Lecture 7

Inflation and Unemployment

M&I 6

Adaptive vs “Rational” Expectations

M&B 19, p. 24
Inflation and Unemployment

Second of 3 motives gov’t may have for $\Delta M/M$, $\pi$:

1. Inflationary Finance (Seigniorage)
2. Reduce U / stimulate y ← Today
3. Reduce i and/or r (M&B 19)
The Phillips Curve (PC)

Observed negative correlation between Inflation $\pi$ and Unemployment $U$.

$\pi$ vs $U$, 1956-1969:

(Phillips 1958 originally used earlier UK data and $\Delta W/W$, but graph similar.)

(PC drawn as straight line for simplicity.)

Economists (eg Samuelson and Solow 1960) originally thought PC gave policy makers a *permanent tradeoff* between $\pi$ and $U$:

$\pi$ and $U$ both bad, but suggested Fed should encourage a little $\pi$ to reduce $U$.

(Nobel Prizes, 1970, 1987)
However –  
PC shifted over time –  
Outward, 1953-83  

“Stagflation” became a concern:  
High U and high $\pi$!  

Is economy doomed to ever higher U and $\pi$?  
“Stagflation”  

SRPC = Short-Run Phillips Curve  
low, 1953-69  
highest, 1979-83
But then SRPC quickly moved back down, 1983 – 2008:

- '50s, '60s – low
- '70s – rising fast
- '79-'83 – highest
- '84-'93 – much lower
- '95-'08 – like '60s.

1. Why does PC shift?

2. Why is there a SR tradeoff?
Why does $\pi$ affect $U, y$?

**No $\pi$:** $D_0, S_0, P_0, Q_0$
Why does $\pi$ affect $U$, $y$?

**No $\pi$:** $D_0$, $S_0$, $P_0$, $Q_0$

**Fully anticipated $\pi = \pi^e$:**
- $D \uparrow$ to $D_1$, vertically by $\pi^e$,
- $S \uparrow$ to $S_1$, vertically by $\pi^e$.

$\Rightarrow P \uparrow$ to $P_1$ by $\pi^e$, as expected,
- $Q$ remains $Q_0$

$\Rightarrow \pi = \pi^e$ does not affect production or $U$. 

Diagram:
- Price $P$:
  - $P_0$,
  - $P_1$
- Quantity $Q$:
  - $Q_0$
- Demand $D$:
  - $D_0$,
  - $D_1$
- Supply $S$:
  - $S_0$,
  - $S_1$
Why does $\pi$ affect $U$, $y$?

**No $\pi$:** $D_0$, $S_0$, $P_0$, $Q_0$

**Unanticipated $\pi$, caused by $M/P > m^D$:**
- $D \uparrow$ to $D_2$, horizontally, by Walras’ Law,
- $S$ unchanged.

$\Rightarrow$ $P \uparrow$ to $P_2$, $\pi > \pi^e$,
- $Q \uparrow$ to $Q_2$

$\Rightarrow \pi > \pi^e$ increases production, reduces $U$. 
Why does $\pi$ affect $U, y$?

**No $\pi$:** $D_0, S_0, P_0, Q_0$

**Unanticipated DEflation, caused by $M/P < m^D$:**
$D \downarrow$ to $D_2$, horizontally, 
by Walras’ Law, 
$S$ unchanged.

$\Rightarrow$ $P \downarrow$ to $P_3$, $\pi < \pi^e$, 
$Q \downarrow$ to $Q_3$

$\Rightarrow \pi < \pi^e$ DEcreases production, 
INcreases $U$. 

![Diagram of Typical Market](image)
Natural Unemployment Rate Hypothesis:

If \( \pi \) fully anticipated
(as in Long Run),
U unaffected by \( \pi \), tends to
“Natural Unemployment Rate” \( U_N \).

\[ \Rightarrow \text{Long Run Phillips Curve (LRPC) vertical at } U_N \]
\( (\pi = \pi^e) \)

\[ \text{when } \pi \text{ on vertical axis,} \]
\[ U \text{ on horizontal axis} \]
Natural Unemployment Rate Hypothesis:  
(Milton Friedman, Edmond Phelps, 1968)

But –

If $\pi \neq \pi^e$ (as in Short Run),

$\pi > \pi^e \rightarrow U < U_N$,

$\pi < \pi^e \rightarrow U > U_N$.

