correlation at intermediate scales, reinforcing the idea that the time horizon is crucial in understanding the relationship between these variables.

From a historical perspective, Fama and Schwert (1977) analyzed the protection offered by various assets against expected and unexpected inflation, concluding that government bonds and residential properties are effective hedges against inflation. On the other hand, Boudoukh and Richardson (1993) demonstrated that, in the long term, stock returns correlate positively with inflation, whereas in the short term, they correlate negatively, highlighting the need for theories to explain this dynamic.

Geske and Roll (1983) also observed a negative relationship between expected and unexpected inflation and stock returns, suggesting that this correlation is an

empirical illusion and may be distorted by the use of nominal interest rates as indicators of inflation. Santoni and Moehring (1994) support this notion, proposing that the observed inverse relationship between expected inflation and asset returns could stem from the improper use of price indices to measure inflation.

More recently, Ahmed and Cardinale (2005) and Lee (2003) explored how inflation affects returns over short and long time horizons, finding evidence that these effects can vary across economic environments and historical periods. Lee identified that the relationship between inflation and assets is driven by three types of disturbances: supply, monetary demand, and fiscal, each exerting distinct effects on the correlation between inflation and returns.

Recent studies by Bekaert and Wang (2010) highlight the ineffectiveness of certain instruments, such as standard bonds and diversified stocks, in hedging against inflation. Their findings suggest that inflation-indexed bonds provide a viable alternative, although they acknowledge that inflation risk remains challenging to mitigate. This underscores the need for governments to consider issuing inflation-indexed bonds to reduce financing costs.

Overall, these studies suggest that the relationship between inflation and asset returns depends on the level of inflation, the time horizon, and the characteristics of the financial asset. The evidence highlights that in high-inflation environments, assets such as bonds or real estate can offer protection against inflation, while stock returns tend to be negatively related to expected inflation, although they may also be influenced by factors such as inflation expectations and monetary policies. Understanding these dynamics is crucial for long-term investors, as the short-term relationship between inflation and returns may not align with the belief that the stock market always serves as a perfect hedge against inflation.

Results

Table 1: Newey-West Regression Results for Monthly Inflation, Expected Inflation, and IPC BMV

Variable	Coefficient	Standard Error	t-Statistic	p-Value	95% Confidence Interval	
Intercept (_cons)	10.34	0.07	137.08	0.00	10.2012	10.4987
Monthly Inflation	0.5205	0.2081	2.50	0.013	0.1103	0.9307
Expected Monthly Inflation	-1.3970	0.2818	-4.96	0.00	-1.9525	-0.8415
Model Summary F-Statistic (2, 226): 15.20 Prob > F: 0.00 Number of Observations: 229						

Source: Own elaboration using Stata software

These results highlight a significant positive correlation between actual inflation and the monthly average values of the IPC BMV, suggesting that an increase in inflation is associated with a rise in the stock market index. Specifically, the coefficient indicates that for every one-unit increase in monthly inflation, the logarithm of the IPC BMV increases by 0.52 units, holding expected inflation constant. However, the relatively low R^2 suggests that the model does not fully capture the variability of the IPC BMV, indicating that other factors not included in this analysis also play a significant role in the index's behavior.

On the other hand, expected inflation shows a significant negative relationship with the IPC BMV. The coefficient implies that when inflation expectations increase by one unit, the logarithm of the IPC BMV decreases by 1.39 units, controlling for the effects of monthly inflation. The p-values for both independent variables (0.013 and 0.000) confirm the statistical significance of these coefficients at the 95% significance level, validating the importance of these variables in the model. This finding supports the hypothesis that higher inflation expectations predict declines in the IPC BMV. This dynamic suggests that, in the Mexican context, effective management of inflation expectations by the Bank of Mexico is crucial, given the potential negative impact of inflation expectations on financial markets.

These findings suggest that in Mexico, a context of high actual inflation can drive momentum in the stock market, while elevated inflation expectations appear to predict declines in IPC BMV values.

Additionally, a model was developed that included a dummy variable to assess the impact of expected inflation above the average on the IPC BMV (Gujarati & Porter, 2003).

This dummy variable was created by assigning a value of 1 when expected monthly inflation exceeded the historical average of 0.3738, and 0 otherwise. This approach allowed for a more precise analysis of how above-average inflation expectations influenced the index's behavior, differentiating between the effects of average-range expected inflation and those considered higher.

