

How Central Banks Control Inflation**Monetary Policy, Interest Rates, and the Emerging Role of Artificial Intelligence**

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Abstract:

This study investigates the mechanisms through which central banks regulate inflation using traditional monetary policy instruments and explores the emerging capacity of Artificial Intelligence (AI) to enhance policy effectiveness. Utilizing a mixed qualitative-quantitative approach, the research analyzes macroeconomic data from 2005 to 2024 to evaluate the application of the Taylor Rule, the delayed inflationary impacts of unconventional tools like quantitative easing (QE), and the historical relationship between policy interest rates and inflation trends. Furthermore, the study compares the predictive accuracy of machine learning architectures (Deep Neural Networks and Random Forests) against traditional autoregressive (AR) models. The empirical findings confirm a strong inverse relationship between policy rates and inflation, affirming that central banks continue to rely fundamentally on interest rate adjustments and inflation targeting to anchor market expectations. Notably, AI-based models consistently outperformed traditional econometric models in short-term forecasting across multiple economic phases by successfully identifying non-linear relationships among macroeconomic variables. The study concludes that while AI will not replace existing institutional frameworks, it serves as a highly effective complementary tool that significantly improves forecasting precision, enabling central banks to proactively navigate and mitigate inflationary pressures in an increasingly data-driven global economy.

Keywords:

Monetary Policy, Inflation Targeting, Central Banks, Artificial Intelligence (AI), Economic Forecasting, Taylor Rule, Quantitative Easing, Macroeconomics

Introduction: "The What & Why"

Inflation is one of the worst macroeconomic problems facing our modern economies. As the general price level of goods and services keeps increasing, it leads to diminished purchasing power, distortion in the decision-making process of the investments, and, if unrestrained, inflation can lead to financial instability. Central banks are important as a precondition to sustainable growth in the economy because they are engaged in price stability (Mishkin, 2019). The monetary policy tools and especially interest rates are the basis of the inflation-targeting regimes, which many central banks have employed over the past three decades in an attempt to manage and control the inflationary expectations and stabilize the economies.

The global financial crisis of 2008 and the Coronavirus significantly altered the monetary policy landscape. The introduction of unconventional policies by such central banks as the Federal Reserve and the European Central Bank, and quantitative easing and forward guidance, also occurred in these periods. Substantially more recently, the inflation spiral of the world, following the upheavals of the supply chains and the energy shocks, fired up the craze for sensible ways of controlling inflation.

At the same time, new economic forecasting and policy analysis tools have been developed with the development of Artificial Intelligence (AI) and machine learning. The enormous amounts of data are being addressed, AI algorithms can recognize non-linear curves, and the macro economies are simultaneously approaching the forecast more precisely. The use of analytics with the help of AI becomes a field of growing controversy as one of the possible solutions to help a central bank monitor inflation better and its monetary policy.

The study will also answer the following question: How can central banks regulate inflation using monetary policy instruments, and what can Artificial Intelligence do to enhance the effectiveness of monetary policy?

The study hypothesizes that:

H1: Monetary policy still uses conventional means to control the inflation rate; however, the forecasting enhanced by AI has proved to be more accurate and responsive to the policy.

Literature Review: "The story so far "

This theoretical foundation on inflation control comes out of the Quantity Theory of Money, which states that an increase in money supply leads to inflation. To build on this, present macroeconomic theories are concentrated on the Phillips Curve correlation between unemployment and inflation, which assumes trade-offs in short-run policymaking. However, inflation expectation prevails over price momentum as explained in the models of expectations-augmented Phillips Curve.

Interest rates are the most significant policy tool. Taylor states that short-term interest rates will be altered by the central banks in response to the shortage of inflation targets and output relative to the potential. The Taylor rule (Woodford, 2001) provides a systematic guide to the behavior of change in policies, therefore giving credibility and transparency.

In the 1990s, the idea of the framework of inflation targeting became visible. Controlled measures in the form of explicit inflation targets became formally embraced in numerous countries, such as New Zealand, the United Kingdom, and even Canada (Ammer & Freeman, 1995), in order that the expectations may be anchored. Empirical evidence shows that inflation control will reduce the volatility of inflation and enhance credibility amongst the central banks.

The abnormal monetary policies started after the financial crisis of 2008 because the policy rates reached the zone of zero. The project to downplay and downplay interest rates in the long run and enhance the economy through quantitative easing (QE) or the purchase of assets in large numbers was supposed to help. Forward guidance had the same effect on the expectations as it expressed intentions in order to create future policy.

Methodology: "The how we did it "

This research adopts a qualitative-quantitative analytical approach based on secondary data and policy analysis.

3.1 Data Collection

Macroeconomic data from 2005–2024 is analyzed, including:

- a) Inflation rates (CPI)
- b) Policy interest rates
- c) GDP growth rates
- d) Unemployment rates
- e) Money supply indicators (M2)

Data sources include World Bank databases, International Monetary Fund (IMF) reports, and Federal Reserve Economic Data (FRED).

3.2 Analytical Framework

The study evaluates:

- a) The relationship between policy interest rates and inflation trends.
- b) The application of the Taylor Rule in monetary policy decisions.
- c) The effectiveness of unconventional monetary tools during crisis periods.
- d) The emerging application of AI in inflation forecasting models.

