Federal reserve monetary policy under the taylor rule: theoretical framework, empirical analysis, and deviations

Cheng Cao [1*]

[1]Rutgers University – New Brunswick, 57 US Highway 1, New Brunswick City, Middlesex County, New Jersey, United States

Abstract. This paper investigates the application of the Taylor Rule in guiding the Federal Reserve’s interest rate decisions. It summarizes the definition, components, and factors of the Taylor Rule. In addition, it compares the patterns of the formula of the Taylor Rule in different periods. Using historical data from 1960 to 2024, this study evaluates whether the Federal Reserve's actual interest rate decisions align with the prescriptions of the Taylor Rule. The analysis also examines the degree of deviation in the periods of various disasters, such as the 2008 banking crisis and the SARS-CoV-2 pandemic. In addition, it examines the differences between the monetary policy under each Fed Chair. The study also explores the impact of these deviations on key economic variables, including inflation, GDP growth, and financial market stability. Additionally, it explores potential models for improving the forecasting power. The findings highlight the challenges of strictly adhering to the Taylor Rule, particularly during crises, and provide insights into the flexibility required in modern monetary policy.

1 Introduction

1.1 Research background and related information

Monetary policy is one of the most essential and fundamental tools for managing the economy [1]. It affects various aspects, such as inflation, employment, and markets. In the U.S., the Federal Reserve is a role that accountable for setting and administering monetary policy, which means that it is one of the most essential departments of the U.S. It also means that the Fed’s decisions often have effects not only within the U.S. but also across the global economy, due to the widespread use of US dollar in the world.

Over the past few decades, especially after the 1980s, the Fed’s actions have received more attention from both economists and the public. Specifically, some historical disasters, like the 2008 financial meltdown and the coronavirus pandemic of 2020, have shown how important and influential the Fed’s decisions can be. These experiences have also raised interest in whether monetary policy should follow clearer and more systematic rules [2].

* Corresponding author: cc2378@scarletmail.rutgers.edu

The Fed conducts its monetary framework mainly by targeting the federal funds rate, which is adjusted through open market operations [3]. Besides interest rate means, the Fed also uses instruments such as the discount rate and reserve requirements to influence liquidity and credit conditions. During the Banking crisis in 2008, the Fed initiated and launched multiple phases of quantitative easing (QE) to bolster financial markets and promote economic growth. Similarly, to maintain the economy based on the background of the COVID-19 pandemic, it quickly reduced interest rates to close to zero and increased its balance sheet via large-scale asset purchases [4]. These actions not only keep the domestic economy stable but also affect global capital flows, exchange rates, and so on in other countries. These actions and decisions also demonstrate the Fed's central position in the financial system of the world [3].

A key challenge in monetary policy is finding the right balance between maintaining inflation levels and encouraging economic growth. Increasing the rate of interest would reduce inflation, but it may also reduce the speed of development of the economy and increase the number of unemployment. Additionally, stabilizing rates at a relatively low level can support economic development and jobs, but it might lead to higher inflation or even financial instability.

In fact, recent research finds that the trade-offs in monetary policy have changed over time: since the mid-1980s, the influences of monetary policy and announcements on GDP have moderated, while there is an intensified effect on credit and housing markets, reflecting a shift toward financial stability concerns [5]. This trade-off is especially difficult during times of crisis. For example, in the 1970s, the U.S. experienced high inflation and slow growth, a situation known as stagflation. Later, during the 2008 crisis and the COVID-19 recession, the Fed maintained the interest rates at a very low level for a long period to support and ensure the economic health, even as inflation rose. These examples show the need for a clear framework to help policymakers make balanced and wise decisions [6].

To avoid the problems of unpredictable or inconsistent decisions, clear rules are an excellent tool to guide interest rate policy. One of the most prominent and recognized examples is the Taylor Rule, introduced by John B. Taylor in the year of 1993. This rule gives a formula for establishing the interest rate based on how far inflation is from the target and how much output is above or below its potential level.