Table 2: Newey-West Regression Results for the Impact of Monthly Inflation and Expected Inflation (with High Expectation Dummy) on IPC BMV

Variable	Coefficient	Standard Error	t-Statistic	p-Value	95% Confidence Interval	
Intercept (_cons)	10.3501	0.0729	141.97	0	10.2065	10.4938
Monthly Inflation	0.5357	0.2039	2.63	0.009	0.1338	0.9376
Expected Monthly Inflation	-1.8623	0.2678	-6.95	0	-2.3902	-1.3345
High Expected Inflation Dummy	0.3347	0.1443	2.32	0.021	0.0504	0.6191
Model Summary F-Statistic (3, 225): 21.51 Prob > F: 0.00 Number of Observations: 229						

Source: Own elaboration using Stata software

The model with Newey-West correction and the High Expected Inflation dummy variable reveals that while an increase in monthly inflation boosts the IPC BMV, expected inflation tends to decrease it. However, when inflation expectations exceed the historical average, there is a positive impact on the IPC BMV, suggesting that investors might anticipate favorable market adjustments.

This differentiation in inflation expectation levels indicates that during periods of above-average expected inflation, the Mexican market reacts with an upward trend, potentially driven by a greater perception of investment opportunities in an economic adjustment context.

However, using a dummy variable for an originally continuous variable may limit interpretation, as it oversimplifies a complex phenomenon. Therefore, future research could benefit from analyses that retain the continuous nature of expected inflation to capture more detailed variations.

Discussion of Results

The results, particularly the negative relationship between inflation expectations and the IPC BMV, align with findings from international studies, such as Boudoukh and Richardson (1993), who documented a negative correlation between inflation expectations and short-term stock returns in developed markets. This parallel suggests that the dynamics observed in Mexico may share similarities with more developed markets, highlighting the importance of inflation expectations in emerging markets for investment decisions and monetary policy.

Similarly, Geske and Roll (1983) examined the negative relationship between inflation and stock returns in the United States, finding that both expected and unexpected inflation have adverse effects on stock prices. These authors argued that this negative correlation could be attributed to immediate adjustments in asset markets in response to changes in inflation expectations. These findings are similar to the results of the present study, as inflation expectations in Mexico also show a negative association with the IPC BMV, indicating similar price adjustment patterns in developed and emerging markets. This suggests that investors and policymakers should consider how inflation expectations impact the market immediately and how these expectations could be used to anticipate price declines in the IPC BMV.

The dummy variable model in this analysis revealed a positive relationship between expected inflation and the IPC BMV when expected inflation exceeded the average, aligning with the study by Tiwari et al. (2014). These authors explored how different inflationary factors affect financial assets across various time horizons, demonstrating a bidirectional relationship between financial assets and the Producer Price Index (PPI), with the financial assets leading

in the short term and the PPI in the long term. In the present analysis, elevated inflation expectations were found to have a positive impact on the IPC BMV by anticipating favorable market adjustments. This result suggests that, in the Mexican context, certain inflationary components and high expectations can alter the IPC BMV dynamics, guiding economic policy and investment decisions based on the time horizon, particularly during periods of economic uncertainty.

This finding is relevant for economic policy, as it suggests that high inflation expectations can anticipate price increases and lead to favorable market adjustments. The observed positive relationship could be interpreted as a risk of overvaluation in high-inflation scenarios. This highlights that the dynamics between inflation expectations and the IPC BMV differ from those in developed markets, highlighting the importance of careful management of expectations by authorities.

Understanding the favorable impact of above-average inflation expectations offers a valuable tool for policymakers and market agents to anticipate and manage price fluctuations, supporting economic stability and enabling informed strategic decisions. However, this favorable relationship may not be sustainable in the long term, and the lack of analysis across varied time horizons limits the generalization of these results, which is a limitation to consider for future research.

Other studies, such as Gagnon (2007), have examined the relationship between inflationary conditions and price setting in Mexico. While the present analysis identifies a positive impact on the IPC BMV when inflation expectations exceed the average, Gagnon showed that in high-inflation contexts (above 10-15%), the frequency of price adjustments increases, leading to greater price sensitivity to inflation. These combined findings highlight how different inflation thresholds can alter price dynamics. This underscores the need for targeted and differentiated policies to maintain stability in scenarios of high inflation volatility.

A key insight from this analysis is that inflation expectations significantly shape the IPC BMV, yet the Bank of Mexico's reliance on surveys of financial analysts raises concerns about representativeness of its approach. Although the respondents are professionals, their forecasts may reflect systemic biases or fail to capture broader economic sentiment.

In contrast, other central banks apply more diverse and statistically robust methods. The U.S. Federal Reserve uses the Survey of Consumer Expectations (SCE), which gathers monthly data from households, calibrates responses by demographic segments, and collects full probability distributions. The European Central Bank, through its Survey of Professional Forecasters (SPF), employs a rotating panel that provides not only short- and long-term point estimates but also measures of uncertainty and distributional forecasts.

