Question: Why is inflation, $\pi$, often high? Why $\pi > 0$ more often than $\pi < 0$?

One of several answers: Proclamations of low-inflation monetary policy by central banks are “dynamically inconsistent.”

Next question: What institutions can address dynamic inconsistency?
Dynamic inconsistency: The intuition

• Assume governments, if operating under discretion, choose monetary policy and hence AD so as to maximize a social function of \( Y \) & \( \pi \).
  – => Economy is at tangency of AS curve & one of the social function’s indifference curves.
  – Assume also that the social function centers on \( \hat{Y} > \bar{Y} \), even though this point is unattainable, at least in the long run.

• Assume \( W \) & \( P \) setters have rational expectations.
  – => \( \pi^e \) (& \( \dddot{\cdot} \).AS) shifts up if rationally-expected \( E \pi \) shifts up.
  – => \( \pi^e = E \pi = \pi \) on average.

• \( \dddot{\cdot} \). economy is at point \( B \) on average. Inflationary bias: \( \pi^e = E \pi > 0 \).

• Lesson: The authorities can’t raise \( Y \) anyway, so they might as well concentrate on price stability at point \( C \).
3. But $\pi^e$ adjusts upward in response to observed $\pi>0$. The LR or Rational Expectations equilibrium must feature $\pi^e = \pi$. Result: inflationary bias $\pi>0$, despite failure to raise $Y$ above $\bar{Y}$.

4. The country would be better off “tying the hands” of the central bank. Result: $\pi=0$. And yet $Y = \bar{Y}$ (no worse than average under discretion).

1. Barro-Gordon innovation: It is useful to think of society’s 1st choice as $Y=\hat{Y}$ (& $\pi=0$), even if it is unattainable.

2. If $\pi^e$ would stay at 0, then to get the higher $Y$ it would be worth paying the price of $\pi>0$. 
Time-Inconsistency of Non-Inflationary Monetary Policy

(Romer 11.53) \[ y - \bar{y} = \sigma(\pi - \pi^e) \]

+ Policy-maker minimizes quadratic loss function:

(11.54) \[ \Lambda = \frac{1}{2} (y - \hat{y})^2 + \frac{1}{2} a(\pi)^2 \]

where the target \( \hat{y} > y \).

\[ \Rightarrow \] \[ \Lambda = \frac{1}{2} (y + \sigma(\pi - \pi^e) - \hat{y})^2 + \frac{1}{2} a(\pi)^2 \]
Given discretion, the CB chooses the monetary policy and inflation rate (assuming it can hit its target) where

\[
\frac{d\Lambda}{d\pi} = (\bar{y} + \sigma(\pi - \pi^e) - \hat{y})\sigma + a(\pi) = 0. 
\]

Take the mathematical expectation:

\[
(\bar{y} + \sigma E(\pi - \pi^e) - \hat{y})\sigma + aE(\pi) = 0.
\]

+ Rational expectations: \( \pi^e = E\pi \implies \)

\[
E\pi = \frac{\sigma}{a}(\hat{y} - \bar{y}) > 0, \text{ the inflationary bias.}
\]
ADDRESSING THE TIME-INCONSISTENCY PROBLEM

- How can the CB credibly commit to a low-inflation monetary policy?

- Announcing a target $\pi = 0$ is time-inconsistent, because a CB with discretion will inflate *ex post*, and everyone knows this *ex ante*.

- CB can eliminate inflationary bias only by establishing non-inflationary credibility,
  - which requires abandoning the option of discretion.
  - so public will see the CB can’t inflate even if it wants to.
  - CB “ties its hands,” as Odysseus did in the Greek myth.
Addressing the Time-Inconsistency Problem (continued)

- **Reputation**

- **Delegation.** Rogoff (1985): Appoint a CB with high weight on low inflation $\phi' >> \phi$, and grant it independence. It will expand at only $\pi = \frac{\sigma}{\alpha'} (\hat{y} - \bar{y})$ << inflationary bias of discretion.

- **Binding rules.** Commit to rule for a nominal anchor:
  1. Price of gold
  2. Money growth
  3. Exchange rate
  4. Nominal GDP
  5. CPI
• **Reputations.** With multiple periods, a CB can act tougher in early periods, to build a reputation for monetary discipline.

  – Backus-Driffill (1985) model: people are uncertain if the CB is of hard-money or soft-money “type.”

  – Then even a soft CB may act tougher, to influence subsequent expectations.
Alesina & Summers: Central banks that are institutionally independent of their governments have lower inflation rates on average.

Figure 9.6, from “Central Bank Independence and Macroeconomic Performance” by Alberto Alesina and Lawrence H. Summers, *Journal of Money, Credit, and Banking*, Vol. 25, No. 2 (May 1993).
“Central Bank Independence, Inflation and Growth in Transition Economies,”
P.Loungani & N.Sheets, IFDP95-519 (1995)
Limitations to the argument for central bank independence

1. Some consider it undemocratic.

2. The argument only works if the right central bankers are chosen.

3. Although independence measures are inversely correlated with inflation, these measures have been debated and,

4. more importantly, the choice to grant independence could be the result of priority on reducing inflation.

5. As with rules to address time-inconsistency, there is little empirical evidence that it succeeds in reducing inflation without loss of output.

6. As with rules, one loses ability to respond to SR shocks.
Inflation Targeting (IT)

Note: the figure shows the dates of formal adoption of IT for the 27 countries operating a full-fledged IT regime at the start of 2009, and the inflation rate at adoption.


Agénor & Pereira da Silva, 2013, Fig.1.