Although the Fed has never officially used the rule, it has often followed a similar pattern in practice. The rule is also useful for comparing what the Fed does with what it might do under a more rule-based approach [2, 6].

1.2 Research questions and objectives

The main aim of this study is to figure out whether the Fed's interest rate decisions always follow the Taylor Rules. By comparing the actual funds rate with the rate calculated by the Taylor Rule over time, the study aims to evaluate the degree to which U.S. monetary policy aligns with rule-based policy recommendations. This analysis will provide a clearer response and understanding of how the Fed responds to economic fluctuations and whether its actions reflect a stable and predictable framework.

To achieve this objective, the study will focus on three key research questions:

(1) Does the Fed's Interest Rate Policy Conform to the Taylor Rule?
(2) In Which Periods Are There Significant Deviations, and Why?
(3) How Can the Impact of These Deviations on Economic Variables Be Quantified?

2 The Taylor Rule and its implications for Federal Reserve policy

2.1 Definition and historical evolution of the Taylor Rule

The original formula of the Taylor Rule:

$$I_t = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5(y_t - y^*) \quad (1)$$

The key advantage of this rule is that it makes monetary policy more systematic and predictable, which reduces the possibility of policy being driven by political pressure or short-term concerns. Taylor found that this rule closely described the actual behavior of the Federal Reserve during the late 1980s and early 1990s [2].

Later research and practical use have adopted a more general form of the rule that allows for different weights on output and inflation [7].

$$i_t = r^* + \pi_t + \alpha(\pi_t - \pi^*) + \beta(y_t - y^*) \quad (2)$$

Here, α and β are policy response coefficients. In Taylor's original paper, both values were set at 0.5, but in empirical research, these parameters can be estimated using historical data. This extended version allows researchers to study how strongly central banks respond to inflation and output changes in different periods.

Although the Taylor Rule works well under normal economic conditions, it still faces important challenges during times of crisis. For instance, in the 2008 global economic crisis and during the SARS-CoV-2 pandemic, the Fed made interest rate decisions that did not follow the Taylor Rule. These periods show the limits of a fixed rule in situations where the economy experiences unusual shocks and disasters.

One major issue of the limitation is the zero lower bound (ZLB). When inflation is low and output is far below potential, the Taylor Rule may recommend a negative interest rate. However, central banks are often unwilling or unable to set nominal rates below zero, because it may weaken the financial system and reduce the confidence of people who want to save money in the bank. In response, the Fed adopted untraditional monetary measures such as QE and forward guidance, which are not captured by the standard Taylor Rule.

Another challenge is that the Fed sometimes needs to respond to financial stability concerns, such as avoiding panic in financial markets or supporting the banking system. These considerations and thoughts are fundamental, but usually not directly included in the basic Taylor Rule.

These exceptions show that although the Taylor Rule is a helpful and potentially efficient guide, it may not be suitable in every situation and be adopted in every season. This raises questions about when it is reasonable to follow the rule strictly and when more flexibility is needed in real-world policy decisions [6].

2.2 Overview of the Federal Reserve's monetary policy

The federal funds rate is the main short-run rate used by the Fed to conduct monetary policy. While this rate is market-determined, the Fed establishes a target range for it through the FOMC's policy decisions.

In each FOMC meeting, members analyze current economic indicators, such as employment and GDP growth, and then vote on the appropriate federal funds rate target. The dual mandate of the Fed is to pursue maximum employment and stability of price, and its rate decisions are aimed at balancing these two goals.

To guide market expectations and maintain credibility, the Fed also publishes a Summary of Economic Projections (SEP), including members' forecasts of future rates, inflation, and unemployment. These projections are helpful to the public to understand the Fed's reaction function, even if it is different from a fixed rule.

In practice of real world, the Fed does not always change interest rates aggressively as a reaction to economic data. Instead, it often adjusts rates gradually, a behavior known as interest rate inertia. This implies that past interest rates may influence current decisions, which may be useful to avoid market shocks and maintain policy stability. For example, the Fed could increase the rate in small steps over several months instead of making a large adjustment all at once, which would be less risky.