These approaches yield richer insights into inflation risk, including information on disagreement, anchoring, and overconfidence, factors that meaningfully affect market dynamics, as shown in studies by Armantier et al. (2017) and Goldfayn-Frank et al. (2024). By contrast, Banxico's static expert panel and reliance on point forecasts limit its ability to assess uncertainty or detect systemic skew. Expanding its methodology to include broader respondent bases and probabilistic forecasting would enhance the credibility and informativeness of its inflation indicators.

Conclusions

This study offers a detailed examination of the relationship between inflation, inflation expectations, and the Mexican Stock Exchange Index (IPC BMV) in an emerging market context. Results show that actual inflation has a positive association with the IPC BMV, likely reflecting nominal price adjustments, while expected inflation has a stronger and negative influence, indicating that forward-looking sentiment drives market responses more directly.

The inclusion of a dummy for above-average expected inflation reveals non-linear behavior: under certain conditions, elevated expectations may coincide with optimistic market adjustments. This dual effect highlights the complexity of expectation-driven dynamics and their implications for financial stability.

The low R^2 of the model indicates that other unaccounted factors also impact the IPC BMV. Finally, since inflation expectations can influence the IPC BMV through market confidence cycles, future studies could explore the causal link between expected and actual inflation, as well as the effects of specific Bank of Mexico policies on long-term inflation dynamics and financial asset behavior.

While this study does not assess the effectiveness of the Bank of Mexico's methodology, it notes that how expectations are constructed may affect markets. The Bank relies on expert surveys, which, according to international literature, may miss broader sentiment or carry bias. Other central banks, like the ECB and the Federal Reserve, use rotating panels, probabilistic forecasts, and broader samples to enhance the accuracy and policy value of expectations.

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Appendices

Table 1: Results of Normality, Heteroscedasticity, and Autocorrelation Tests

Prueba	Valor Observado	Valor p	Interpretación
Shapiro-Wilk	W = 0.92302	Prob > z = 0.0000	Residuals do not follow a normal distribution, indicating a deviation from normality in the data.
Durbin-Watson	d = 0.1041		Strong positive autocorrelation in residuals, which may affect significance tests.
Breusch-Pagan (Heteroscedasticity)	$\chi^2(1) = 0.45$	Prob > χ^2 = 0.5013	No evidence of heteroscedasticity according to the Breusch-Pagan test.
White (Heteroscedasticity and Others)	$\chi^2(5) = 19.47$	Prob > χ^2 = 0.0016	The White test indicates heteroscedasticity, skewness, and kurtosis, confirming non-constant variability and heavy tails.

Source: Own elaboration using Stata software

To evaluate the assumptions of normality, homoscedasticity, and independence in the model residuals, several statistical tests were conducted. The Shapiro-Wilk test was used to assess the normality of residuals, revealing a significant deviation from normality. Subsequently, the Durbin-Watson test was applied to detect autocorrelation in the residuals, indicating evidence of positive autocorrelation, which could introduce bias in the estimates.

To test for homoscedasticity, the Breusch-Pagan and White tests were applied. While the Breusch-Pagan test showed no significant evidence of heteroscedasticity, the White test indicated non-constant variability in the residuals, along with skewness and kurtosis, confirming the presence of heavy tails. These results justified the application of Newey-West robust standard error corrections to ensure the validity of inferences.

Table 2: Regression Model Results

Model	Inflation (monthly) Coef.	Expected Average Monthly Inflation Coef.	R^2	Estimation Method
Original Model	9875.08	-25612.53	0.0998	OLS Regression
Transformed Model (log)	0.5205	-1.3970	0.1259	OLS Regression
Robust Errors Model	0.5205	-1.3970	0.1259	OLS with Robust Errors
Newey-West Model (Final)	0.5205	-1.3970	0.1259	Regression with Newey-West Errors

Source: Own elaboration using Stata software.

The analysis began with an original linear regression model using Ordinary Least Squares (OLS), which provided an initial view of the relationships between the dependent and independent variables. However, this model exhibited issues with normality and heteroscedasticity in the residuals, compromising the reliability of significance tests. To improve normality and stabilize variance, a logarithmic transformation was applied to the dependent variable, resulting in a more stable fit, though not fully resolving all residual issues.

To achieve a more robust model, robust standard errors were incorporated in the next stage, allowing control for heteroscedasticity and yielding more reliable inferences. Finally, the model adjusted with Newey-West errors was established as the final model, as this adjustment corrects for both heteroscedasticity and autocorrelation, ensuring the validity of the relationships between variables and providing a solid foundation for interpreting the results.

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