CHAPTER 11

Aggregate Demand II: Applying the *IS-LM* Model

MACROECONOMICS SIXTH EDITION

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PowerPoint® Slides by Ron Cronovich

Context

- Chapter 9 introduced the model of aggregate demand and supply.
- Chapter 10 developed the *IS-LM* model, the basis of the aggregate demand curve.

In this chapter, you will 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
- several theories about what caused the Great Depression

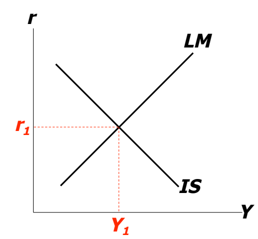
Equilibrium in the *IS-LM* model

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

$$Y = C(Y - \overline{T}) + I(r) + \overline{G}$$

The *LM* curve represents money market equilibrium.

$$\overline{M}/\overline{P} = L(r, Y)$$



The intersection determines the unique combination of ***Y*** and ***r*** that satisfies equilibrium in both markets.

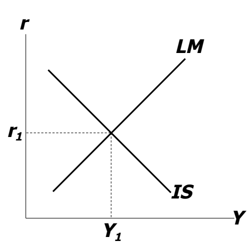
Policy analysis with the *IS-LM* model

$$Y = C(Y - \overline{T}) + I(r) + \overline{G}$$

$$\overline{M}/\overline{P} = L(r, Y)$$

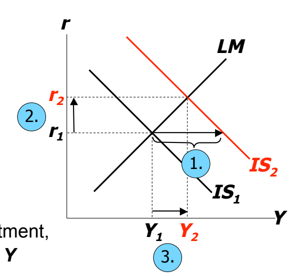
We can use the *IS-LM* model to analyze the effects of

- fiscal policy: ***G*** and/or ***T***
- monetary policy: ***M***



An increase in government purchases

1. *IS* curve shifts right by $\frac{1}{1-\text{MPC}}\Delta \boldsymbol{G}$ 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 $\frac{1}{1-\text{MPC}}\Delta \boldsymbol{G}$



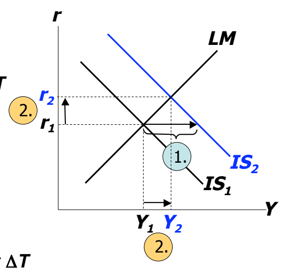
A tax cut

Consumers save (1–*MPC*) of the tax cut, so the initial boost in spending is smaller for ΔT than for an equal ΔG…

and the *IS* curve shifts by

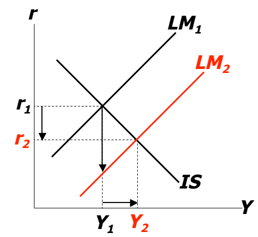
1. $\dfrac{-MPC}{1-MPC}\Delta T$

2. …so the effects on r and Y are smaller for ΔT than for an equal ΔG.



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, 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 ΔG are different:

Response 1: Hold *M* constant

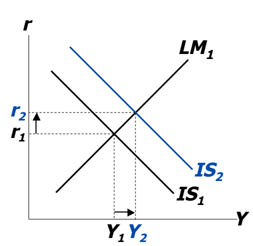
If Congress raises G, the *IS* curve shifts right.

If Fed holds M constant, then *LM* curve doesn't shift.

Results:

$$\Delta Y = Y_2 - Y_1$$

$$\Delta r = r_2 - r_1$$



Response 2: Hold *r* constant

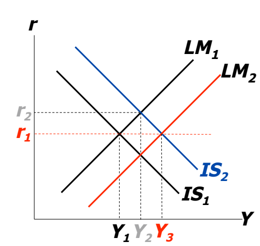
If Congress raises G, the *IS* curve shifts right.

To keep r constant, Fed increases M to shift *LM* curve right.

Results:

$$\Delta Y = Y_3 - Y_1$$

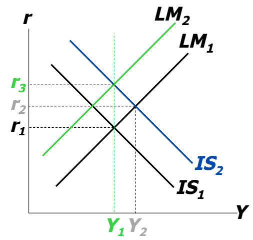
$$\Delta r = 0$$



Response 3: Hold *Y* constant

If Congress raises ***G***, the *IS* curve shifts right.