In addition to rate adjustments, the Fed also uses forward guidance to influence expectations about future monetary policy. Forward guidance refers to official statements that indicate how the Fed is likely to behave in the future. This tool became especially important during periods when interest rates were near zero and the Fed could not lower them further.

In one word, these elements, target setting, gradual adjustments, and communication strategies, form a flexible but structured framework. Although the Fed does not formally adopt the Taylor Rule, its policy actions can often be evaluated using such rules, especially in stable periods.

2.3 Key variables in the Taylor Rule

2.3.1 Natural rate of interest, target inflation rate, and actual inflation rate

The natural rate of interest (r^*) is the real interest rate that supports the economy at full employment with inflation at a stable level. In Taylor's original rule, it is typically assumed to be 2%. This value may vary over time due to structural changes such as demographics, productivity growth, or global financial conditions.

The target inflation rate (π^*) represents the long-run goal of the central bank for inflation. For the Federal Reserve, this is officially set at 2% per year, as clarified in its long-run policy statements. The target helps anchor expectations and gives monetary policy a benchmark against which actual inflation can be evaluated.

The actual inflation rate (π_t) is typically measured using indices like the CPI or the PCE. In empirical applications of the Taylor Rule, quarterly or annual inflation data is used to calculate how far actual inflation deviates from the target.

2.3.2 Actual versus potential GDP growth

The deviations between actual output (y_t) and potential output (y^*) are called the output gap. Potential output is the level of GDP that the economy can achieve when all resources are fully employed without creating inflationary pressure. Like r^*, it is not directly measurable and must be estimated using methods such as the Hodrick-Prescott (HP) filter or the Congressional Budget Office (CBO) estimates.

The output gap is a key input in the Taylor Rule. When actual GDP is above potential, indicating an overheating economy, the rule suggests increasing the interest rate. When actual GDP is lower than its potential level, the rule recommends reducing the interest rate to encourgae economic expansion.

This variable captures the cyclical position of the economy and reflects whether monetary policy should be contractionary or expansionary at a given time.

2.3.3 Economic interpretation of the α and β coefficients

The parameters α and β in the Taylor Rule represent the responsiveness of central bank to inflation and output, respectively. In Taylor's original formulation, both were set at 0.5. In empirical studies, these values can be estimated from data and may vary across periods or policy regimes. These coefficients also allow researchers to test whether actual policy decisions match the behavior suggested by the rule. For example, suppose estimated values of α and β differ significantly from the original 0.5 values. It may indicate that the central bank has different preferences or is responding to other factors not captured by the basic Taylor Rule.

3 Empirical analysis and model construction

3.1 Data sources and processing methods

3.1.1 Data coverage: quarterly data from 1960 to 2024

This study utilizes quarterly macroeconomic data spanning from Q1 1960 to Q1 2024. The long historical coverage allows for analysis across several monetary policy regimes, including the Great Inflation, the Volcker disinflation period, the financial meltdown in 2008, and the SARS-CoV-2 pandemic recession. To be specific, the dataset includes the Federal Funds Effective Rate, PCE Price Index, Real GDP, Potential GDP, Nominal GDP, and the Civilian Unemployment Rate.

3.1.2 Data sources: FRED

All macroeconomic data were sourced from the FRED provided by the Federal Reserve Bank of St. Louis. Specific indicators and their descriptions are listed in Table 1.

Table 1. Federal Reserve indicators.

Indicator	Variable Name	FRED Code
Federal Funds Effective Rate	i_t	RIFSPFFNA
Personal Consumption Expenditures (PCE) Index	π_t	PCEPI
Real GDP	y_t	GDPC1
Potential GDP	y^*	GDPPOT
Nominal GDP		GDP
Unemployement Rate		UNRATE

3.1.3 Calculation methods for inflation and GDP growth rates

To compute the necessary inputs for the Taylor Rule and deviation analysis, the following transformations and calculations were applied:

$$\pi_t = \frac{PCE_t - PCE_{t-4}}{PCE_{t-4}} \times 100 \tag{3}$$

$$Output\ Gap_t = \frac{yt - yt*}{yt*} \times 100 \tag{4}$$

Real Interest Rate Comparison: The Federal Funds Rate is treated as the nominal interest rate and compared against the Taylor Rule-implied rate to determine the degree of policy deviation.