$\Rightarrow$ There is a permanent tradeoff between unanticipated $\pi$ & $U$.
Natural Unemployment Rate Hypothesis:
(Milton Friedman, Edmond Phelps, 1968)

But –

If $\pi \neq \pi^e$ (as in Short Run),

$\pi > \pi^e \rightarrow U < U_N$,
$\pi < \pi^e \rightarrow U > U_N$.

⇒ There is a permanent tradeoff between unanticipated $\pi$ & $U$.

And, there is a different Short Run PC (SRPC) for every $\pi^e$,
intersecting LRPC at $\pi^e$.
Acceleration Hypothesis
(Hayek, *A Tiger by the Tail*, 1972)

Target $U^* < U_N$ attainable, but only with *accelerating* $\pi$:

$\pi^e \quad \pi$ for $U = U_N$

| 0% | 5% |

$\pi^e$
Acceleration Hypothesis
(Hayek, *A Tiger by the Tail*, 1972)

Target $U^* < U_N$ attainable, but only with 
**accelerating** $\pi$:

\[
\begin{array}{ll}
\pi^e & \pi \text{ for } U = U_N \\
0\% & 5\% \\
5\% & 10\%
\end{array}
\]
Acceleration Hypothesis
(Hayek, *A Tiger by the Tail*, 1972)

Target $U^* < U_N$ attainable, but only with **accelerating** $\pi$: 

<table>
<thead>
<tr>
<th>$\pi^e$</th>
<th>$\pi$ for $U = U_N$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>5%</td>
</tr>
<tr>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>etc!</td>
<td></td>
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</tbody>
</table>

![Graph showing Actual $\pi$ vs $\pi^e$ with labels: LRPC, SRPC, $\pi^e = 10\%$, $\pi^e = 5\%$.]
Acceleration Hypothesis
F.A. Hayek, A Tiger by the Tail, 1972, Nobel Prize 1974

Target $U^* < U_N$ attainable, but only with **accelerating $\pi$**:

$\pi^e$ for $U = U_N$

- 0% 5%
- 5% 10%
- 10% 15%
- etc!

If $\pi$ ever stops accelerating, you are stuck with high $\pi$ and $U = U_N$.

**Graph**: The graph illustrates the relationship between $U$ and $\pi$, with $U^*$ and $U_N$ representing the feasible and attainable targets, respectively. The scenario indicates that to maintain an achievable $U^*$, $\pi$ must accelerate at a certain rate to avoid getting stuck at a high $\pi$ and $U = U_N$. The diagram highlights the importance of policy adjustments to prevent economic traps.
Disinflation (stopping ongoing $\pi$)

Requires $U > U_N$
if expectations adaptive

A. Cold Turkey
   ($\pi \to 0$ immediately)
   $U$ goes very high,
   **Sharp recession**
   or depression.
Disinflation (stopping ongoing $\pi$)

Requires $U > U_N$ if expectations adaptive

A. Cold Turkey ($\pi \rightarrow 0$ immediately)
   U goes very high,
   **Sharp recession or depression.**
   But $\pi^e \downarrow$ quickly,
   U returns to $U_N$.
Disinflation (stopping ongoing $\pi$)

Requires $U > U_N$ if expectations adaptive

B. Gradualism
$U_{Max} = \text{Max tolerable } U$
$\pi \downarrow \text{ in small steps}$
$\Rightarrow U \leq U_{Max}$
but takes longer than Cold Turkey!

Actual $\pi$

$U_{Max}$

LRPC

SRPC, $\pi^e = 15\%$
SRPC, $\pi^e = 10\%$
SRPC, $\pi^e = 5\%$
SRPC, $\pi^e = 0\%$
Natural U Rate $U_N$ also known as NAIRU: 
Non-Accelerating Inflation Rate of Unemployment 
similar idea, but suggests low U causes $\pi$.

