

The Challenges with Rules-Based Policy Implementation

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“Policymakers, such as members of the FOMC, currently base their decisions on many factors: leading indicators, the shape of the yield curve, the forecast of the Fed staff models. There is no reason why a policy rule such as [the Taylor rule] could not be added to the list, at least on an experimental basis.” (Taylor 1993, p. 208)

The Financial CHOICE Act of 2017 (H.R. 10)

- ▶ Title X amends the Federal Reserve Act.
 - ▶ Requires FOMC to vote on a Directive Policy Rule that “describes the strategy or rule of the Federal Open Market Committee for the systematic quantitative adjustment” of the policy instrument, including the coefficients in the Directive Policy Rule.
 - ▶ Requires the FOMC to state whether the Directive Policy Rule substantially conforms” to the Reference Policy Rule (RPR).
 - ▶ Comptroller General of the U.S. to determine whether Directive Policy Rule has changed and if it has, to submit a compliance report on whether FOMC is in compliance with its requirements under the CHOICE Act.
- ▶ The Reference Policy Rule (RPR) is

$$i_t = 2 + \pi_t + \frac{1}{2} (\pi_t - 2) + \frac{1}{2} (y_t - y_t^{pot}).$$

The debates over rule-based policy (RBP)

Table 1: Benefits and costs of rule-based policies

Benefits	Costs
Limits discretion	Limits discretion
Frames decisions	Frames decisions
Promotes accountability	Promotes accountability
Promotes transparency	Promotes transparency
Robust	Ignores risk considerations
Provides clear advice	Provides conflicting advice

- ▶ Parallels with IT debates: Rudebusch and Walsh (1998).

Outline of talk: the challenges

- ▶ Are rules made to be broken?
 - ▶ Should the policy regime be mechanical or allow deviations?
 - ▶ Svensson (2003) – what's the rule for deviating from the rule?
- ▶ Does a RBP regime anchor inflation expectations?
 - ▶ What does it mean to commit to a rule that may change in the future?.
- ▶ What rule should be chosen?
 - ▶ Whose rule? Which rule? Which variables? Which parameters?

Strict versus flexible regimes

Strict versus flexible regimes

- ▶ Important distinction in the analysis of inflation targeting regimes (or other goal-based regimes).
- ▶ Flexibility means central bank is not an “inflation nutter”.
 - ▶ Deviations from target are allowed.
 - ▶ In the benchmark NK model with indexation, these deviations under discretion satisfy

$$\kappa \hat{\pi}_t + \lambda x_t = 0,$$

is the rule governing deviations from target, where
 $\hat{\pi}_t \equiv \pi_t - \pi^T$.

- ▶ Critics of RBPs often focus on mechanical implementation of a rule. But just as with IT, the distinction between strict and flexible rules-based regimes is important.

Strict versus flexible regimes: a simple model

Based on Walsh (2015, 2016)

- ▶ Society's objective: minimize standard quadratic loss in inflation deviations from target ($\hat{\pi}_t$) and output gap (x_t), where $x_t \equiv x_t - x^*$ is the (log) gap between output and the socially efficient output level.
- ▶ Policy is delegated to a central bank with instrument independence but subject to pressures that distort the central bank objectives; central bank's loss function L_t^{cb} can differ from social welfare loss.
- ▶ Policy environment is one of discretion.
- ▶ Economic environment is a basic NK model.

Strict versus flexible regimes: a RBP regime

- ▶ Represent a RBP regime as one in which the central bank's objectives now include minimizing deviations of i_t from the reference rule value i_t^r .
- ▶ Central bank minimizes

$$L_t = \frac{1}{2} \left[L_t^{cb} + \delta (i_{t+i} - i_{t+i}^r)^2 \right],$$

where δ is the weight placed on setting the interest rate equal to i_t^r , the rate implied by the reference rule assigned to the central bank.

- ▶ Would the government choose a non-zero values of δ if it wished to minimize social loss?

Strict versus flexible regimes: the reference rule

- ▶ To keep the analysis simple, assume that the reference rule is defined by

$$i_t^r = \bar{r} + \pi^T + \psi_\pi \hat{\pi}_t.$$

- ▶ In the CHOICE Act, the reference rule is the Taylor rule. This case is dealt with in Walsh (2015).
- ▶ The economy:

$$\hat{\pi}_t = \beta E_t \hat{\pi}_{t+1} + \kappa x_t + e_t,$$

$$x_t = E_t x_{t+1} - \left(\frac{1}{\sigma} \right) \left(i_t - \pi^T - E_t \hat{\pi}_{t+1} - r_t^* \right).$$

Strict versus flexible regimes: the reference rule

- ▶ The first order conditions for the central bank's problem imply

$$\kappa \hat{\pi}_t + \lambda x_t = v_t + a\delta (i_t - i_t^r),$$

where $a \equiv \sigma + \kappa\psi_\pi$ and v_t represents the wedge between the central bank's and society's objectives.