To keep ***Y*** constant, Fed reduces ***M*** to shift *LM* curve left.



Results:

$$\Delta Y = 0$$

$$\Delta r = r_3 - r_1$$

Estimates of fiscal policy multipliers

from the DRI macroeconometric model

Assumption about monetary policy	Estimated value of $\Delta Y/\Delta G$	Estimated value of $\Delta Y/\Delta T$
Fed holds money supply constant	0.60	–0.26
Fed holds nominal interest rate constant	1.93	–1.19

Shocks in the *IS-LM* model

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

Examples:

- stock market boom or crash
  $\Rightarrow$ change in households' wealth
  $\Rightarrow \Delta C$
- change in business or consumer confidence or expectations
  $\Rightarrow \Delta I$ and/or ΔC

Shocks in the *IS-LM* model

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

Examples:

- a wave of credit card fraud increases demand for money.
- more ATMs or the Internet reduce money demand.

EXERCISE: *Analyze shocks with the IS-LM model*

Use the *IS-LM* model to analyze the effects of

1. a boom in the stock market that makes consumers wealthier.
2. after a wave of credit card fraud, consumers using cash more frequently in transactions.

For each shock,

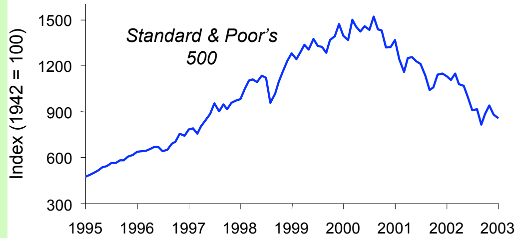
a. use the *IS-LM* diagram to show the effects of the shock on ***Y*** and ***r***.
b. determine what happens to ***C***, ***I***, and the unemployment rate.

CASE STUDY: The U.S. recession of 2001

- During 2001,
  - 2.1 million people lost their jobs, as unemployment rose from 3.9% to 5.8%.
  - GDP growth slowed to 0.8% (compared to 3.9% average annual growth during 1994-2000).

CASE STUDY: The U.S. recession of 2001

- Causes: 1) Stock market decline ⇒ ↓***C***



CASE STUDY: The U.S. recession of 2001

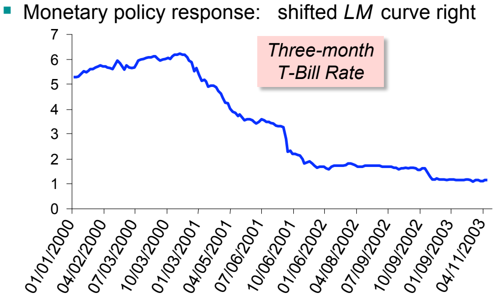
- Causes: 2) 9/11
  - increased uncertainty
  - fall in consumer & business confidence
  - result: lower spending, *IS* curve shifted left
- Causes: 3) Corporate accounting scandals
  - Enron, WorldCom, *etc.*
  - reduced stock prices, discouraged investment

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



What is the Fed's policy instrument?

- The news media commonly report the Fed's policy changes as interest rate changes, as if the Fed has direct control over market interest rates.
- In fact, the Fed **targets** the *federal funds rate* – the interest rate banks charge one another on overnight loans.
- The Fed changes the money supply and shifts the *LM* curve to achieve its target.
- Other short-term rates typically move with the federal funds rate.

What is the Fed's policy instrument?

Why does the Fed target interest rates instead of the money supply?

1) They are easier to measure than the money supply.
2) The Fed might believe that *LM* shocks are more prevalent than *IS* shocks. If so, then targeting the interest rate stabilizes income better than targeting the money supply.