3.2 Baseline model: Taylor Rule Forecasts vs actual rates

To calculate the Taylor Rule implied interest rate, this study adopts the standard parameter values originally proposed by John Taylor (1993). Using the variable settings defined in Section 3.1.2, the Taylor Rule is applied to compute the implied quarterly federal funds rate for each observation between 1960 and 2024. The calculation was implemented in R using the cleaned and merged dataset.

In R, the Taylor-implied rate was generated by creating new variables Inflation_YoY and Output_Gap, then applying the formula using the mutate() function. Observations with missing values in either the inflation or GDP series were excluded from the calculation.

The consequence of analyzing the interest rate can be seen in **Table 2** in the appendix.

This implied rate will serve as the benchmark to assess deviations in actual interest rate decisions, which will be examined in the next section.

In addition, a time series line chart was constructed in R using the ggplot2 package. Fig.1 draws the actual federal funds rate (Fed_Funds_Rate) and the Taylor-implied rate (Taylor_Rate) over time. The dataset also spans from 1960 to 2024. The observations before 1964 were excluded from the plot because of the lack of inflation data for year-over-year rates [8].

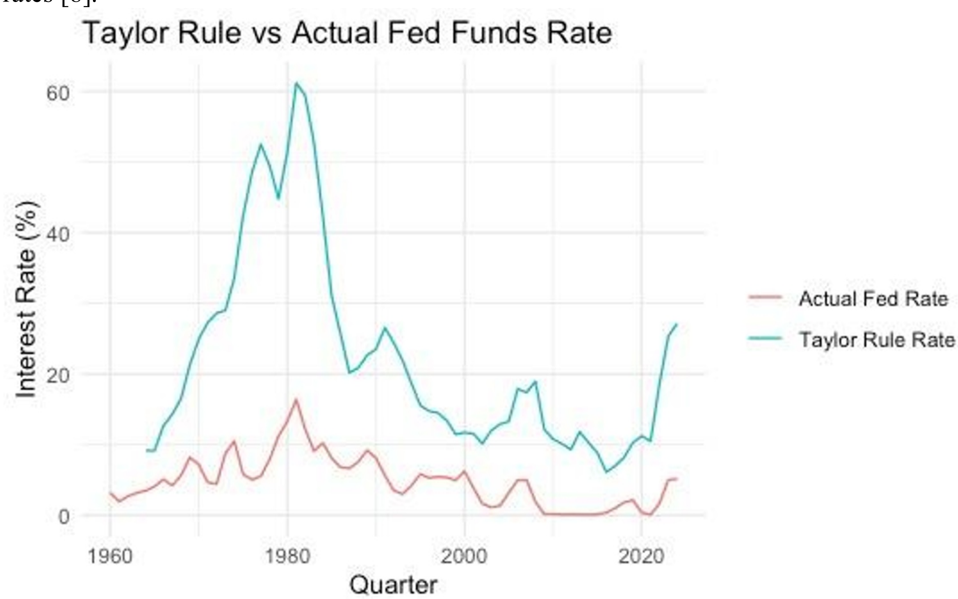

Fig. 1. Taylor rule vs actual fed funds rate.

Fig.1 compares the interest rate forecasted by the Taylor Rule with the actual federal funds rate between the year 1960 and the year 2024. There are notable discrepancies between the two series during periods of economic stress, such as the early 1980s, the post-2008 financial crisis, and the COVID-19 recovery, which show the discretionary policy responses by the Federal Reserve. The curves clearly illustrate several periods of significant deviation. For instance, during the early 2000s and the aftermath of 2008, the actual federal funds rate remained substantially lower than the Taylor Rule recommendation. This suggests that the

Federal Reserve adopted an expansionary stance more accommodative than what the rule would imply. In the late 1970s, the Taylor rate was markedly higher, reflecting the Fed's aggressive efforts to curb runaway inflation under Chairman Paul Volcker.