- ▶ If $\delta = 0$, v_t distorts policy under discretion.
- ▶ If $i_t - i_t^r$ covaries negatively with v_t , the RBP can improve over pure discretion by reducing the impact of the distortionary shock v_t on policy.
- ▶ But a cost is generated in that now inflation and the output gap are affected by r_t^* and the reaction to e_t is potentially distorted.

A rule for deviating from the rule

- ▶ The central bank's first-order condition in the RBP regime can be written as

$$i_t = i_t^r + \frac{1}{a\delta} (\kappa \hat{\pi}_t + \lambda x_t - v_t).$$

- ▶ If $0 < \delta < \infty$, deviations from the rule occur – the regime is a flexible RBP.
- ▶ The greater the value of δ – that is, the more costly it becomes for the central bank to deviate from the reference policy rule – the smaller the role the unconstrained discretionary optimality condition plays in the setting of i_t , and the closer i_t comes to the value given by the reference rule.

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- ▶ This is the rule for deviating from the rule.

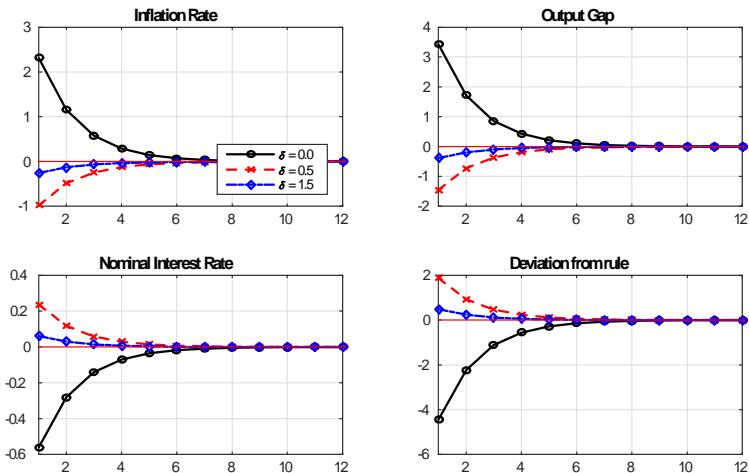


Figure: Response to a one unit distortionary policy preference shock v_t in a simple NK model.

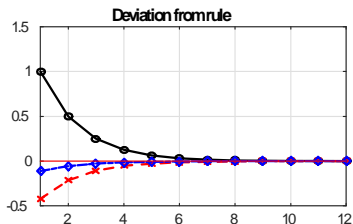
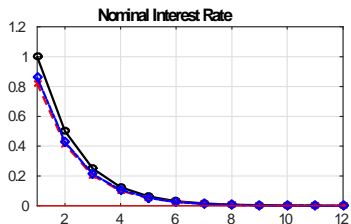
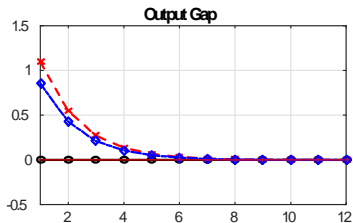
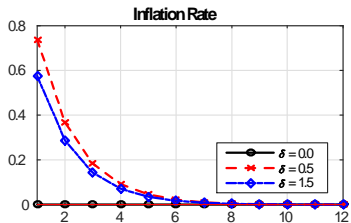


Figure: Response to a one unit shock to r_t^* in a simple NK model.

How flexible should a RBP regime be?

- ▶ For the case of *iid* shocks, one can solve analytically for the value of δ that minimizes the unconditional social loss:

$$\delta^* = \frac{(\lambda + \kappa^2) \sigma_v^2}{(\lambda + \kappa^2)^2 \sigma_{r^*}^2 + \Lambda \sigma_e^2},$$

where

$$\Lambda \equiv \sigma \kappa (\sigma \kappa - \psi_\pi \lambda).$$

- ▶ The optimal RBP regime trades off limiting the effects of v_t shocks against distorting stabilization policy in the face of r_t^* and e_t shocks.
- ▶ If rule is optimal ($\psi_\pi^* = \sigma \kappa / \lambda$ and includes a time varying constant r_t^* , i.e. $i_t^r = r_t^* + \pi^T + \psi_\pi^* \hat{\pi}_t$), a strict regime is optimal ($\delta = \infty$).
 - ▶ Design of rule crucial – requires knowledge of model and preferences.