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:

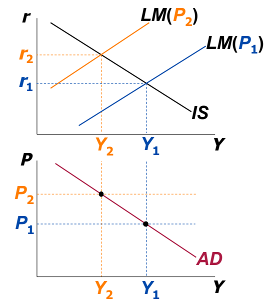
↑***P*** ⇒ ↓(***M/P***)

⇒ *LM* shifts left

⇒ ↑***r***

⇒ ↓***I***

⇒ ↓***Y***



Monetary policy and the *AD* curve

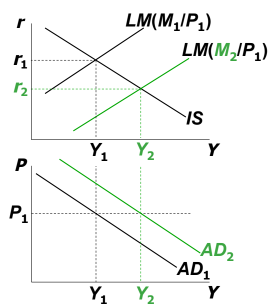
The Fed can increase aggregate demand:

↑***M*** ⇒ *LM* shifts right

⇒ ↓***r***

⇒ ↑***I***

⇒ ↑***Y*** at each value of ***P***



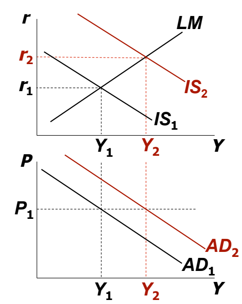
Fiscal policy and the *AD* curve

Expansionary fiscal policy (↑***G*** and/or ↓***T***) increases agg. demand:

↓***T*** ⇒ ↑***C***

⇒ *IS* shifts right

⇒ ↑***Y*** at each value of ***P***



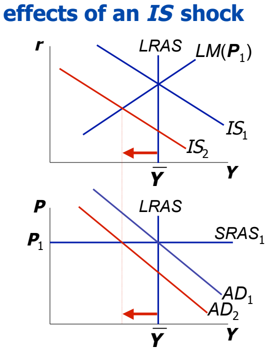
IS-LM and *AD-AS* in the short run & long run

Recall from Chapter 9: The force that moves the economy from the short run to the long run is the gradual adjustment of prices.

In the short-run equilibrium, if	then over time, the price level will
$Y > \bar{Y}$	rise
$Y < \bar{Y}$	fall
$Y = \bar{Y}$	remain constant

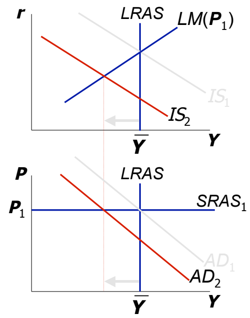
The SR and LR effects of an *IS* shock

A negative *IS* shock shifts *IS* and *AD* left, causing ***Y*** to fall.



The SR and LR effects of an *IS* shock

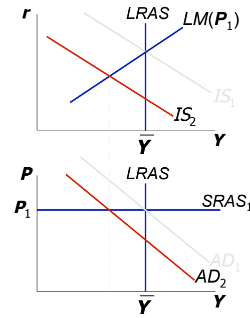
In the new short-run equilibrium, $Y < \bar{Y}$



The SR and LR effects of an *IS* shock

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

Over time, ***P*** gradually falls, which causes
- *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, which causes
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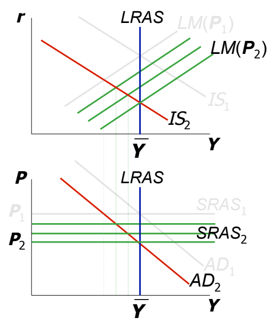
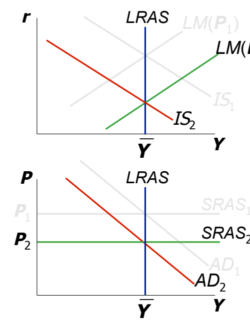


The SR and LR effects of an *IS* shock

This process continues until economy reaches a long-run equilibrium with $Y = \bar{Y}$



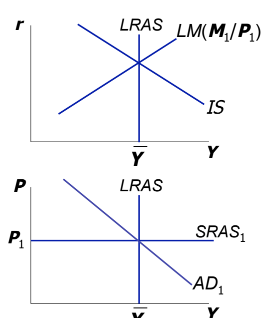
EXERCISE:
Analyze SR & LR effects of ΔM

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

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

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

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



Chapter Summary

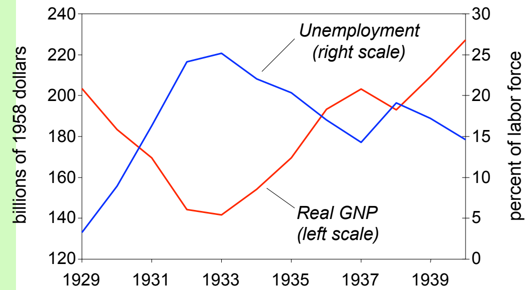
1. *IS-LM* model
   - a theory of aggregate demand
   - exogenous: ***M***, ***G***, ***T***, ***P*** exogenous in short run, ***Y*** in long run
   - endogenous: ***r***, ***Y*** endogenous in short run, ***P*** in long run
   - *IS* curve: goods market equilibrium
   - *LM* curve: money market equilibrium

