LECTURE 5
Review of IS–LM/MP Framework

February 5, 2013
Announcement

- On the Andersen & Jordan reading for next time, it’s fine to not read the paper super-closely.
I. The IS–LM/MP Model
The IS–LM/MP Model: Where We Are Headed

\[ Y \text{ is output; } r \text{ is the real interest rate } (\equiv i - \pi^e) \]
What Have You Seen in Previous Courses?

• IS plus an interest rate rule for monetary policy (IS–MP)?

• IS plus a curve describing equilibrium in the money market under the assumption that the central bank is targeting the money supply (IS–LM)?

• Both?

• Neither or don’t know?
A Key Assumption

• The starting point of the IS–LM/MP model: prices and wages are not completely flexible.
• In today’s lecture, a stronger assumption: the price level and expected inflation are exogenous.
• A general comment about models and assumptions:
  – The purpose of a model is not to be “realistic.”
  – It is to provide insights about particular features of the world.
The Equations of the IS Curve #1: Planned Expenditure and Output

\[ E = Y \]

E is planned expenditure, Y is output.
The Equations of the IS Curve #2: Modeling Planned Expenditure

\[ E = C(Y - T) + I(r) + G \]

- \( T \) is taxes (net of transfers)
- \( G \) is government purchases
- \( C(Y - T) \) is a function giving consumption as a function of disposable income.
- \( I(r) \) is a function giving desired investment as a function of the real interest rate.
Assumptions about Planned Expenditure

\[ E = C(Y - T) + I(r) + G \]

- \( T \) is exogenous: \( T = \overline{T} \).
- \( G \) is exogenous: \( G = \overline{G} \).
- \( C(Y - T) \): When \( Y - T \) rises, consumption rises, but by less than the increase in \( Y - T \).
- \( I(r) \): When \( r \) rises, desired investment falls.
The Keynesian Cross

\[ E = Y \]

\[ E = C(Y - T) + I(r) + G \]
The Effects of a Rise in the Interest Rate in the Keynesian Cross

\[ Y = E = C(Y - T) + I(r_0) + G \]

\[ E = C(Y - T) + I(r_1) + G \]

\( r_1 > r_0 \)

Diagram showing the effect of a rise in the interest rate on equilibrium income and output.
The IS Curve
One Approach to the Other Curve: An Interest Rate Rule and the MP Curve
An Interest Rate Rule

• When $Y$ rises, the central bank raises $r$.
• When $\pi$ rises, the central bank raises $r$.

So:

$$r = r(Y, \pi)$$

The real interest rate the central bank targets is an increasing function of both $Y$ and $\pi$. 
The MP Curve and the IS–MP Diagram

Graph showing the IS and MP curves intersecting.
But How is the Central Bank Able to Control the Real Interest Rate?

By adjusting the money supply

- Unless all prices are completely and instantaneously flexible, an increase in the money supply lowers the real interest rate, and a decrease in the money supply raises the real interest rate.

- The central bank can change the money supply.

- Therefore, the central bank, by changing the money supply, can raise \( r \) when \( Y \) rises or \( \pi \) rises, and can lower \( r \) when \( Y \) falls or \( \pi \) falls.
The Other Approach to the Other Curve: The Money Market and the LM Curve
The Concept of Money We Will Focus On

High-powered money

- Controlled directly by the central bank.
- Pays no nominal interest (usually), so the opportunity cost of holding it is the nominal interest rate.
The Supply and Demand for Money

- Money supply: \( M = \bar{M} \)

- Demand for “real” money balances \((M/P)\): \( L(i,Y) \)

Money demand is an increasing function of output \((Y)\), and a decreasing function of the nominal interest rate \((i)\).
The Interest Rate for a Given Level of Output: The Money Market

\[ \overline{M}/P = L(i,Y) \]
The Effects of a Rise in Output in the Money Market Diagram

Recall: $i = r + \pi^e$

$L(i,Y_0)$

$L(i,Y_1)$  
$(Y_1 > Y_0)$
The LM Curve and the IS–LM Diagram
MP or LM?

• Where the two models differ is in what they assume about how monetary policy is conducted.

• Thus, in deciding whether to use MP or LM, the key consideration is how monetary policy is conducted in the situation you are looking at.
MP or LM? Examples

• The effects of any development in the United States in the 1990s. MP
• The central bank is targeting the money supply, and decides to raise its target. LM
• The Island of Yap. LM
II. EXAMPLES
Example: A Fall in Investment Demand

The development we want to analyze: In 2000 and 2001, firms realized that high-tech investment goods, such as fiber-optic cable, were not going to have as large payoffs as they had thought.

Corresponds to a shift of the $I(r)$ function: $I$ at a given $r$ is lower.
MP or LM?

MP
The Effects of a Fall in Investment Demand in the Keynesian Cross

The graph illustrates the effects of a fall in investment demand in the Keynesian Cross. Initially, with investment demand at its old level, the equilibrium is at point $E_0$. When investment demand falls, the new equilibrium is at point $E'$. The equations representing the new and old levels of investment demand are:

Old Investment Demand:

$$E = C(Y - T) + I^{OLD}(r) + G$$

New Investment Demand:

$$E = C(Y - T) + I^{NEW}(r) + G$$

Where $E$ is the equilibrium level of income, $Y$ is the income, $T$ is the tax, $C$ is consumption, $I^{OLD}$ is old investment, $I^{NEW}$ is new investment, and $G$ is government expenditure.
The Effects of a Fall in Investment Demand in the IS-MP Diagram

The diagram illustrates the impact of a fall in investment demand on the IS-MP model. The IS curve shifts from IS$_0$ to IS$_1$, reflecting a decrease in investment demand. The new equilibrium is at point $Y_1$, with a higher interest rate $r_1$ compared to the initial equilibrium at $Y_0$, where the interest rate was $r_0$. This shift indicates a decrease in aggregate demand, leading to a lower level of output and a higher interest rate to maintain equilibrium in the goods market.
The Effects of a Fall in Investment Demand in the IS-LM Diagram

- LM₀
- IS₀
- IS₁
- Y₀
- Y₁
- r₀
- r₁
Example: Financial Innovation

The development we want to analyze:
New technologies allow people to make many purchases using debit cards that they used to have to make using cash.

Corresponds to a shift of the $L(i,Y)$ function: money demand at a given $i$ and $Y$ is lower.
If the Central Bank Keeps the Money Supply Fixed

Step 1: The Effect on the Money Market at a Given $Y$?
If the Central Bank Keeps the Money Supply Fixed

Step 2: The Effect on the IS and/or LM Curves?
If the Central Bank Is Following an Interest Rate Rule

The Effect on the IS and/or MP Curves?

Neither curve changes.
Interest rates were very volatile in the period when the Fed was – to some extent – targeting the money supply.