Rulable variables

- ▶ Variables in RPR must be rulable (Kocherlakota 2016).
- ▶ Suppose central bank announces its estimate of r_t^* . Denote this by r_t^a and let reference rule be

$$i_t^r = r_t^a + \pi^T + \psi_\pi \hat{\pi}_t.$$

- ▶ Optimal value to announce is

$$r_t^a = r_t^* - \left(\frac{\sigma}{\lambda}\right) v_t,$$

- ▶ This ensures $i_t = i_t^r$ and

$$\kappa \hat{\pi}_t + \lambda x_t = v_t.$$

- ▶ Rule does not offset distortionary shock.
- ▶ Challenge: designing optimal rule when nonverifiable variables are excluded.

Challenge: getting flexibility in an RBP regime right

- ▶ Strict rules-based systems are not generally optimal, just as strict inflation targeting regimes aren't.
- ▶ Deviations from the rule are “rule based”, just as deviations from the inflation target are in IT regimes.
- ▶ The stricter the rule, the more accountable the central bank is to following the rule and the more the rule frames the policy debate.
 - ▶ This reduces the effects of distortionary preference shocks but also distorts stabilization in the face of non-rulable variables such as r_t^* .
- ▶ Getting the optimal degree of flexibility right depends on knowing the model and the objectives.
- ▶ This is also true under IT, but IT allows better stabilization to shocks such as r_t^* .

Credibility, changing the rule and escape clauses

Does the rule anchor inflation at the target?

- ▶ Evaluating a rule requires a model and objectives. If low and stable inflation is a primary objective of monetary policy, will a reference rule that is transparency and verifiable achieve it?
- ▶ Consider the RPR

$$i_{t/t+h}^r = \bar{r} + \pi^T + \psi_\pi \hat{\pi}_{t/t+h}.$$

- ▶ The Fisher equation must also hold:

$$i_{t/t+h} = r_{t/t+h}^* + \pi^T + \hat{\pi}_{t/t+h+1}.$$

- ▶ These, together with the rule for deviating from i^r imply, if $x_{t/t+h} = 0$,

$$\hat{\pi}_{t/t+h+1} = \bar{r} - r_{t/t+h}^* + \phi \hat{\pi}_t, \quad \phi = \psi_\pi + \kappa/a\delta$$

Anchoring inflation expectations and shifts in natural real rate

- ▶ Does a constant-intercept rule stabilize inflation expectations?
- ▶ Suppose

$$r_t^* = \rho r_{t-1}^* + (1 - \rho) r^* + \eta_t,$$

where η_t is white noise and ρ is very close to one.

- ▶ If $r_{t-1}^* = r^*$, the solution for this system implies

$$\pi_{t/t+h} - \pi^T = \left(\frac{\rho^h}{\phi - \rho} \right) \eta_t = B\eta_t.$$

- ▶ Parameters: $\psi_\pi = 1.5$, $\rho = 0.99$, $\sigma = 1$, and $\kappa = 0.34$.

Future inflation volatility around target

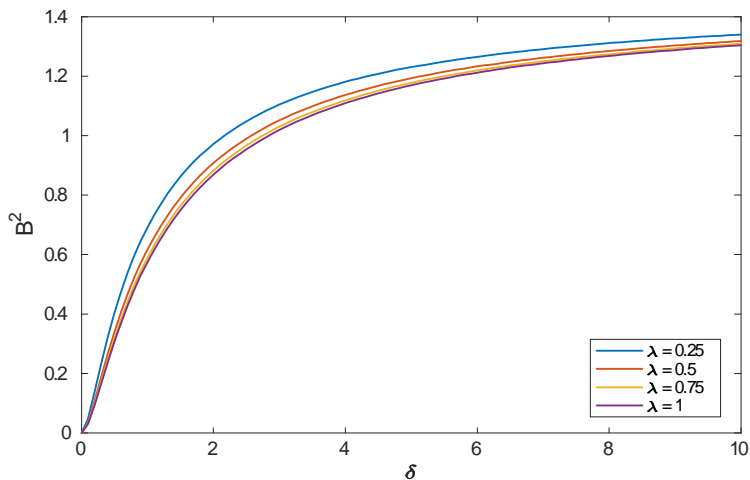


Figure: The volatility of inflation deviations from target 48 quarters in the future in response to a persistent shock to the natural real rate of interest.

Credibility: permanent shifts in natural real rate

- ▶ If $r_{t/t+h}^* \rightarrow \bar{r}^*$, the stationary equilibrium implies

$$\pi = \pi^T + \frac{\bar{r}^* - \bar{r}}{\phi - 1} \neq \pi^T.$$

- ▶ The policy rate and value of the reference rule imply

$$\begin{aligned} i_{t/t+h} &= \bar{r} + \pi^T + \phi \hat{\pi}_{t/t+h} \\ &\rightarrow \bar{r} + \pi^T + \left(\frac{\phi}{\phi - 1} \right) (\bar{r}^* - \bar{r}); \end{aligned}$$

$$i_{t/t+h}^r \rightarrow \bar{r} + \pi^T + \left(\frac{\psi \pi}{\phi - 1} \right) (\bar{r}^* - \bar{r}).$$

- ▶ Under IT, credibility can be measured by $\pi_{t/t+h} - \pi^T$.
 - ▶ $\delta \rightarrow 0$, $\phi \rightarrow \infty$ and $\pi \rightarrow \pi^T$ but
 $i = \bar{r}^* + \pi^T \neq \bar{r} + \pi^T = i^r$.
- ▶ Under RBP, $\delta \rightarrow \infty$, $\phi \rightarrow \psi \pi$ and $i \rightarrow i^r$ but $\pi \neq \pi^T$.

