LECTURE 11
Extending the IS/MP/IA Framework

February 26, 2013
Announcement

• Problem Set 2 is being distributed. It is due a week from today.
I. INTRODUCTION
II. The IS-MP-IA Model Extended
Key Assumptions:  1

The nominal interest rate cannot be negative

• The central bank would like to set \( r = r(Y, \pi) \).

• Since the real interest rate, \( r \), equals \( i - \pi^e \), this means that \( r \) cannot be less than \( 0 - \pi^e \).

• Thus:

\[
    r = \begin{cases} 
        r(Y, \pi) & \text{if } r(Y, \pi) + \pi^e \geq 0 \\
        0 - \pi^e & \text{otherwise} 
    \end{cases}
\]
Key Assumptions: 2

• Expected inflation is an increasing function of actual inflation.

• That is, $\pi^e = \pi^e(\pi)$, where $\pi^e(\pi)$ is an increasing function.
One Comment Before We Proceed

- We will continue to use the usual IS-MP-IA model (that is, the model without the zero lower bound) in cases where it is appropriate.
Where We Are Headed: The Aggregate Demand Curve Accounting for the Zero Lower Bound
Accounting for the Zero Lower Bound: Step 1

The IS and MP Curves

\[ r(Y, \pi) \]

\[ 0 - \pi^e(\pi) \]
The IS and MP Curves
Accounting for the Zero Lower Bound: Step 2

\[ 0 - \pi^e(\pi) \]

\[ r \]

\[ Y \]
Deriving the AD Curve

\[ Y \leq 0 - \pi^e(\pi_0) \]

\[ Y \leq 0 - \pi^e(\pi_1) \]

\[ Y \leq 0 - \pi^e(\pi_2) \]

\[ \pi_0 > \pi_1 > \pi_2 \]
Deriving the AD Curve (continued)

\[ r \]

\begin{align*}
0 - \pi^e(\pi_3) \\
0 - \pi^e(\pi_2)
\end{align*}

\[ r \]

\[ \text{MP}(\pi_2) \]

\[ \text{IS}_0 \]

\[ \pi \]

\[ \pi_2 \]

\[ \pi_3 \]

\[ Y_3 \]

\[ Y_2 \]

\[ Y \]

\[ \pi_2 > \pi_3 \]
Deriving the Aggregate Demand Curve:
Conclusion
A Little Bit about the Case of Money Targeting

• Continue to assume that expected inflation is lower when actual inflation is lower.
• Suppose the central bank is targeting the money stock, and suppose that at some inflation rate, $\pi_0$, the nominal interest rate is zero. Thus the real interest rate is $0 - \pi^e(\pi_0)$.
• Now consider lower inflation, $\pi_1$ (so $\pi_0 > \pi_1$).
• The lowest possible real interest rate is $0 - \pi^e(\pi_1)$, which is higher than the real interest rate at $\pi_0$, $0 - \pi^e(\pi_0)$. Thus, $r$ must be higher.
• That is, we still have the key result that when the economy is at the zero lower bound, lower inflation raises $r$. 
III. EXAMPLES
Example: A Large, Long-Lasting Fall in Planned Expenditure

\[ MP(\pi_0) \]

\[ IS_0 \]

\[ IS_1 \]

\[ 0 - \pi^e(\pi_0) \]

\[ \pi_0, \pi_1 \]

\[ AD_0, AD_1 \]

\[ IA_0, IA_1 \]

\[ Y_1, Y_0 (= \bar{Y}) \]

\[ Y_1, Y_0 (= \bar{Y}) \]
A Large, Long-Lasting Fall in Planned Expenditure (cont.)

0 - $\pi^e(\pi_2)$

0 - $\pi^e(\pi_1)$
The Effects of a Large Rebound in Planned Expenditure.
How Seriously Should We Take This?

The main message: When the economy is at the zero lower bound, a key force keeping the economy stable is inoperative.
Example 2: Anchored Expectations

Inflation has fallen less in the current severe recession than in previous recessions.
A Model of Anchored Expectations

Two influences on inflation:

• As usual, below-normal output acts to make firms raise price and wages by less than before. This works to push inflation down.

• Firms’ expectations of inflation act to move inflation toward $\pi^*$. When actual inflation is below $\pi^*$, this works to push inflation up.
Revisiting a Large, Long-Lasting Fall in Planned Expenditure

\[ r \]

\[ 0 - \pi^e(\pi^*) \]

\[ Y_1 Y_0 (= \bar{Y}) \]

\[ \text{MP}(\pi^*) \]

\[ \text{IS}_0 \]

\[ \text{IS}_1 \]

\[ \text{AD}_0 \]

\[ \text{AD}_1 \]

\[ \pi^* \]

\[ \pi \]

\[ Y_1 Y_0 (= \bar{Y}) \]

\[ \text{IA}_0, \text{IA}_1 \]
A Large, Long-Lasting Fall in Planned Expenditure (cont.)

\[ r \]

\[ MP(\pi^*) \]

\[ MP(\pi_{LR}) \]

\[ 0 - \pi^e(\pi_{LR}) \]

\[ 0 - \pi^e(\pi^*) \]

\[ IS_1 \]

\[ Y \]

\[ \pi \]

\[ \pi^* \]

\[ \pi_{LR} \]

\[ AD_1 \]

\[ IA_1 \]

\[ IA_{LR} \]

\[ Y_{LR} \]

\[ Y_1 \]

\[ \bar{Y} \]
A Large, Long-Lasting Fall in Planned Expenditure (concluded)

With anchored expectations, inflation can stabilize at a level below $\pi^*$ where the upward pull from $\pi^*$ and the downward pull from $Y - Y < 0$ balance.
IV. POLICIES TO DEAL WITH THE ZERO LOWER BOUND: OVERVIEW
Shifting the IS Curve to Escape from a Liquidity Trap

\[ 0 - \pi^e_0(\pi_0) \]

\[ IS_0 \rightarrow MP_0(\pi_0) \rightarrow IS_1 \]

\[ AD_0 \rightarrow AD_1 \]

\[ AD_0 \rightarrow IA_0 \]

\[ Y_0 \rightarrow Y \rightarrow Y_1 \]
Things that Might Shift the IS Curve at the Zero Lower Bound

- Fiscal policy
- Affecting expectations of future output
- Affecting long-term real interest rates (at a given policy interest rate)
- Exchange rate policies
- ...
Shifting the MP Curve to Escape from a Liquidity Trap

\[
0 - \pi^e_0(\pi_0) \quad \text{MP}_0(\pi_0)
\]

\[
0 - \pi^e_1(\pi_0) \quad \text{MP}_1(\pi_0)
\]