These deviations may reflect the influence of other policy considerations, such as concerns about financial system stability, the implementation of forward guidance strategies, or limitations in real-time estimates of output deviations and inflation.

3.3 Regression analysis: estimating policy reaction coefficients

3.3.1 Estimating α and β through regression models

To quantitatively assess the Federal Reserve's responsiveness to inflation and output fluctuations, this research estimates the empirical Taylor rule using linear regression.

$$i_t = \alpha(\pi_t - \pi^*) + \beta(y_t - y^*) + c + \varepsilon_t \tag{5}$$

Where:

c is the regression intercept.

Using quarterly U.S. data from 1960 to 2024, this research performs ordinary least squares regression.

Table 2. Regression analysis (using R Studio).

Term	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	1.15071	0.37412	3.076	0.0032
inflation_gap	0.32920	0.02468	13.339	< 2e-16
output_gap	0.76597	0.10667	7.181	1.46e-09

Other Coefficients:

Multiple R^2: 0.7665, Adjusted R^2: 0.7585

From Table 2, the adjusted R^2 of 0.7585 implies that the model shows an obvious portion of the variation in the federal funds rate. In addition, the estimated α = 0.329 means that for each 1 percentage point increase in the inflation gap, the Fed tends to raise the interest rate by approximately 0.329 percentage points. Additionally, the estimated β = 0.766 indicates a strong reaction to economic overheating: a 1 percentage point increase in the output gap leads to a 0.766 percentage point improvement in the interest rate.

These results support the hypothesis that U.S. monetary policy during the observed historical period generally followed a rule-like behavior, with a stronger emphasis on output stabilization than the standard Taylor benchmark.

3.3.2 Period-specific analysis: Greenspan, Bernanke, and others

To deeply understand the differences in Federal Reserve monetary policy under different leadership, there are separate regressions that are conducted for each Fed Chair using the baseline model:

$$i_t = \alpha + \alpha(\pi_t - \pi^*) + \beta(y_t - y^*) \tag{6}$$

From Table 3, Volcker (1979–1987): The coefficients on inflation_YoY (0.353) and output deviation (0.836) are both statistically significant at the 99% confidence level, indicating a strong and balanced response to both inflationary pressures and economic slack.

This is consistent with Volcker's aggressive anti-inflation stance at the beginning of the 1980s, which helped restore credibility to the Fed.

Table 3. Regression analysis(Volcker period).

Term	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	1.7714	0.6566	2.698	0.0429 *
Inflation_YoY	0.3532	0.0241	14.686	2.64e-05 ***
Output_Gap	0.8363	0.1052	7.946	0.0005 ***

From Table 4, Greenspan (1987–2006): The inflation coefficient rises to 0.418, while the output gap coefficient increases to 1.271, both highly significant. This suggests Greenspan placed greater emphasis on stabilizing output fluctuations, aligning with his reputation for smooth economic steering during the "Great Moderation.".

Table 4. Regression analysis (Greenspan period).

Term	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	0.48830	0.90809	0.538	0.598172
Inflation_YoY	0.41750	0.08305	5.027	0.000124 ***
Output_Gap	1.27094	0.20670	6.149	1.4e-05 ***

According to Table 5, Bernanke (2006–2014): The inflation coefficient drops to 0.086 and is statistically insignificant (p = 0.801), while the output gap coefficient is 0.669 and marginally significant (p = 0.061). This shows a diminished sensitivity to inflation during the financial crisis era, possibly due to the Fed's focus on output stabilization and unconventional monetary tools such as quantitative easing.

Table 5. Regression analysis(Bernanke period).