Committing to the rule when the rule can change

- ▶ What is the priority?
 - ▶ Committing to the rule?
 - ▶ Or committing to goals?
- ▶ If it's the goal, then rule has to change.
 - ▶ If objective is to make the policy instrument more predictable (not policy, the policy instrument), then the fact the public knows the rule may need to be changed works against that objective.
 - ▶ What is the rule for changing the rule?
 - ▶ Issue with unforeseen future situations such as ELB.

Whose rule? The role of preferences

Challenges to implementing a flexible RBP: Who picks the rule?

- ▶ Large literature on robustness of alternative rules that examines how rules perform in different models.
 - ▶ Levin, Wieland and Williams (1999), Levin and Williams (2003), Orphanides and Williams (2007), Orphanides and Wieland (2013), Tetlow (2015).
- ▶ But even if there is agreement on “the” model, disagreements over the reference rule will occur.
- ▶ Consider the Smets-Wouter (2007) U.S. model as the true model.
 - ▶ Replace the SW policy rule with an alternative rule and feedback in the historical shocks identified by the model.
 - ▶ Compare the outcomes under these counterfactual histories.
 - ▶ Rank outcomes based on $(1 - \alpha_z) \sigma_\pi^2 + \alpha_z \sigma_z^2$, for z equal to output or the output gap.

Table 2: Alternative policy rules

SW	$i_t = 0.82i_{t-1} + (1 - 0.82) (2.04\pi_t + 0.09x_t) + 0.23 (x_t - x_{t-1})$
TRy	$i_t = 1.5\pi_{4,t} + 0.5y_t$
TRx	$i_t = 1.5\pi_{4,t} + 0.5x_t$
BAy	$i_t = 1.5\pi_{4,t} + y_t$
BAX	$i_t = 1.5\pi_{4,t} + x_t$
CRy	$i_t = i_{t-1} + 1.2\pi_{4,t} + y_t$
CRx	$i_t = i_{t-1} + 1.2\pi_{4,t} + x_t$
FDy	$i_t = i_{t-1} + 0.5\pi_{4,t} + 0.5 (y_t - y_{t-4})$
FDx	$i_t = i_{t-1} + 0.5\pi_{4,t} + 0.5 (x_t - x_{t-4})$

- ▶ From Board of Governors, Monetary Policy Report, July 2017 and Okun's Law.

Table 3: Standard deviations: Counterfactuals

Alternative rules	All shocks	$std(r_t)$	$std(\pi_t)$	$std(x_t)$	$std(y_t)$
		1.000	1.000	1.000	1.000
SW	No MP shock	0.863	0.953	1.023	0.924
TRy	"	1.446	1.641	1.117	0.830
TRx	"	1.652	2.099	1.004	0.854
BAy	"	2.002	2.430	1.080	0.722
BAx	"	2.37	3.292	0.859	0.713
CRy	"	1.376	1.210	1.219	0.985
CRx	"	1.496	1.708	1.081	0.948
FDy	"	0.626	0.528	1.148	0.877
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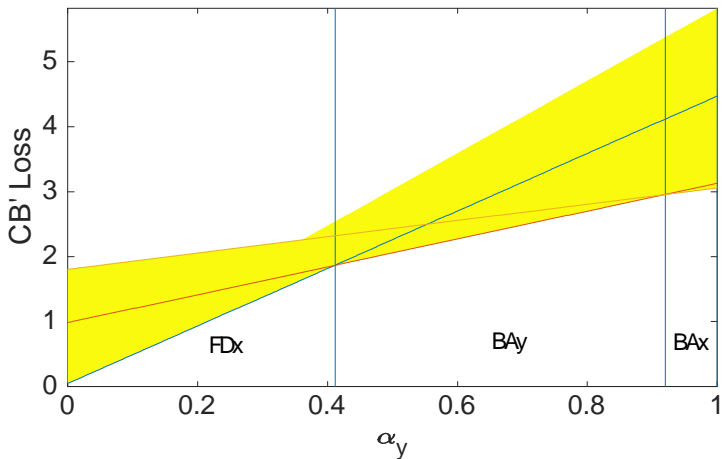


Figure: Loss under the rules in Table 2 as a function of the weight placed on output volatility when loss depends on the standard deviation of inflation and output.

