Policy Rule Evaluation for the Fed's Strategy Review

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Federal Reserve Strategy Review

- Discussed at the January 2025 FOMC Meeting
  - Scheduled to be Completed in Late Summer 2025
- Included in the February 2025 Monetary Policy Report
- Press Release on November 22
- Earlier Speeches by Chair Powell

Statement on Longer-Run Goals and Monetary Policy Strategy
January 2012

- Two Percent Inflation Target
- Mitigate Deviations of
  - Inflation from its Longer-Run Goal
  - Employment from Maximum Employment

Revised Statement on Longer-Run Goals and Monetary Policy Strategy August 2020

- Flexible Average Inflation Targeting (FAIT)
  - "following periods when inflation has been running *persistently below* 2 percent, appropriate monetary policy will likely aim to achieve inflation *moderately* above 2 percent for *some time*"
- Mitigate *Shortfalls*, Rather than *Deviations*, of Employment from its Maximum Level
  - Will no Longer Raise the FFR if $U < U^*$ to Counter Future π

2019 Strategy Review

- Experience During and Following the Great Recession
  - Effective Lower Bound
  - Low Inflation
- Analysis of Alternative Policy Rules
- Focus on Raising Inflation Above 2 Percent
  - Arias, Bodenstein, Chung, Drautzburg, and Raffo (2020)
    - Average and Asymmetric Average Inflation Targeting
    - "Make-up" Strategies for FFR

Principles for the 2019 Strategy Review

- Clarida (2022)
- Asymmetric
  - Raise Inflation "Moderately Above" 2% from Below
  - Don't Lower Inflation Below 2% from Above
- Time Consistent
  - Did Not Adopt Average Inflation or Make-Up Rules
  - Described FAIT as *Ex Ante* Inconsistent and *Ex Post* Consistent

2025 Strategy Review

- Cycle of Pandemic, Recovery, Inflation, and Disinflation
  - Hopefully Won't be Repeated
  - Not a Good Basis for the Review
- Experience Following the Covid-19 Recession
  - FAIT – Annual Core PCE Inflation
    - 1.7 Percent in March 2021 – 3.4 Percent in June 2021
    - Not Relevant Before June 2021
  - Shortfalls
    - Unemployment Above 4 Percent Until March 2022
- Interpretation of Statements by Chair Powell

Time Inconsistent Policy

- Kydland and Prescott (1977) and Calvo (1978)
  - Optimal Control (Discretion)
  - Incentives for Future Governments
    - Modify Policies that are Optimal from Today's Perspective
  - Understood by Rational Agents
    - Economic Performance Improved by Policy Rules
- Policy Rules Assumed to be Time Consistent

Time Inconsistent Rules

- Average and Asymmetric Average Inflation Targeting Rules
- Target T-Year Average Inflation Instead of Annualized Inflation
  - When Inflation Below 2 Percent Rises Above 2 Percent
  - Average Inflation Still Below 2 Percent
  - FOMC will Violate Rule and Switch from Stimulus to Restraint
  - Negates Additional Stimulus when Inflation is Below 2 Precent

Time Inconsistent Rules

- Solutions to Time Inconsistent Rules
  - Arias et al. (2020) and Duarte et al. (2020)
  - Reputation in Barro and Gordon (1983)
  - Analogy to Patent Law in Taylor (1993)
- Applicable to Time Inconsistent Policies, not Time Inconsistent Rules
- We Don't Analyze Average Inflation Targeting or Make-up Rules

Principles for the 2025 Strategy Review

- Rules Can be Symmetric or Asymmetric
- Symmetric
  - Equally Stimulative when $\pi < 2$ % than Restrictive when $\pi > 2$ %
  - Taylor and Balanced Approach Rules
- Asymmetric
  - More Stimulative when $\pi < 2$ % than Restrictive when $\pi > 2$ %
  - Proposed Rules
- Time Consistent
  - No Incentive to Renege on Rules When $\pi > 2$
- Interpretation Similar but Not Identical to Clarida (2022)