Natural Rate Hypothesis (NRH) \Rightarrow 
M policy may affect U, y temporarily, 
but must be neutral on average to prevent accelerating $\pi$. 
\Rightarrow Stimulus during recessions requires restriction during good times. 
This principle incorporated into Taylor Rule (M&B 21)
Caveat -- Natural Rate may vary with

• Efficiency of Labor Market, eg internet
• Turnover of jobs, eg after WW II
• Degree of unionization
• Composition of Labor Force
  • Postwar baby boom
  • Institutional population “not part of Labor Force”:
    • military ↑ 900,000 1965-73
    • prison pop. 500,000 in 1980, 2,400,000 in 2008.
• Minimum Wage
  • ↑ 41%, 2007-2009, affects low-skill most
• Unemployment compensation
  • up to 99 weeks in current recession, just renewed thru 1/12
  • never before so long
  • avg. duration of U = 37.1 wks. 2/11, vs 20.8 wks. 6/83.
Variation in $U_N$ over time

(McCulloch 2007 estimates)

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>1960-70</td>
<td>5.7%</td>
</tr>
<tr>
<td>1980</td>
<td>6.7%</td>
</tr>
<tr>
<td>1990</td>
<td>6.2%</td>
</tr>
<tr>
<td>2000</td>
<td>5.2%</td>
</tr>
<tr>
<td>2007</td>
<td>5.0%</td>
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</tbody>
</table>
2009, 2010 U abnormally high, relative to $\pi$!

¿ Caused by extended U benefits? 2007-09 ↑ in Min. W?
Expectations Models

1. **Adaptive Learning (AL)**
   
   (Evans and Honkapohja, 2001)

   Expectations based on past experience,
   with declining, time-varying weights
   
   Past $\pi$ best single predictor of future $\pi$,
   though U, M policy, etc. may also be useful

   Modern generalization of **Adaptive Expectations (AE)**
   
   (Friedman, Cagan, 1950s, 60s)

2. **Equilibrium or “Rational” Expectations (“RE”)**

   Expectations = best forecast using
   
   true structure of economy
   true intentions of policy makers
   all data, public and private

   Dominant assumption in economics, 1970s-90s
   
   Lucas, Sargent, Wallace, Prescott
   
Implications of AL, AE:

• $P \rightarrow P^*$ only gradually, since $P^*$ unknown, 
  $\pi^e$ drives $\pi$ in SR

• Policy can fool public in SR
  • $s^* > s_{\text{Max}}$ feasible
    but $\Rightarrow$ accelerating $\pi$
  • $U^* < U_N$ feasible
    but $\Rightarrow$ accelerating $\pi$

• Disinflation costly in SR
  since $U > U_N$, $s$ below Laffer Curve
  until $\pi^e \downarrow$ to $\pi$

• High $\pi$ costly in terms of high future $\pi^e$
• Low $\pi$ a good investment in low future $\pi^e$
Implications of Equilibrium ("Rational") Expectations:

- \( P \rightarrow P^* \) immediately,
  since public knows \( M, m^D \), has taken Econ 520
  \( \Rightarrow P \) tracks \( M/m^D \) with no lag

- Policy can’t fool public, not even in SR
  - \( s^* > s_{\text{Max}} \), \( U^* < U_N \) **not** feasible
  \( \Rightarrow P \rightarrow \infty \) immediately
    - i.e. \( 1/P \rightarrow 0 \), \( M \) worthless, since
      public knows policy inconsistent

- Disinflation costless
  since \( \pi^e \downarrow \) immediately, so no recession

- High \( \pi \) costless in terms of high future \( \pi^e \)
  since \( \pi^e \) doesn’t depend on past \( \pi \)

- Low \( \pi \) has no payoff in terms of low future \( \pi^e \)
  for same reason
Equilibrium ("Rational") Expectations, cont’d.

- Economic orthodoxy, 1970s-90s
  - Lucas, Sargent, Wallace, Prescott
  - Useful exercise to study internal consistency of policies
  - But unrealistic as model of actual expectations, IMHO*
- “Rational” a misnomer
  - “Equilibrium Expectations” more accurate, IMHO

1990s, 2000s –

Movement away from “RE”:
  “Bounded Rationality”
  -- Sargent
  “Adaptive Learning”
  -- Evans and Honkapohja
  “Adaptive Least Squares” estimation procedure
  -- McCulloch

* In My Humble Opinion