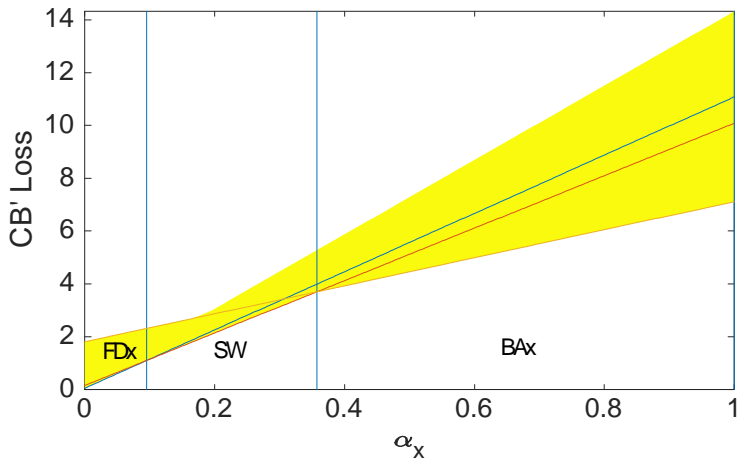


Figure: Loss under the rules in Table 2 as a function of the weight placed on output gap volatility when loss depends on the standard deviation of inflation and the output gap.

Choosing a rule

- ▶ Picking a rule forces FOMC to agree on how to make short-run tradeoffs.
- ▶ Committee preferences may shift as membership changes.
- ▶ This issue is also faced under inflation targeting, but IT isn't faced with potential inconsistency between rule and goal.
- ▶ Preferences about longer-run inflation may be more stable.

Which rule? Which variables? Which parameters?

Which rule?

- ▶ Generic instrument rule:

$$\begin{aligned}i_t = & \rho i_{t-1} + (1 - \rho) \left(r_t^* + \pi^T \right) + \alpha \left(\pi_{t/t+h} - \pi^T \right) \\ & + \beta \left(z_{t/t+k_1} - z_{t/t+k_1}^* \right) \\ & + \gamma \left[\left(z_{t/t+k_2} - z_{t/t+k_2}^* \right) - \left(z_{t/t+k_2-s} - z_{t/t+k_2-s}^* \right) \right].\end{aligned}$$

- ▶ Challenges in picking variables and parameters.
- ▶ If rule is to promote accountability and transparency, variables in it must be rulable in the terminology of Kocherlakota (2014).
 - ▶ This creates problems with forecasts and unobservables, though both play an important role in optimal policy.
 - ▶ They can be in the Directive Policy Rule.
- ▶ Principles: Rule should promote transparency, measureability, accountability, robustness and clear communications of policy actions.

Which rule?

- ▶ Principles point to a first different rule of the form

$$i_t = i_{t-1} + \alpha (\pi_t - \pi^T) + \gamma [(z_t - z_t^*) - (z_{t-4} - z_{t-4}^*)],$$

where π_t is PCE inflation and $z_t - z_t^*$ is the unemployment rate gap.

- ▶ Uncertainty about r_t^* suggests $\rho = 0$ (Orphanides and Williams 2002, Hamilton, Harris, and West 2015). ▶ Natural rate
- ▶ 2% PCE inflation is the stated goal of the FOMC. ▶ Inflation goal
- ▶ The unemployment rate is widely understood by the public. ▶ U gap
- ▶ Public discourse focuses on policy rate changes. ▶ Policy actions
- ▶ Steady-state consistent with inflation target.

Data revisions and the first-difference rule

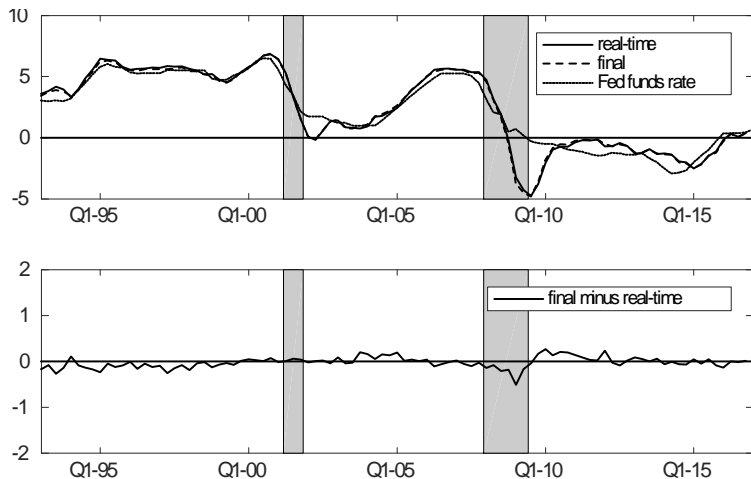


Figure: Upper panel: The funds rate implied by the first-difference rule based on real-time (dashed line) and final data (solid line). Lower panel: The deviation between the final and real-time values from the rule. Wu-Xia shadow rate is used for 2009-2015.

