What if the CB can commit to a rule? Set $\Pi = 0$. Now $U = U^*$, $\Pi = 0$

Why can't the discretionary CB just promise to set $\Pi = 0$? The promise or announcement is not credible.

Suppose, the private sector believes the promise and sets $\Pi^e = 0$. Then the CB will find it optimal to surprise the public by setting $\Pi = \alpha \delta$.
Implications of the Expectations-Augmented Phillips Curve for Monetary Policy

**Expectations-Augmented Phillips Curve**

\[ U_t = U^n - \alpha (\pi_t - \pi^e_t) \]

or

\[ \pi_t = \pi^e_t - h (U_t - U^n) \]

**Note:** Assuming the Central Bank always wants to lower the unemployment rate, the Expectations-Augmented Phillips Curve gives the Central Bank an incentive to surprise the public.

Assuming the public is aware of this incentive, what happens?
A Generalization

Again suppose, \( U_t = u^n - \alpha (\pi_t - \pi^e_t) \)

Also suppose the CB's Loss Function is, \( L(u, \pi) = U + \gamma \pi^2 \)

If the CB cannot commit, what is its optimal choice of \( \pi ? \)

\[
L = [u^n - \alpha (\pi - \pi^e)] + \gamma \pi^2
\]

\[
\frac{dL}{d\pi} = -\alpha + 2\gamma \pi = 0
\]

\[
\Rightarrow \pi = \frac{\alpha}{2\gamma} \quad \text{[First-Order Condition]}
\]

What is \( u^n ? \) Because \( \pi^e = \frac{\alpha}{2\gamma} \) (Reframing Expectation)

it turns out \( U = u^n \)
Reputation and Trigger Strategies

Trigger Strategy: Start out trusting (i.e., believing) the CB, setting $\pi^c = 0$. If the CB ever takes advantage of you and surprises you (by increasing $M$), don't ever believe them again. Set $\pi^c = \frac{\alpha}{2}$ forever (starting next period).

Under what circumstances can this support the commitment outcome?
$L^c =$ losses of the CB if it sticks to its promises

$D^d =$ losses of the CB if it reneges (or defects).

$L^n =$ losses in the sub-optimal one-period Nash equil.

$L^d < L^c < L^n$

$\frac{L^c - L^d}{1 - \beta} \leq \beta (L^n - L^c)$

present value of future losses due to loss of reputation.

one-shot gain from defecting
Commitment
\[ \Pi = \Pi^e = 0 \quad \rightarrow \quad L^e = u^n \]

Discretion (Nash Equilibrium)
\[ \Pi = \Pi^e = \frac{\alpha}{2\theta} \quad \rightarrow \quad L^n = u^n + \frac{\alpha^2}{4\theta} \]

One-Time Gain From Cheating
\[ \Pi^e = 0 \quad \Pi = \frac{\alpha}{2\theta} \quad \rightarrow \quad L^p = u^n - \frac{\alpha^2}{4\theta} \]

Sustainability Condition
\[ L^e - L^p \leq \frac{1}{1-\beta} (L^n - L^e) \]

\[ \Rightarrow \frac{\alpha^2}{4\theta} \leq \frac{\beta}{1-\beta} \left( \frac{\alpha^2}{4\theta} \right) \]

\[ \Rightarrow \beta \geq \frac{1}{2} \]

If the Central Bank's Discount Rate exceeds \( \frac{1}{2} \) then Commitment outcome is sustainable.
Ways to Overcome the Time Consistency Problem

1.) Adopt Rules

2.) Alter the incentives of the CB
   Suppose you change the CB's loss function to
   \[ L(u, \pi) = u + \gamma \pi^2 + \alpha \pi \]
   Verify that the optimal discretionary rule is to set \( \pi = 0 \).

3.) Reputation

4.) Make the CB politically independent
Inflation and Central-Bank Independence This scatterplot presents the international experience with central-bank independence. The evidence shows that more independent central banks tend to produce lower rates of inflation.

The Taylor Rule

- The benefits of basing monetary policy on an explicit objective are now widely appreciated by most countries.

- There is also widespread agreement that, operationally, Central Banks should base policy on a systematic (but flexible) rule.

- Unfortunately, there is less agreement about what exactly this rule should be.

- In practice, it appears that many Central Banks follow a simple rule whereby the interest rate responds to just two variables:
  1. The current deviation of inflation from the inflation target.
  2. The current "output gap" (deviation between current output and the full-employment output).

- These kinds of rules are called "Taylor Rules".
The Taylor Rule

\[ i_t = \Pi_t + r^* + 0.5(\Pi_t - \Pi^*) + 0.5(y_t - \bar{y}_t) \]

- The "natural" rate of interest
- Target inflation
- Actual output
- Full employment output

**Figure 1**

Greenspan Years: Federal Funds Rate and Taylor Rule
(CPI \( p^* = 2.0, r^* = 2.0 \)) \( a = 1.5, b = 0.5 \)

- Federal Funds Rate

- In practice, estimating \( \bar{y}_t \) can be challenging. If \( \bar{y}_t \) is mismeasured, it can produce policy errors.