Term	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	1.80860	3.31454	0.546	0.6088
Inflation_YoY	0.08636	0.32482	0.266	0.8009
Output_Gap	0.66865	0.27746	2.410	0.0609

From Table 6, Yellen (2014–2018): The inflation coefficient becomes negative (-0.352) and statistically insignificant, and the output gap coefficient (1.079) is also not statistically significant (p = 0.250). The small sample size likely affects the reliability of this regression, but the signs may reflect Yellen's dovish stance, emphasizing labor market recovery.

Table 6. Regression analysis (Yellen period).

Yellen	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	3.3710	1.9773	1.705	0.338
Inflation_YoY	-0.3517	0.3988	-0.882	0.540
Output_Gap	1.0790	0.4475	2.412	0.250

In Table 7, Powell (2018–present): The inflation and output gap coefficients remain positive (0.266 and 0.786, respectively), but are not statistically significant. The Fed's recent experience with COVID-19 shocks and elevated uncertainty may explain the weaker statistical relationship and more flexible policy approach.

Table 7. Regression analysis(Powell period).

Term	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	-0.6020	2.3644	-0.255	0.815
Inflation_YoY	0.2657	0.2358	1.127	0.342
Output_Gap	0.7862	1.1219	0.701	0.534

Overall, the results highlight meaningful differences in monetary policy conduct, with Volcker and Greenspan adhering most closely to Taylor Rule principles, while Bernanke, Yellen, and Powell appear to have pursued more discretionary or crisis-responsive policies. The results show the difference in the rate between various periods and the actions of the chairmen.

3.4 Quantifying policy deviations

3.4.1 Defining deviation: iactual – itaylor

To quantify the degree to which actual monetary policy has exhibited departures from the Taylor Rule benchmark, a simple deviation metric is defined as the deviation between the actual funds rate and the rate suggested by the rule:

$$Deviation_t = i^{actual}{}_t - i^{taylor}{}_t \tag{7}$$

$$i_t = r^* + \pi_t + \alpha(\pi_t - \pi^*) + \beta(y_t - y^*) \tag{8}$$

This deviation serves as a numerical signal of whether monetary policy was more accommodative or more contractionary than suggested by a rule-based framework. A negative deviation indicates a policy stance more accommodative than the rule recommends, such as during crises when the Fed lowers rates aggressively. Conversely, a positive deviation implies a more contractionary policy than the rule would suggest. This metric provides the basis for further analysis in the following section, identifying and explaining major periods of persistent deviation from the Taylor Rule benchmark, with a focus on the 2008 financial shock and the 2020 pandemic shock.

3.4.2 Identifying and explaining major deviation periods (2008, 2020)

To further explore the practical relevance of the Taylor Rule, the periods where substantial deviations occurred between the actual federal funds rate and the rate calculated by the rule are examined. As shown in Fig. 2, two of the most significant deviation episodes took place at the end of the 1970s and the beginning of the 1980s. However, the deviations in the year 2008 and the year 2020 are surprisingly not as significant as the most significant deviations.

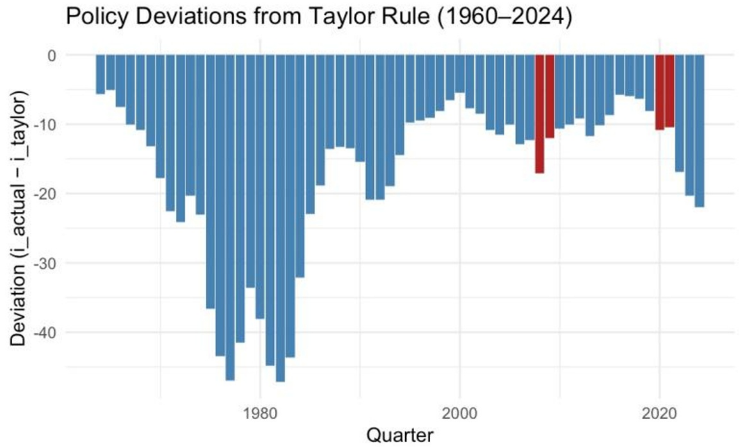

Fig. 2. Policy deviations from the Taylor rule.