Picking parameters

1. Optimized

1.1 May lack robustness, are not transparent, and hard for public to verify.

2. Estimated

2.1 Captures systematic behavior in a particular historical period but may fail to capture the very actions that produced good outcomes.

3. Calibrated

3.1 May be simple to explain but difficult to agree on.

Policy preferences matter

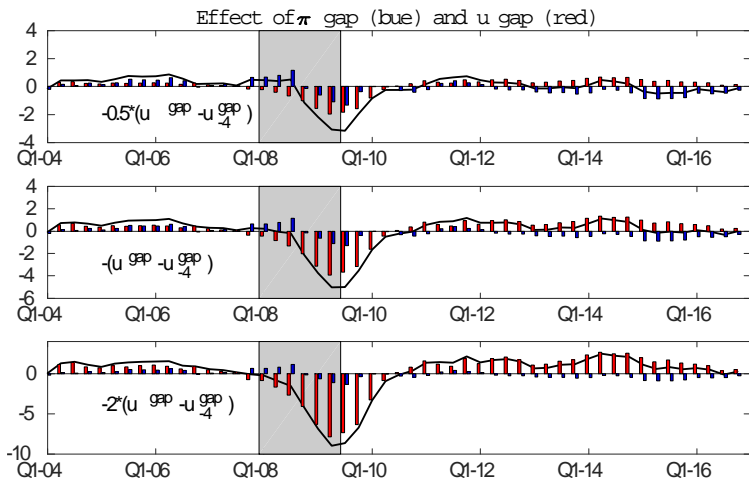


Figure: Solid line: change in the funds rate implied by the first-difference rule for different coefficients on the change in the unemployment gap. Based on real-time data.

Conclusions

Key challenges

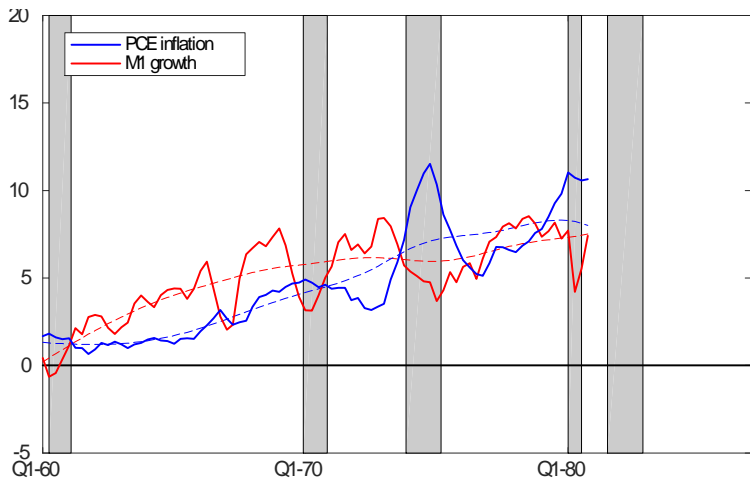
- ▶ Finding appropriate balance between flexibility and accountability.
- ▶ Deciding whether policy is committed to the rule or to policy goals.
- ▶ Gaining credibility to a rule if the rule might change.
- ▶ Gaining committee agreement over the rule if the FOMC picks the rule.
- ▶ Choosing the rule's form, the variables in the rule, and the rule's parameters.

Clarity about goal(s) is central to meeting each of these challenges.

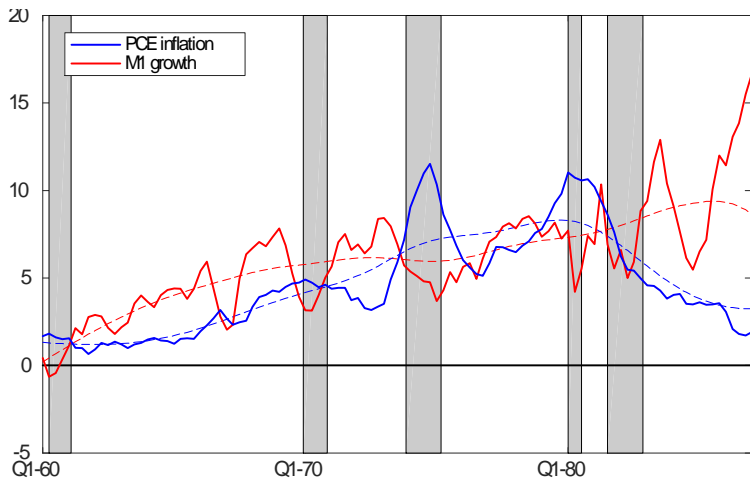
Directions for research

- ▶ If the rule can change, how does one assess the credibility of a RBP regime?
- ▶ What is the rule for changing the rule?
- ▶ If credibility is ultimately based on a goal, what does a rule add?
- ▶ Committee decision making: can a committee agree on a rule?
- ▶ If transparency argues for labor market variables, there is a need for models with richer labor market specifications in which rules based on the unemployment rate or alternative labor measures such as an employment gap can be evaluated.