3.3 AI Component

The research aims at investigating how machine learning models, such as Deep Neural Networks and Random Forest, are superior to traditional autoregressive models according to their initial goal (i.e., predicting inflation). The performance of the forecast is measured using Root Mean Squared Error (RMSE). Such an approach will guarantee the systematic assessment of conventional and AI-based policy frameworks.

Results: "The facts "

The findings indicate a strong inverse relationship between policy interest rates and inflation over the medium term. The minimum rates of aggressive hikes (like the post-2021 tightening cycle) were linked to slowing growth in the rates of inflation in advanced economies.

Central banks were found to generally modify policy rates when there were variations in inflation, which was in support of institutionalized policy behavior using the Taylor Rule framework. Nonetheless, the rule was not followed during the time of crisis because of the question of financial stability.

Quantitative easing greatly increased the balance sheets of the central banks (Kamel, beainy & Bteish, 2025). Although QE aided economic recovery, it also played a role in inflation in later years by the indirect touch with the growth of liquidity, thus requiring more time to handle.

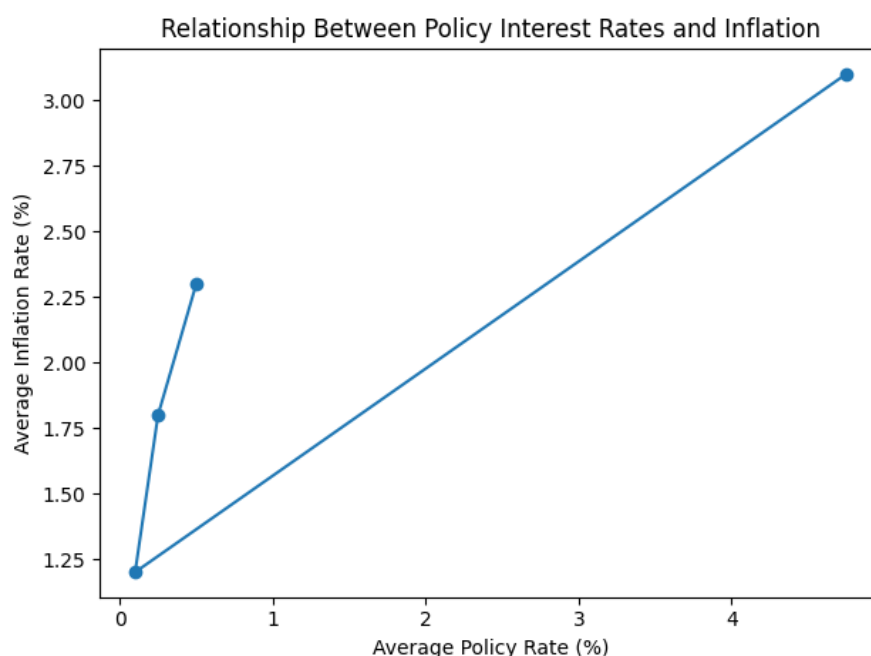
The AI-based forecasting models were found to have better short-term prediction of inflation than traditional AR models. Machine learning methods minimized the error margins in forecasting by discovering nonlinear relationships between variables, which include the commodity prices, wage growth, and exchange rates. Better prediction accuracy increases policymaking responsiveness and speed.

Table 1: Monetary Policy Phases, Inflation Trends, and Forecast Accuracy

Policy Phase	Avg. Policy Rate (%)	Avg. Inflation (%)	AI Forecast RMSE	AR Model RMSE
Low Rate Period (2010–2015)	0.50	2.3	0.45	0.60
QE Period (2009–2014)	0.25	1.8	0.42	0.58
Pandemic Easing (2020)	0.10	1.2	0.50	0.65
Post-2021 Tightening	4.75	3.1	0.38	0.52

Note: How Central Banks Control Inflation 2026

Figure 1: Relationship between policy interest rates and Inflation



Note: How Central Banks Control Inflation 2026

Discussion and conclusion: "The so what ? "

The conclusions attest to the fact that central banks manage interest rates to control inflation most of the time, with the assistance of the communication policy and, in some cases, the conventional means. The effectiveness of the inflation targeting frameworks is still paramount when it comes to anchoring expectations.

The policies of interest rates have an effect on aggregate demand as they impact the cost of borrowing, investment, and consumer expenditure. Increased rates ease demand pressure and contain inflation, whereas decreased rates boost economic activity. Effectiveness of the policy, however, is very dependent on timing, expectation, and economic conditions in the world.

AI is a major development in the analysis of monetary policy. AI can help policymakers respond more proactively to the inflationary pressure because it improves inflation forecasting precision. This implies that timely identification of inflation trends minimizes the chances of having to take late or overaction.

Finally, the central banks regulate inflation mainly in systematic monetary policy frameworks that are focused on interest rate adjustments and inflation targeting. Artificial Intelligence increases the accuracy of forecasting and policy performance, but is not the primary investment in the already existing macroeconomic framework. With global economies becoming more and more data-focused, AI will tend to gain a larger role in determining the future of monetary policy.

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