Chapter 13

Stabilization Policy and the AS/AD Framework

Outline of Chapter 13 lectures

13.1. Monetary policy rules
13.2. AD curve
13.3. AS curve
13.4. Using AS-AD
13.5. Empirical evidence
13.6. Rules versus discretion
13.7. Rational expectations and inflation targeting

13.1. Monetary policy rules

- The short-run model consisted of 3 basic equations

\[
\text{IS curve: } \quad \bar{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r}),
\]

\[
\text{MP curve: } \quad \text{The central bank chooses } R_t,
\]

\[
\text{Phillips curve: } \quad \Delta \pi_t = \bar{\beta}\bar{Y}_t + \bar{u}.
\]

- Assumption: the central bank has a long-run target for the inflation rate it would like to see, denoted \( \bar{r} \).
- When the central bank follows a policy like the one we will look at, \( \bar{r} \) would be the long-run inflation rate

• But no modern central bank sets the real rate to some arbitrary value for no good reason
• Instead, they follow deliberate policies to achieve some objective
• Goal in this section: see how the economy behaves when the central bank is acting in a systematic way
Suppose that when actual inflation is higher than the Fed wants, (that is, when $\pi_t > \bar{\pi}$) the Fed raises the real interest rate above the long-run value (that is, it sets $R_t > \bar{r}$) in order to bring inflation down.

- When $\pi_t < \bar{\pi}$. Fed sets $R_t < \bar{r}$ which will bring inflation up.

- The Fed of course is not literally pursuing such a simple rule.
- But we will see that it is not a bad approximation empirically to what the Fed actually does
- Gives us a very simple model to study the effects of monetary policy.

The simple monetary policy rule is:

$$R_t - \bar{r} = \bar{m}(\pi_t - \bar{\pi})$$

- The Fed, ECB, Bank of Japan, and Bank of England today all have explicit inflation targets of 2% ($\bar{\pi} = 2\%$).
- A value of $\bar{m} = 0.5$ gives a good approximation to what the Fed usually does.
- If inflation is 2% higher than the Fed wants, it would aim for a real interest rate 1% above the long-run equilibrium $\bar{r}$.

13.2. Aggregate demand curve

- The short-run model consisted of 3 basic equations
- What we’ll do now is substitute the monetary policy rule in for the MP curve

<table>
<thead>
<tr>
<th>IS curve</th>
<th>$\tilde{Y}_t = \tilde{a} - \tilde{b}(R_t - \bar{r})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP curve</td>
<td>The central bank chooses $R_t$, $\Delta\pi_t = \bar{\nu}\tilde{Y}_t + \bar{a}$.</td>
</tr>
</tbody>
</table>

IS curve: $\tilde{Y}_t = \tilde{a} - \tilde{b}(R_t - \bar{r})$
MP rule: $R_t - \bar{r} = \bar{m}(\pi_t - \bar{\pi})$
PC: $\Delta\pi_t = \bar{\nu}\tilde{Y}_t + \bar{a}$

Substituting MP rule into IS curve: $\tilde{Y}_t = \tilde{a} - \tilde{b}\bar{m}(\pi_t - \bar{\pi})$
We will call this the aggregate demand curve.
IS curve: \( \tilde{Y}_t = \tilde{a} - \tilde{b}(R_t - \tilde{r}) \)
MP rule: \( R_t = \tilde{m}(\pi_t - \tilde{\pi}) \)
PC: \( \Delta \pi_t = \tilde{v}Y_t + \tilde{\alpha} \)
Substituting MP rule into IS curve:
\( \tilde{Y}_t = \tilde{a} - \tilde{b}\tilde{m}(\pi_t - \tilde{\pi}) \)
We will call this the aggregate demand curve.

\[ Y_t = \tilde{a} - \tilde{b}m(\pi_t - \tilde{\pi}) \]
Note the AD curve passes through \( Y_t = \tilde{a}, \pi_t = \tilde{\pi} \).

\[ Y_t = \tilde{a} - \tilde{b}m(\pi_t - \tilde{\pi}) \]
If economy is in long-run equilibrium, AD passes through \( Y_t = 0, \pi_t = \tilde{\pi} \).
Inflation π

Short run
Output Y

AD shifts to the right if \( \ddot{a} \) increases.

\[
\ddot{a} = \ddot{a}_c + \ddot{a}_i + \ddot{a}_g + \ddot{a}_{ex} - \ddot{a}_{im} - 1
\]

- Positive shock to consumption, investment, government spending, or exports shift AD to right.
- Negative shock to imports shifts AD to the right.

An increase in Fed’s inflation target also shifts AD to the right

Movement along AD curve:
When Fed sees \( \pi_t > \bar{\pi} \), it sets \( R_t > \bar{r} \) which results in \( \bar{Y}_t < \ddot{a} \).
When Fed sees \( \pi_t < \bar{\pi} \), it sets \( R_t < \bar{r} \) which results in \( \bar{Y}_t > \ddot{a} \).