Inflation and money growth: 1960-1985



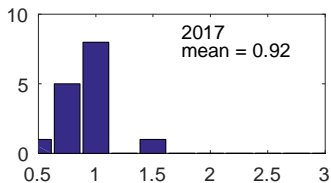
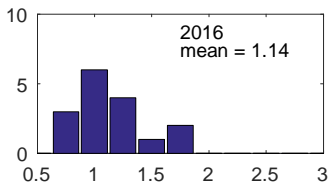
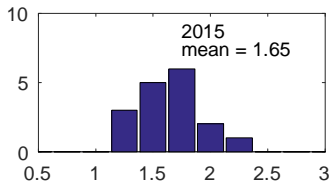
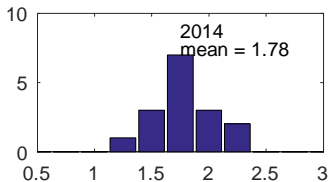
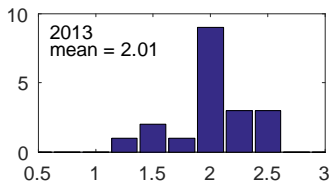
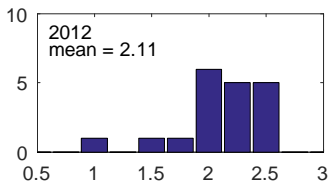
Inflation and money growth: 1960-1985



It seems to me that a reaction function in which the real funds rate changes by roughly equal amounts in response to deviations of inflation from a target of 2 percent and to deviations of actual from potential output describes tolerably well what this Committee has done since 1986. This policy . . . is an example of the type of hybrid rule that would be preferable [to inflation targeting] in my view, if we wanted a rule. I think the Greenspan Fed has done very well following such a rule, and I think that is what sensible central banks do. Yellen in 1995 (Federal Reserve Board 1995, pp. 43–44).

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“It would be a grave mistake for the Fed to commit to conduct monetary policy according to a mathematical rule.” Yellen, in testimony before the House Financial Services Committee (July 16, 2014).



The inflation measure

- ▶ Kohn (2012) – It;s not so simple.

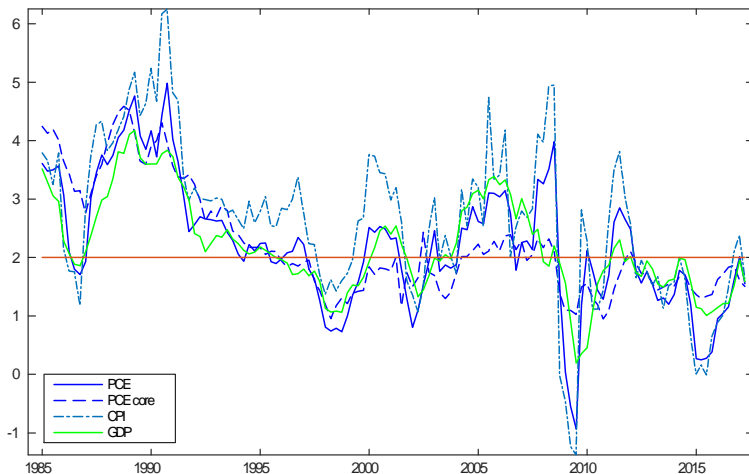


Figure: Four measures of inflation (4-quarter percent change).

The FOMC's Statement on Longer-run Goals

The Committee reaffirms its judgement that inflation at the rate of 2 percent, as measured by the annual change in the price index for persona consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate.

▶ Return

Unemployment in the longer run

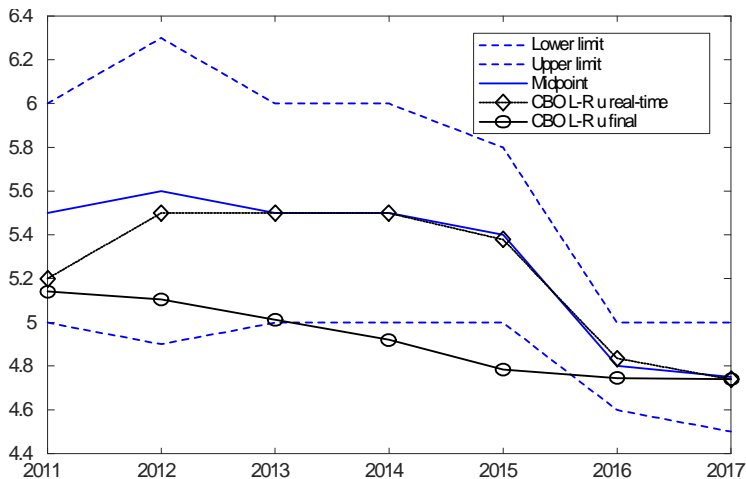


Figure: The upper, lower, and midpoint of FOMC projections for the unemployment rate in the longer run.