Chapter Summary

2. *AD* curve

- shows relation between ***P*** and the *IS-LM* model's equilibrium ***Y***.
- negative slope because
  $\uparrow P \Rightarrow \downarrow(M/P) \Rightarrow \uparrow r \Rightarrow \downarrow I \Rightarrow \downarrow Y$
- expansionary fiscal policy shifts *IS* curve right, raises income, and shifts *AD* curve right.
- expansionary monetary policy shifts *LM* curve right, raises income, and shifts *AD* curve right.
- *IS* or *LM* shocks shift the *AD* curve.

The Great Depression



THE SPENDING HYPOTHESIS: Shocks to the *IS* curve

- asserts that the Depression was largely due to an exogenous fall in the demand for goods & services – a leftward shift of the *IS* curve.
- evidence:
  output and interest rates both fell, which is what a leftward *IS* shift would cause.

THE SPENDING HYPOTHESIS: Reasons for the *IS* shift

- Stock market crash ⇒ exogenous ↓***C***
  - Oct-Dec 1929: S&P 500 fell 17%
  - Oct 1929-Dec 1933: S&P 500 fell 71%
- Drop in investment
  - "correction" after overbuilding in the 1920s
  - widespread bank failures made it harder to obtain financing for investment
- Contractionary fiscal policy
  - Politicians raised tax rates and cut spending to combat increasing deficits.

THE MONEY HYPOTHESIS: A shock to the *LM* curve

- asserts that the Depression was largely due to huge fall in the money supply.
- evidence:
  *M*1 fell 25% during 1929-33.
- But, two problems with this hypothesis:
  - ***P*** fell even more, so ***M***/***P*** actually rose slightly during 1929-31.
  - nominal interest rates fell, which is the opposite of what a leftward *LM* shift would cause.

THE MONEY HYPOTHESIS AGAIN: The effects of falling prices

- asserts that the severity of the Depression was due to a huge deflation:
  P fell 25% during 1929-33.
- This deflation was probably caused by the fall in ***M***, so perhaps money played an important role after all.
- In what ways does a deflation affect the economy?

THE MONEY HYPOTHESIS AGAIN: The effects of falling prices

- The stabilizing effects of deflation:
- $\downarrow P \Rightarrow \uparrow(M/P) \Rightarrow LM$ shifts right $\Rightarrow \uparrow Y$
- **Pigou effect**:

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

  $\Rightarrow$ consumers' wealth $\uparrow$

  $\Rightarrow \uparrow C$

  $\Rightarrow$ *IS* shifts right

  $\Rightarrow \uparrow Y$

THE MONEY HYPOTHESIS AGAIN: The effects of falling prices

- The destabilizing effects of expected deflation:

  $\downarrow \pi^e$

  $\Rightarrow r \uparrow$ for each value of i

  $\Rightarrow I \downarrow$ because $I = I(r)$

  $\Rightarrow$ planned expenditure & agg. demand $\downarrow$

  $\Rightarrow$ income & output $\downarrow$

THE MONEY HYPOTHESIS AGAIN: The effects of falling prices

- The destabilizing effects of unexpected deflation: **debt-deflation theory**

$\downarrow P$ (if unexpected)

$\Rightarrow$ transfers purchasing power from borrowers to lenders

$\Rightarrow$ borrowers spend less, lenders spend more

$\Rightarrow$ if borrowers' propensity to spend is larger than lenders', then aggregate spending falls, the *IS* curve shifts left, and Y falls

Why another Depression is unlikely

- Policymakers (or their advisors) now know much more about macroeconomics:
  - The Fed knows better than to let M fall so much, especially during a contraction.
  - Fiscal policymakers know better than to raise taxes or cut spending during a contraction.
- Federal deposit insurance makes widespread bank failures very unlikely.
- Automatic stabilizers make fiscal policy expansionary during an economic downturn.