13.3. Aggregate supply curve

- The short-run model with monetary policy rule consisted of 3 basic equations
- The first two equations gave us the AD curve
- The third equation (PC) will give us AS

IS curve: \( \bar{Y}_t = \ddot{a} - \ddot{b}(\pi_t - \bar{\pi}) \)
MP rule: \( R_t - \bar{r} = \ddot{m}(\pi_t - \bar{\pi}) \)
PC: \( \Delta\pi_t = \ddot{\nu}\bar{Y}_t + \ddot{\delta} \)
PC: \( \Delta \pi_t = \bar{\nu} \tilde{Y}_t + \bar{\delta} \)

Rewrite as

\[
\pi_t - \pi_{t-1} = \bar{\nu} \tilde{Y}_t + \bar{\delta} \\
\pi_t = \pi_{t-1} + \bar{\delta} + \bar{\nu} \tilde{Y}_t
\]

Upward-sloping relation between \( \pi_t \) and \( \tilde{Y}_t \).

Passes through \( \tilde{Y}_t = 0, \pi_t = \pi_{t-1} + \bar{\delta} \).

• The AS curve is just a way of drawing the Phillips Curve when we have inflation instead of the change in inflation on the vertical axis

If the inflation rate is increasing over time, the AS curve is shifting up over time.

\( t = 1 \): passes through \( \tilde{Y}_t = 0, \pi_t = \pi_{t-1} \)

\( t = 2 \): passes through \( \tilde{Y}_t = 0, \pi_t = \pi_{t-1} \)

If inflation was higher in period 1 than in period 0 (if \( \pi_1 > \pi_0 \)) then AS curve for period 2 will be shifted up from AS curve for period 1.
Movement along AS curve:
When $\tilde{Y}_t > 0$, firms increase prices faster than $\pi_t\prime$.
Under adaptive expectations $\pi_t\prime = \pi_{t-1}$.
Thus $\pi_t$ will be higher than $\pi_{t-1}$ when $\tilde{Y}_t > 0$.

13.4. Using AS-AD

AD:
$\tilde{Y}_t = \tilde{a} - \tilde{b}n(\pi_t - \tilde{r})$
slopes down
passes through $\tilde{Y}_t = \tilde{a}, \pi_t = \tilde{r}$

AS:
$\pi_t = \pi_{t-1} + \tilde{\sigma} + \tilde{\nu}\tilde{Y}_t$
slopes up
passes through $\tilde{Y}_t = 0, \pi_t = \pi_{t-1} + \tilde{\sigma}$

AD passes through $\tilde{Y}_t = \tilde{a}, \pi_t = \tilde{r}$
AS passes through $\tilde{Y}_t = 0, \pi_t = \pi_{t-1} + \tilde{\sigma}$

Long-run equilibrium:
$\tilde{a} = 0$
$\tilde{\sigma} = 0$
$\tilde{Y}_t = 0$
$\pi_t = \pi_{t-1} = \tilde{r}$

Conclusion: in a long-run equilibrium, AS and AD intersect at $\tilde{Y}_t = 0, \pi_t = \tilde{r}$.

Example 1: An inflation shock

Suppose the price of oil increases in period 1 and stays at new level forever.
$\tilde{a} > 0$ in period 1
$\tilde{\sigma} = 0$ in periods 2, 3,... (no new shock to the inflation rate = change in prices)
• Inflation is higher in period 1 because of higher cost of oil (AS shifts up)
• Fed responds to higher inflation than desired by raising interest rate putting output below potential (move along AD)
• Economy goes from initial point A to point B at the end of period 1 (higher inflation, lower output)

But even though there is no new shock to inflation in period 2 ($\bar{\sigma} = 0$ in period 2), AS in period 2 does not go back to original AS.
Reason: for original AS, $\pi_{1-1} = \bar{\pi}$.
For period 2 AS, $\pi_{1-1} = \pi_1 > \bar{\pi}$.

• What happened?
• Because inflation was higher in period 1, people expect inflation to be higher in period 2 as well and increased prices in anticipation that others would as well.
• This causes inflation to remain above the Fed’s target, and the Fed still has to keep output below potential to bring inflation down.
Summary of process:
- Economy moved from A to B (higher inflation, lower output) in period 2.
- This led to higher inflation expectations which gradually came down as the Fed continued to fight against the inflation.
- Eventually the economy will return to A if the Fed stays with its objective and there is no new shock.

Example 2: Disinflation

Suppose we start out in a long-run equilibrium in which the Fed’s target inflation is \( \pi^* = 4\% \).

In period 1 the Fed decides to move to a permanently lower target for inflation of \( \pi' = 2\% \).

Results:
- Inflation is lower (but does not fall all the way to 2\%, the Fed’s new target).
- Output falls below potential.
- Reason: people still expected 4\% inflation, and are only forced to keep price increases below 4\% if output falls below potential.
- Economy moves from A to B in period 1.
In period 2 AS will shift down because inflation expectations are now at $\pi_1$ (= 3% say). But this is still above the new target $\bar{\pi} = 2\%$ so Fed will have to keep output below potential as long as inflation stays above 2%.