Outline of the Paper

- Analyze "Taylor-Type" Policy Rules
  - Traditional Rules in Accord with 2012 Statement
    - Taylor and Balanced Approach
  - Shortfalls Rules in Monetary Policy Report Since February 2021
    - Kiley (2024)
  - Proposed Rules
    - Asymmetric Coefficient Inflation Targeting
    - Asymmetric Target Inflation Targeting

Policy Rule Evaluation

- Linearized Version (LINVER) of (FRB/US) Model
  - Fed's Main Policy Model
- Evaluate Rules by Quadratic Loss Function
  - Inflation Gaps, Output Gaps, and Δ FFR
  - Symmetric and Asymmetric
- Expectations
  - Financial Market Participants and Wage and Price Setters Have Model Consistent Expectations
  - Other Agents Have Vector Autoregressive (VAR) Expectations

Traditional Policy Rules Consistent with January 2012 Statement

- Non-Inertial Taylor Rule
  - $R_t = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5y_t$
  - R_t = Federal Funds Rate Prescribed by the Rule
  - r^*= neutral real interest rate
  - π_t = Annual Core PCE Inflation Rate
  - π^* = 2 Percent Target Level of Inflation
  - y_t = Output Gap

Traditional Policy Rules

- Inertial Taylor Rule
  - $R_t = 0.85\ R_{t-1} + 0.15[r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5y_t]$
  - R_{t-1} = Rate Prescribed by the Rule if R_{t-1} > ELB of 0.125
  - R_{t-1} = ELB Rate of 0.125 if $R_{t-1} <$ ELB
- Non-Inertial Balanced Approach Rule
  - $R_t = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 1.0y_t$
- Inertial Balanced Approach Rule
  - $R_t = 0.85\ R_{t-1} + 0.15[r^* + \pi_t + 0.5(\pi_t - \pi^*) + 1.0y_t]$

Shortfalls Rules Consistent with August 2020 Statement Monetary Policy Report from Feb. 2021 (U Gap)

- Non-Inertial Taylor (shortfalls) rule

$$R_t = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5 \min\{0, y_t\}$$

- Non-Inertial Balanced Approach (shortfalls) rule

$$R_t = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 1.0 \min\{0, y_t\}$$

- Inertial Taylor (shortfalls) rule

$$R_t = 0.85\, R_{t-1} + 0.15[r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5 \min\{0, y_t\}]$$

- Inertial Balanced Approach (shortfalls) rule

$$R_t = 0.85\, R_{t-1} + 0.15[r^* + \pi_t + 0.5(\pi_t - \pi^*) + 1.0 \min\{0, y_t\}]$$

Proposed Rules
Asymmetric Coefficient Inflation Targeting (ACIT)

- Non-Inertial Taylor Rule Version
- $$R_t = \begin{cases} [r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5\, y_t] & \text{if } \pi_t > \pi^* \\ [r^* + \pi_t + \pi^C(\pi_t - \pi^*) + 0.5\, y_t] & \text{if } \pi_t \leq \pi^* \end{cases}$$
- Traditional Rule if $\pi_t > \pi^*$
- Larger Coefficient on Inflation Gap if $\pi_t \leq \pi^*$
- π^C = 1.0, 1.5, or 2.0
- Time Consistent
- Taylor Inertial, Balanced Approach Non-Inertial and Inertial

Proposed Rules
Asymmetric Target Inflation Targeting (ATIT)

- Non-Inertial Taylor Rule Version
- $$R_t = \begin{cases} [r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5\, y_t] & \text{if } \pi_t > \pi^* \\ [r^* + \pi_t + 0.5(\pi_t - \pi^T) + 0.5\, y_t] & \text{if } \pi_t \leq \pi^* \end{cases}$$
- Inflation Target $\pi^T > \pi^*$
- Traditional Rule if $\pi_t > \pi^*$
- Higher Inflation Target π^T if $\pi_t \leq \pi^*$
- π^T = 2.5, 3.0, or 3.5
- Time Consistent
- Taylor Inertial, Balanced Approach Non-Inertial and Inertial