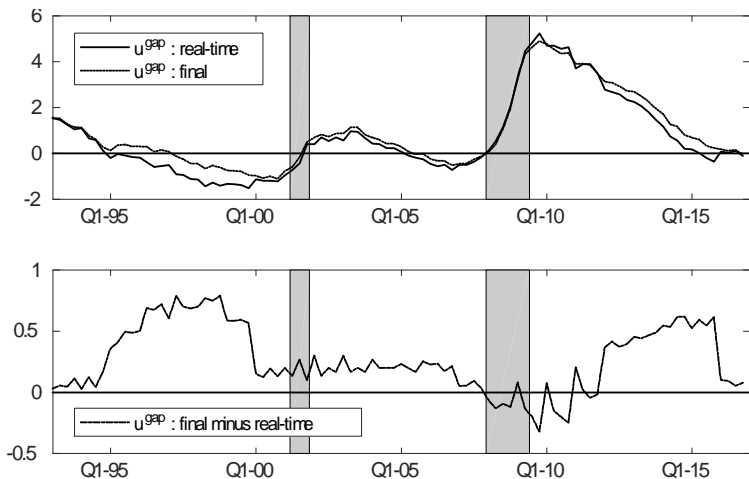


Figure: Upper panel: u^{gap} based on real-time data (solid line) and final data (dashed line) as of July 2017. Lower panel: The difference between the final and real-time estimates of u^{gap} .

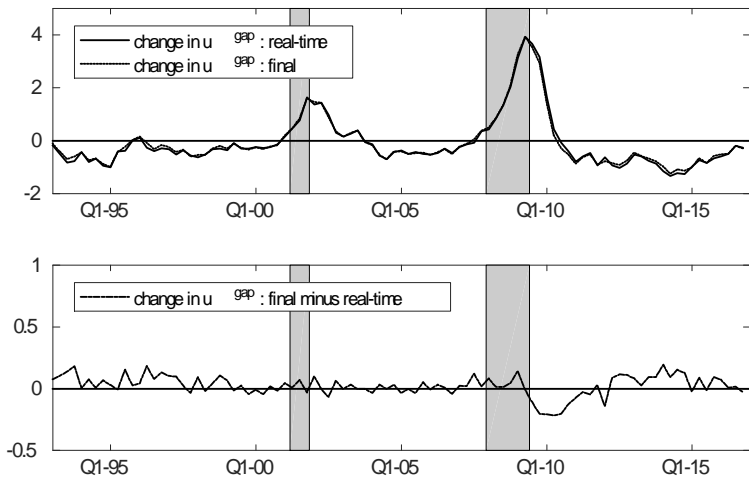


Figure: Upper panel: $u_t^{gap} - u_{t-4}^{gap}$ based on real-time data (solid line) and final data (dashed line) as of July 2017. Lower panel: The difference between the final and real-time estimates of $u_t^{gap} - u_{t-4}^{gap}$.

Fischer (2017, p. 2):

FOMC's "decision is typically whether to raise or reduce the federal funds rate or to leave it unchanged."

▶ Return

Equilibrium

$$\begin{aligned}\hat{\pi}_{t/t+h} &= \left(\frac{1}{\phi}\right) (r_{t/t+h}^* - r^*) + \left(\frac{1}{\phi}\right) \hat{\pi}_{t/t+h+1} \\ &= \left(\frac{1}{\phi}\right) \sum_{j=0}^{\infty} \left(\frac{1}{\phi}\right)^j (r_{t/t+h+j}^* - r^*)\end{aligned}$$

Accountability and framing

- ▶ The parameter captures regime flexibility, but it also measures accountability to the rule and the extent to which the rule frames the policy debate.
 - ▶ Kocherlakota (2016)
- ▶ A less flexible RBP regime distorts stabilization policy (unless rule is optimal).
 - ▶ Debelle and Fischer (1994, p. 219). “...the cult of central bank independence, the appointment of independent central bankers, and the emphasis on inflation in the incentive contracts seen so far, appear to lead to an excessive concentration on inflation prevention and insufficient acknowledgment of the short-run trade-offs between inflation and output. Without accountability to elected representatives, such as the Congress, central banks run a very good chance of becoming too conservative.”