"Rethinking Inflation Targeting: A Perspective from the Developing World," CGBCR DP 185, U.Manchester.
Countries adopting IT experienced lower inflation


Table 1
Inflation data

<table>
<thead>
<tr>
<th>Country</th>
<th>Adoption year</th>
<th>Initial inflation</th>
<th>Final inflation</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>1999</td>
<td>8,7</td>
<td>7,9</td>
<td>-0,8</td>
</tr>
<tr>
<td>Chile</td>
<td>1991</td>
<td>21,8</td>
<td>7,2</td>
<td>-14,6</td>
</tr>
<tr>
<td>Colombia</td>
<td>2000</td>
<td>22,8</td>
<td>6,9</td>
<td>-15,9</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>1998</td>
<td>3,8</td>
<td>3,5</td>
<td>-0,3</td>
</tr>
<tr>
<td>Hungary</td>
<td>2001</td>
<td>15,3</td>
<td>5,9</td>
<td>-9,4</td>
</tr>
<tr>
<td>Israel</td>
<td>1992</td>
<td>17,2</td>
<td>6,1</td>
<td>-11,1</td>
</tr>
<tr>
<td>Mexico</td>
<td>1999</td>
<td>21,8</td>
<td>7,2</td>
<td>-14,6</td>
</tr>
<tr>
<td>Peru</td>
<td>1994</td>
<td>48,6</td>
<td>6,6</td>
<td>-42,0</td>
</tr>
<tr>
<td>Philippines</td>
<td>2002</td>
<td>11,3</td>
<td>5,0</td>
<td>-6,3</td>
</tr>
<tr>
<td>Poland</td>
<td>1999</td>
<td>22,8</td>
<td>4,5</td>
<td>-18,3</td>
</tr>
<tr>
<td>South Africa</td>
<td>2000</td>
<td>12,3</td>
<td>5,2</td>
<td>-7,1</td>
</tr>
<tr>
<td>Thailand</td>
<td>2000</td>
<td>5,4</td>
<td>2,2</td>
<td>-3,3</td>
</tr>
<tr>
<td>South Korea</td>
<td>1998</td>
<td>7,4</td>
<td>3,4</td>
<td>-4,0</td>
</tr>
<tr>
<td><strong>Targeters mean</strong></td>
<td><strong>1998</strong></td>
<td><strong>17</strong></td>
<td><strong>5,5</strong></td>
<td><strong>-11,4</strong></td>
</tr>
<tr>
<td><strong>Non-targeters’ mean</strong></td>
<td>–</td>
<td><strong>13,4</strong></td>
<td><strong>6,9</strong></td>
<td><strong>-6,5</strong></td>
</tr>
</tbody>
</table>
Appendix 1:
Introducing disturbances into the Barro-Gordon model
à la Rogoff (1985) and Fischer (1987)

AD shocks

No effect on average inflation: \( E\pi = \frac{\sigma}{a} (\hat{y} - \bar{y}) \).

Discretionary monetary policy could offset AD shocks, so they don’t show up as fluctuations in \( \pi \) & \( y \),
if lags in monetary policy are shorter than lags in adjustment of \( W \) & \( P \).

\[ \Rightarrow \] Choice of rules vs. discretion then becomes choice of eliminating LR inflation bias \( (E\pi=0) \) vs. SR shocks.
Appendix 2: GLOBAL INFLATION HAS DECLINED SINCE 1990. WHY?

- Better understanding of costs of inflation and the temporariness of the AS tradeoff?
- Spread of commitment devices such as central bank independence, hard exchange rate pegs (currency boards & monetary unions), & IT?
- Rogoff (2003): Globalization & increased competition have reduced $\sigma$ and/or $(\hat{y} - \bar{y})$ and thereby the inflationary bias $\frac{\sigma}{a}(\hat{y} - \bar{y})$. 
Figure 3.1. Inflation
(Distribution of five-year averages of year-on-year CPI inflation across countries)

Inflation declined significantly during the 1980s and 1990s in industrial countries and, with a lag, major emerging markets.

[Graph showing median and quartile inflation rates for Industrial Countries and Asian Emerging Markets, with peak inflation labeled as early 80s.]
Figure 3.1. Inflation
(Distribution of five-year averages of year-on-year CPI inflation across countries)

Inflation declined significantly during the 1980s and 1990s in industrial countries and, with a lag, major emerging markets.
Appendix 3: Comparison of alternate rules

(M1 vs. $E$ vs. $CPI$ ...)

The choice of anchor depends on:

1. Credibility of the commitment

2. Tradeoff: advantage of time-consistent commitment vs. ability to stabilize short-term shocks
   - Must compare $E(\text{Loss})$ function for $M$ vs. $GDP$ vs. $ex.\text{rate}$ vs. $P$ targets)
   - Original treatment due to Rogoff (1985)

3. Other objectives served (e.g., a peg reduces exchange rate risk)
6 proposed nominal targets and the Achilles heel of each:

<table>
<thead>
<tr>
<th>Targeted variable</th>
<th>Vulnerability</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monetarist rule</td>
<td>M1</td>
<td>Velocity shocks</td>
</tr>
<tr>
<td>Nominal GDP targeting</td>
<td>Nominal GDP</td>
<td>Measurement problems</td>
</tr>
<tr>
<td>Gold standard</td>
<td>Price of gold</td>
<td>Vagaries of world gold market</td>
</tr>
<tr>
<td>Fixed exchange rate</td>
<td>$ (or euro)</td>
<td>Appreciation of $ (or other)</td>
</tr>
</tbody>
</table>