Loss Functions

- Symmetric
  - $L(t) = (\pi_t - \pi^*)^2 + y_t^2$
- Symmetric with Δ FFR
  - $L(t) = (\pi_t - \pi^*)^2 + y_t^2 + (\Delta \text{ FFR})^2$
- Shortfalls
  - $L(t) = (\pi_t - \pi^*)^2 + y_t^2$ if Y < Y*
  - $L(t) = (\pi_t - \pi^*)^2$ if Y > Y*
- Shortfalls with Δ FFR
  - $L(t) = (\pi_t - \pi^*)^2 + y_t^2 + (\Delta \text{ FFR})^2$ if Y < Y*
  - $L(t) = (\pi_t - \pi^*)^2 + (\Delta \text{ FFR})^2$ if Y > Y*
- Substitute Unemployment Gap ($U_T - U^*$) for Output Gap y_t

Policy Rule Evaluation

- Eight Types of Rules
  - Traditional, Shortfalls
  - ACIT with Coefficients of 1.0, 1.5, and 2.0 on the Inflation Gap
  - ATIT with 2.5, 3, and 4 Percent Inflation Targets
- Four Versions of Each Rule
  - Non-Inertial Taylor, Non-Inertial Balanced Approach
  - Inertial Taylor, Inertial Balanced Approach
- Eight Loss Functions – Four Output and Four Unemployment Gaps
  - Symmetric, Symmetric with Δ FFR,
  - Shortfalls, Shortfalls with Δ FFR
- Policy Rules with and without Effective Lower Bound Imposed

Traditional Policy Rule Evaluation Results

Output Gap with Symmetric Loss without ΔFFR

	Non-Inertial	Inertial	Difference
Taylor	21.23	20.92	0.31
Balanced Approach	17.35	17.02	0.33
Difference	3.88	3.90	

Traditional and Shortfalls Policy Rules

Balanced Approach Inertial Rules without ΔFFR
Output Gap with Symmetric and Shortfalls Loss

	Symmetric Loss	Shortfalls Loss
Traditional Rules	17.02	13.50
Shortfalls Rules	26.13	14.69
Difference	9.11	1.19

ACIT Policy Rule Evaluation Results

Output Gap with Symmetric Loss without ΔFFR

Inflation Gap Coefficient = 1.5	Non-Inertial	Inertial	Difference
Taylor	18.94	18.93	0.01
Balanced Approach	15.44	15.37	0.07
Difference	3.50	3.56	

Traditional and ACIT Policy Rules

Balanced Approach Inertial Rules without ΔFFR
Output Gap with Symmetric Loss

Inflation Gap Coefficient For ACIT	1.0	1.5	2.0
Traditional Rule	17.02	17.02	17.02
ACIT Rule	16.05	15.37	14.96
Difference	0.97	1.65	2.06

ATIT Policy Rule Evaluation Results

Output Gap with Symmetric Loss without ΔFFR

Inflation Target = 3.0	Non-Inertial	Inertial	Difference
Taylor	19.80	19.59	0.21
Balanced Approach	16.24	15.94	0.30
Difference	3.56	3.65	