In the year of 2008, the Fed drastically decreased the federal funds rate in response to a collapsing financial system, liquidity shortages, and economic contraction. According to the Taylor Rule, the implied rate would have been substantially higher than zero, even accounting for falling output and rising inflation volatility. However, the Fed kept the nominal interest rate near zero through 2009–2015, diverging sharply from the rule's prescription.

Similarly, in 2020, the onset of the COVID-19 pandemic led to a rapid economic downturn. The Fed once again reduced the federal funds rate to close to zero and implemented large-scale asset purchases to stabilize markets and support recovery. The Taylor Rule would have suggested a more moderate reduction in rates due to declining output and inflation expectations, but the Fed prioritized financial stability and labor market support.

These two episodes highlight the limitations of a strict rule-based policy during crises. The Taylor Rule, while useful for benchmarking, does not fully account for extreme uncertainty, nonlinear dynamics, or zero lower bound (ZLB)constraints. In such situations, discretionary policy responses may be more effective, albeit at the cost of greater subjectivity and potential communication challenges.

4 Limitations and directions for future research

4.1 Policy inertia and special events (crises) had a major impact

Regression analysis further reveals that the Fed's responsiveness to inflation and output gap varies across different chairpersons. For instance, during the Volcker and Greenspan eras, the estimated policy reaction coefficients are relatively high, suggesting more aggressive responses to economic changes. In contrast, more recent periods under Bernanke, Yellen, and Powell show lower or statistically insignificant coefficients, highlighting the presence of policy inertia or non-rule-based discretion.

In particular, during the Global Financial Crisis and SARS-CoV-2 pandemic, the Fed deployed untraditional measures, such as QE and forward guidance [9]. These policies, though outside the Taylor Rule framework, were essential to maintain the stability of the financial system and support recovery.

In one word, these findings imply that while the Taylor Rule offers a useful benchmark, it does not always reflect the complex realities of policymaking, especially when faced with shocks, uncertainty, and binding constraints like the effective lower bound (ELB).

4.2 Natural interest rate and potential output are difficult to observe accurately

One of the fundamental limitations of applying the Taylor Rule is the unobservability of key inputs, particularly the natural interest rate (r^*) and potential output (Y^*). These variables are theoretical constructs rather than directly measurable quantities, which often rely on filtering techniques such as the Hodrick-Prescott filter or assumptions embedded in macroeconomic models [10]. Estimation uncertainty can mislead Taylor Rule prescriptions, especially during transitional or crisis periods. Future studies may explore using time-varying r^* and Y^* estimates to accurately reflect shifting macroeconomic conditions.

4.3 Incorporating GARCH or DSGE models to improve forecasting power

Although the traditional Taylor Rule offers a simple and transparent framework, it cannot account for volatility clustering, expectations, or structural dynamics that characterize real-world economies. In order to improve the ability of the prediction, some models may be helpful. For example, GARCH (Generalized Autoregressive Conditional Heteroskedasticity) can be useful in capturing time-varying volatility in interest rate decisions, especially during high-uncertainty episodes [11]. In addition, Dynamic Stochastic General Equilibrium models allow for the integration of microfoundations, forward-looking behavior, and policy constraints [12, 13]. These approaches can be used to develop augmented Taylor-type rules or alternative monetary policy benchmarks under more realistic assumptions.

4.4 Extending the framework to compare other central banks

Finally, research in the future could develop and extend this empirical framework to conduct cross-country and multicountry comparisons, especially between advanced and emerging economies. For example, applying a Taylor Rule analysis to the People's Bank of China (PBoC) could offer insights into how monetary policy responds to domestic inflation, output gap, and financial stability objectives under a managed exchange rate regime. Such a comparison would emphasize the extent to which rule-based frameworks are adaptable in different institutional settings. Additionally, it would provide a better understanding of the global diversity in monetary policymaking.

