In this chapter, we learn

• how to use the *IS-LM* model to analyze the effects of shocks, fiscal policy, and monetary policy

• how to derive the aggregate demand curve from the *IS-LM* model
Equilibrium in the *IS-LM* model

The *IS* curve represents equilibrium in the goods market.

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

The *LM* curve represents money market equilibrium.

\[ \frac{M}{P} = L(r, Y) \]

The intersection determines the unique combination of *Y* and *r* that satisfies equilibrium in both markets.
Shocks in the IS-LM model

**IS shocks**: exogenous changes in the demand for goods & services.

Examples:
- Increase in government spending or tax cut
- stock market boom or crash
  \[ \Rightarrow \text{change in households’ wealth} \]
  \[ \Rightarrow \Delta C \]
- change in business or consumer confidence or expectations
  \[ \Rightarrow \Delta I \text{ and/or } \Delta C \]
Shocks in the *IS-LM* model

**LM shocks**: exogenous changes in the supply of or demand for money.

Examples:

- Changes in money supply
- a wave of credit card fraud increases demand for money.
- more ATMs or the Internet reduce money demand.
An increase in government purchases

1. IS curve shifts right by \( \frac{1}{1-\text{MPC}} \Delta G \), causing output & income to rise.

2. This raises money demand, causing the interest rate to rise...

3. ...which reduces investment, so the final increase in \( Y \) is smaller than \( \frac{1}{1-\text{MPC}} \Delta G \).
A tax cut

Consumers save $(1 - MPC)$ of the tax cut, so the initial boost in spending is smaller for $\Delta T$ than for an equal $\Delta G$… and the $IS$ curve shifts by

1. $\frac{-MPC}{1 - MPC} \Delta T$

2. …so the effects on $r$ and $Y$ are smaller for $\Delta T$ than for an equal $\Delta G$. 
Monetary policy: An increase in $M$

1. $\Delta M > 0$ shifts the $LM$ curve down (or to the right)

2. ...causing the interest rate to fall

3. ...which increases investment, causing output & income to rise.
Interaction between monetary & fiscal policy

• Model:
  Monetary & fiscal policy variables \( (M, G, \text{ and } T) \) are exogenous.

• Real world:
  Monetary policymakers may adjust \( M \) in response to changes in fiscal policy, or vice versa.

• Such interaction may alter the impact of the original policy change.
The Fed’s response to $\Delta G > 0$

- Suppose Congress increases $G$.
- Possible Fed responses:
  1. hold $M$ constant
  2. hold $r$ constant
  3. hold $Y$ constant
- In each case, the effects of the $\Delta G$ are different…
The Slopes of the IS and LM Curves

- Determining factors for the slope of the IS curve:
  - The elasticity of investment with regard to $r$
  - The slope of the planned expenditure line

- Determining factors for the slope of the LM curve:
  - The elasticity of money demand with regard to $r$
  - The elasticity of money demand with regard to $Y$
  - The slope of money supply curve

- Examples of extreme cases
CASE STUDY:
The U.S. recession of 2001

• During 2001,
  – 2.1 million jobs lost,
    unemployment rose from 3.9% to 5.8%.
  – GDP growth slowed to 0.8%
    (compared to 3.9% average annual growth during
CASE STUDY:
The U.S. recession of 2001

Causes: 1) Stock market decline ⇒ ↓\text{C}

![Graph showing Standard & Poor’s 500 Index from 1995 to 2003]
CASE STUDY:
The U.S. recession of 2001

Causes: 2) 9/11
   – increased uncertainty
   – fall in consumer & business confidence
   – result: lower spending, IS curve shifted left

Causes: 3) Corporate accounting scandals
   – Enron, WorldCom, etc.
   – reduced stock prices, discouraged investment
CASE STUDY:
The U.S. recession of 2001

• Fiscal policy response: shifted IS curve right
  – tax cuts in 2001 and 2003
  – spending increases
    • airline industry bailout
    • NYC reconstruction
    • Afghanistan war
CASE STUDY:

The U.S. recession of 2001

- Monetary policy response: shifted $LM$ curve right
**IS-LM and aggregate demand**

- So far, we’ve been using the *IS-LM* model to analyze the short run, when the price level is assumed fixed.

- However, a change in $P$ would shift $LM$ and therefore affect $Y$.

- The **aggregate demand curve** (*introduced in Chap. 9*) captures this relationship between $P$ and $Y$. 
Deriving the $AD$ curve

Intuition for slope of $AD$ curve:

$\uparrow P \Rightarrow \downarrow (M/P)$

$\Rightarrow LM$ shifts left

$\Rightarrow \uparrow r$

$\Rightarrow \downarrow I$

$\Rightarrow \downarrow Y$
Monetary policy and the $AD$ curve

The Fed can increase aggregate demand:

$\uparrow M \Rightarrow LM$ shifts right

$\Rightarrow \downarrow r$

$\Rightarrow \uparrow I$

$\Rightarrow \uparrow Y$ at each value of $P$
Fiscal policy and the $AD$ curve

Expansionary fiscal policy ($\uparrow G$ and/or $\downarrow T$) increases agg. demand:

$\downarrow T \Rightarrow \uparrow C$

$\Rightarrow IS$ shifts right

$\Rightarrow \uparrow Y$ at each value of $P$
Recall from Chapter 9: The force that moves the economy from the short run to the long run is the gradual adjustment of prices.

<table>
<thead>
<tr>
<th>In the short-run equilibrium, if</th>
<th>then over time, the price level will</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Y &gt; \bar{Y}$</td>
<td>rise</td>
</tr>
<tr>
<td>$Y &lt; \bar{Y}$</td>
<td>fall</td>
</tr>
<tr>
<td>$Y = \bar{Y}$</td>
<td>remain constant</td>
</tr>
</tbody>
</table>
The SR and LR effects of an IS shock

A negative IS shock shifts IS and AD left, causing Y to fall.
The SR and LR effects of an IS shock

In the new short-run equilibrium, $Y < \bar{Y}$
The SR and LR effects of an IS shock

In the new short-run equilibrium, $Y < \bar{Y}$

Over time, $P$ gradually falls, causing
- $SRAS$ to move down
- $M/P$ to increase, which causes $LM$ to move down
The SR and LR effects of an IS shock

Over time, $P$ gradually falls, causing

- $SRAS$ to move down
- $M/P$ to increase, which causes $LM$ to move down
The SR and LR effects of an IS shock

This process continues until economy reaches a long-run equilibrium with

\[ Y = \bar{Y} \]
NOW YOU TRY:

Analyze SR & LR effects of $\Delta M$

a. Draw the IS-LM and AD-AS diagrams as shown here.

b. Suppose Fed increases $M$. Show the short-run effects on your graphs.

c. Show what happens in the transition from the short run to the long run.

d. How do the new long-run equilibrium values of the endogenous variables compare to their initial values?