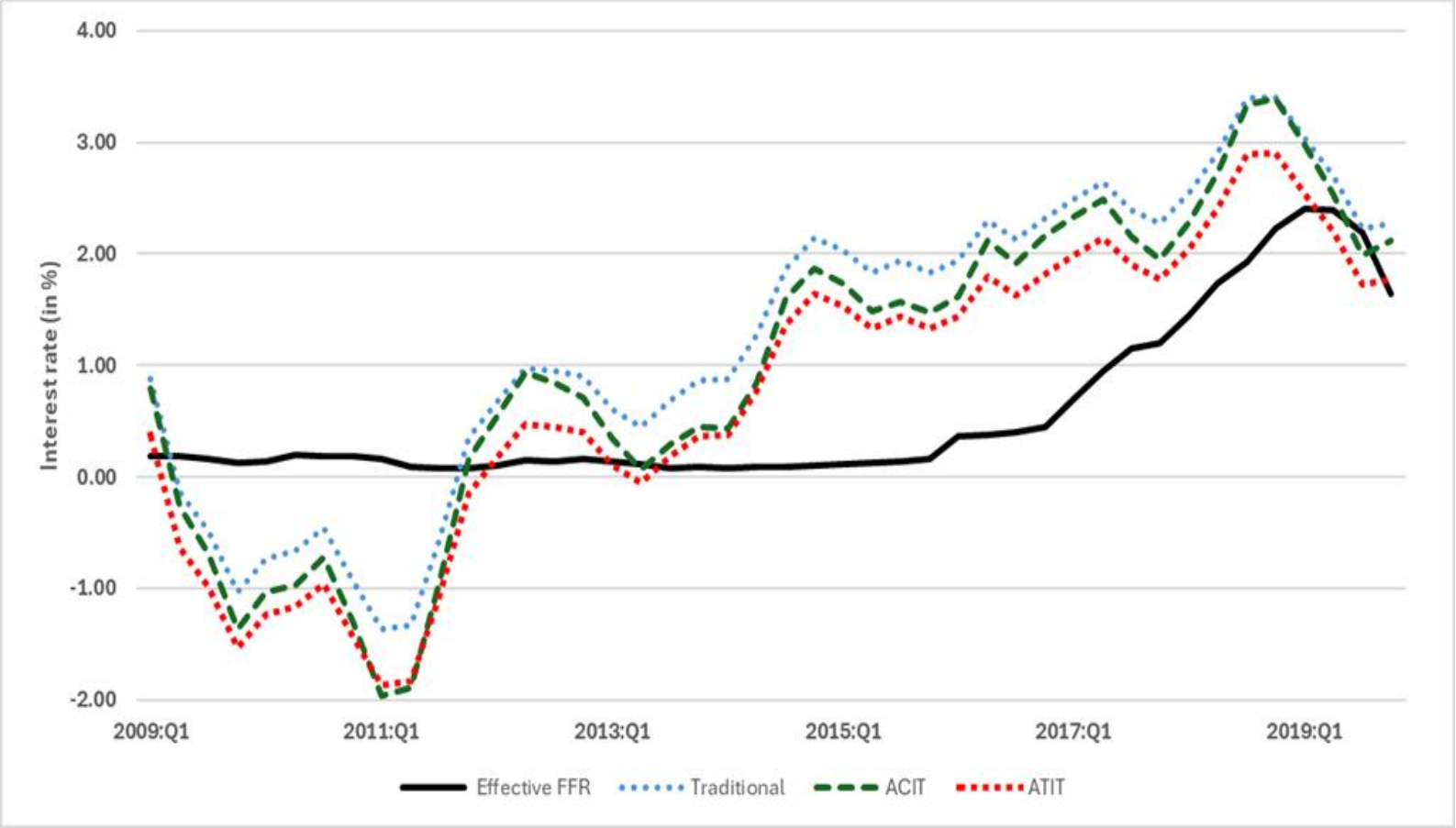
Traditional and ATIT Policy Rules

Balanced Approach Inertial Rules without ΔFFR

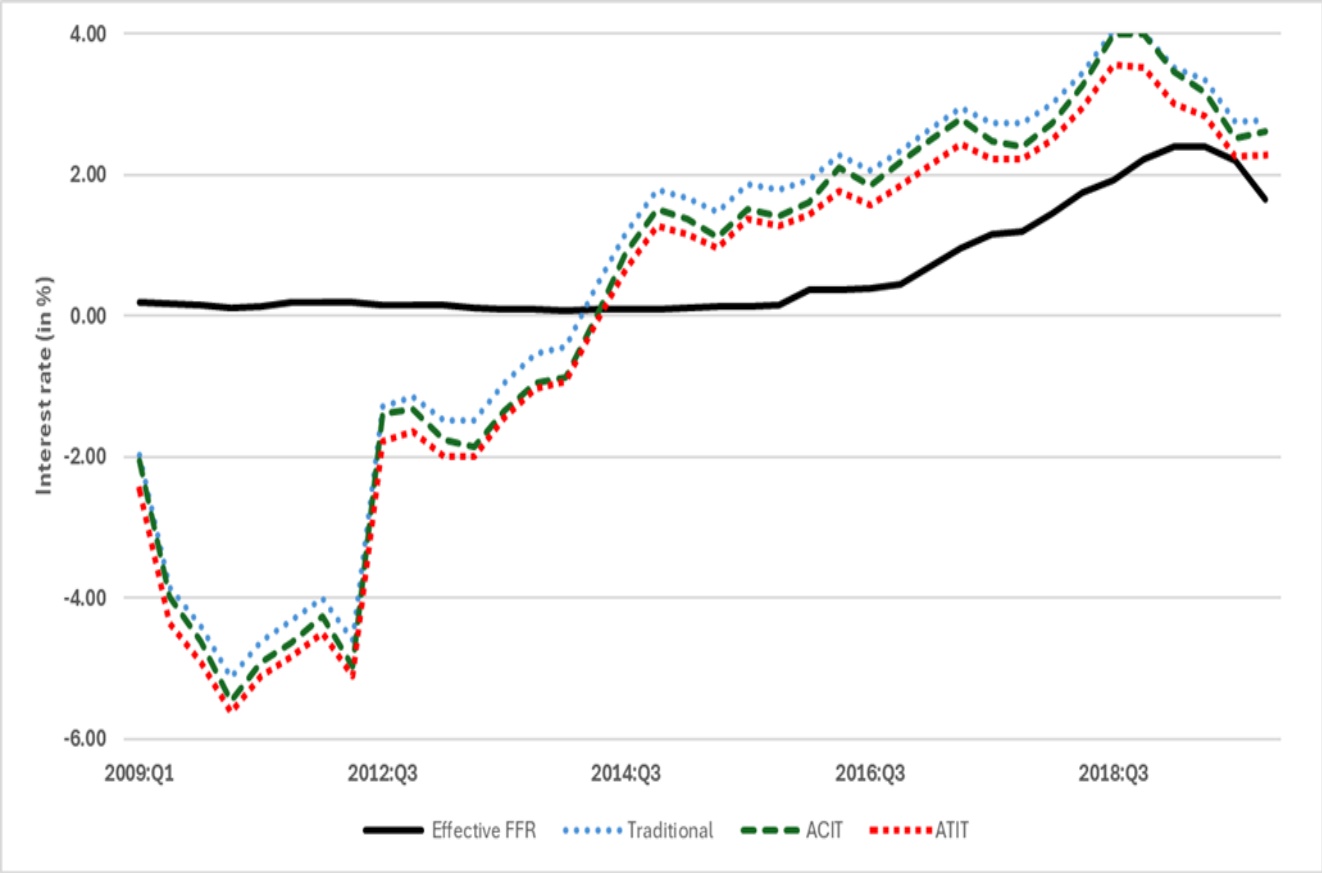
Output Gap with Symmetric Loss

Inflation Target For ATIT	2.5	3.0	3.5
Traditional Rule	17.02	17.02	17.02
ATIT Rule	16.45	15.94	15.51
Difference	0.57	1.08	1.51

Decade Following the Great Recession
Non-Inertial Taylor Rule



Decade Following the Great Recession
Non-Inertial Balanced Approach Rule



Summary of Results

- Similar Loss With
  - Inertial and Non-Inertial Rules
- Lower Loss With
  - Balanced Approach than Taylor Rules
    - Large Differences
  - Traditional than Shortfalls Rules
    - Large Differences Smaller with Shortfalls Loss
  - ACIT and ATIT than Traditional Rules
    - Moderate Differences
- ACIT and ATIT are Asymmetric and Time Consistent