5 Conclusion

This study evaluates the extent to which the decisions of U.S. Federal Reserve's interest rate from 1960 to 2024 align with the Taylor Rule. The baseline Taylor Rule model was constructed using standard parameter values. The results indicate that in several periods—especially during normal economic conditions—the actual federal funds rate closely tracked the path suggested by the Taylor Rule. However, substantial deviations emerged during extraordinary circumstances, most notably in 2008 and 2020, where the Fed set interest rates far lower than the level implied by the Taylor Rule. These deviations underscore the limitations of rule-based frameworks during crisis episodes, when monetary authorities may deliberately pursue more accommodative policies than a standard rule would allow.

In addition, the regression estimates across different chairmanships also indicate significant variation in policy responses. Chairs like Volcker and Greenspan generally followed patterns closer to the Taylor Rule, while Bernanke, Yellen, and Powell displayed more discretionary behavior, possibly responding to financial stability concerns or severe economic disruptions. These findings highlight the challenge of balancing rule-based policy frameworks with the need for discretionary judgment in practice.

Overall, the Taylor Rule is still an efficient and excellent tool to evaluate monetary policy consistency over time, but its application needs to be considered carefully, especially under exceptional circumstances. Further research could build on this work by incorporating more advanced models, such as GARCH or DSGE frameworks, to better capture the dynamics of policy transmission and volatility. Additionally, applying similar analyses to other central banks, including those in emerging economies, may provide useful insights into the adaptability of rule-based frameworks across different institutional and economic settings.

References

1. D. Alex, Inflation targeting and the changing transmission mechanism of monetary policy in India. Econ. Model. **151**, 107141 (2025) https://doi.org/10.1016/j.econmod.2025.107141

2. G.P. Shultz, The importance of rules-based monetary policy in practice. J. Econ. Dyn. **Control 49**, 142–143 (2014) https://doi.org/10.1016/j.jedc.2014.09.002
3. Board of Governors of the Federal Reserve System, Open market operations. Available at: https://www.federalreserve.gov/monetarypolicy/openmarket.htm. Accessed June 17, 2025
4. Federal Reserve Board, Federal Reserve issues FOMC statement (2020) https://www.federalreserve.gov/newsevents/pressreleases/monetary20200315a.htm
5. B. Hofmann, G. Peersman, Monetary policy transmission and trade-offs in the United States: Old and new. Int. Finance. **27**, 253–278 (2024) https://doi.org/10.1111/infi.12452
6. A. Orphanides, Monetary policy rules based on real-time data. Am. Econ. Rev. **91**, 964–985 (2001) https://www.jstor.org/stable/2677821
7. J.B. Taylor, Discretion versus policy rules in practice. Carnegie-Rochester Conf. Ser. Public Policy. **39**, 195–214 (1993) https://doi.org/10.1016/0167-2231(93)90009-L
8. U.S. Bureau of Economic Analysis, Gross Domestic Product [GDP], retrieved from FRED, Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org/series/GDP. Accessed June 17, 2025
9. B.S. Bernanke, The new tools of monetary policy. Am. Econ. Rev. **110**, 943–983 (2020)
10. T. Ito, F.S. Mishkin, Two decades of Japanese monetary policy and the deflation problem. NBER Working Paper No. 10878 (2004) https://doi.org/10.3386/w10878
11. I. Archakov, P.R. Hansen, A. Lunde, A multivariate realized GARCH model. J. Econom. 106040 (2025) https://doi.org/10.1016/j.jeconom.2025.106040
12. L.J. Christiano, M. Eichenbaum, C.L. Evans, Nominal rigidities and the dynamic effects of a shock to monetary policy. J. Polit. Econ. **113**, 1–45 (2005) https://doi.org/10.1086/426038
13. M. Del Negro, M.P. Giannoni, F. Schorfheide, Inflation in the Great Recession and New Keynesian models. Am. Econ. J. Macroecon. **12**, 190–224 (2020) https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr618.pdf