CHAPTER TEN
Aggregate Demand II

macroeconomics

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macro

Context

- Chapter 8 introduced the model of aggregate demand and supply.

- Chapter 9 developed the IS-LM model, the basis of the aggregate demand curve.

- In Chapter 10, we will use the IS-LM model to
  - see how policies and shocks affect income and the interest rate in the short run when prices are fixed
  - derive the aggregate demand curve
  - explore various explanations for the Great Depression
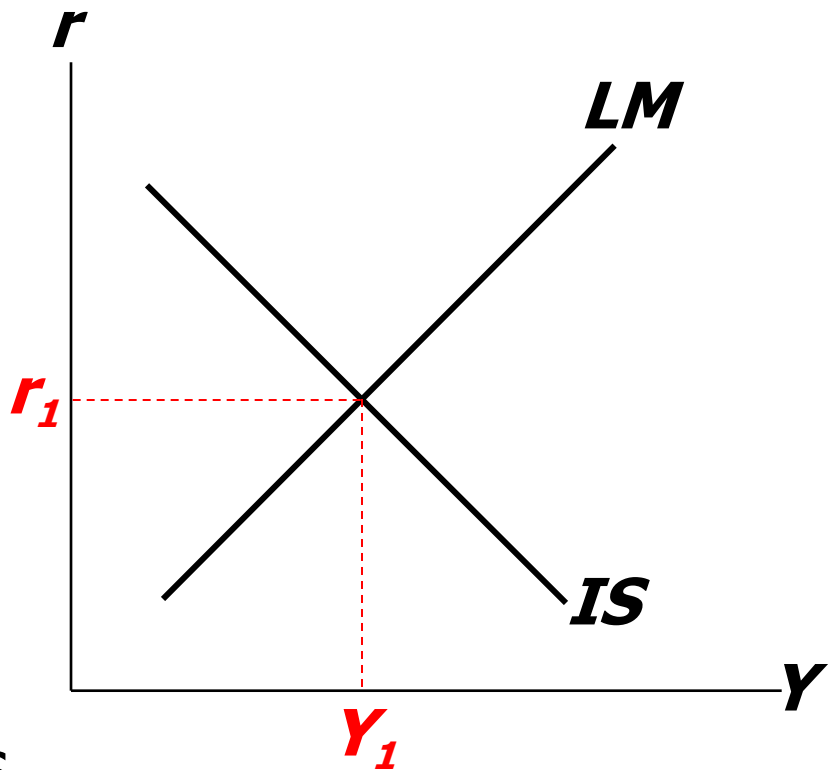
Equilibrium in the *IS-LM* Model

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.
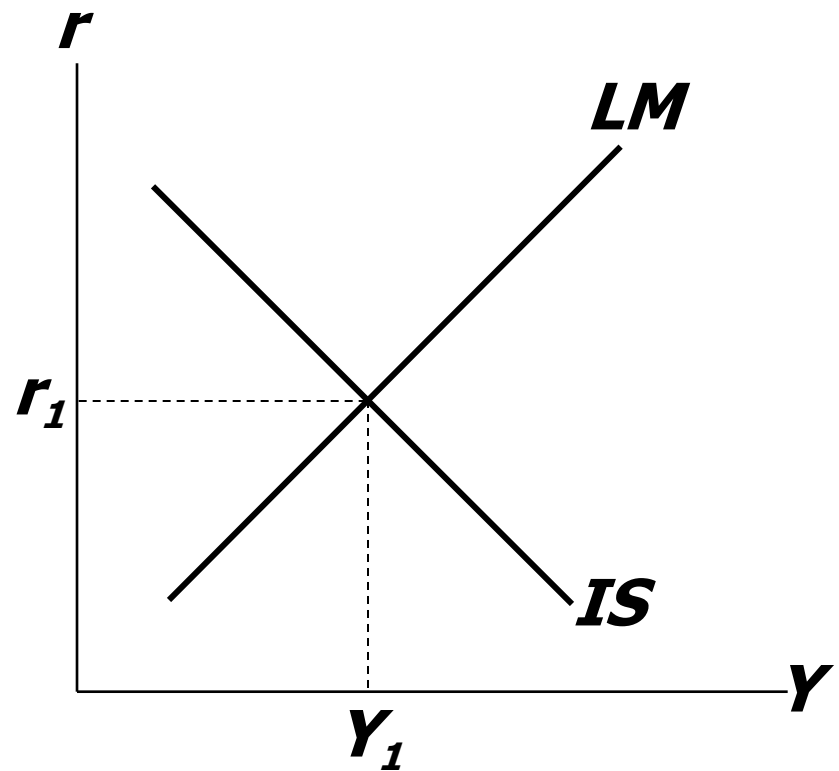
Policy analysis with the *IS-LM* Model

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

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

Policymakers can affect macroeconomic variables with

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

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

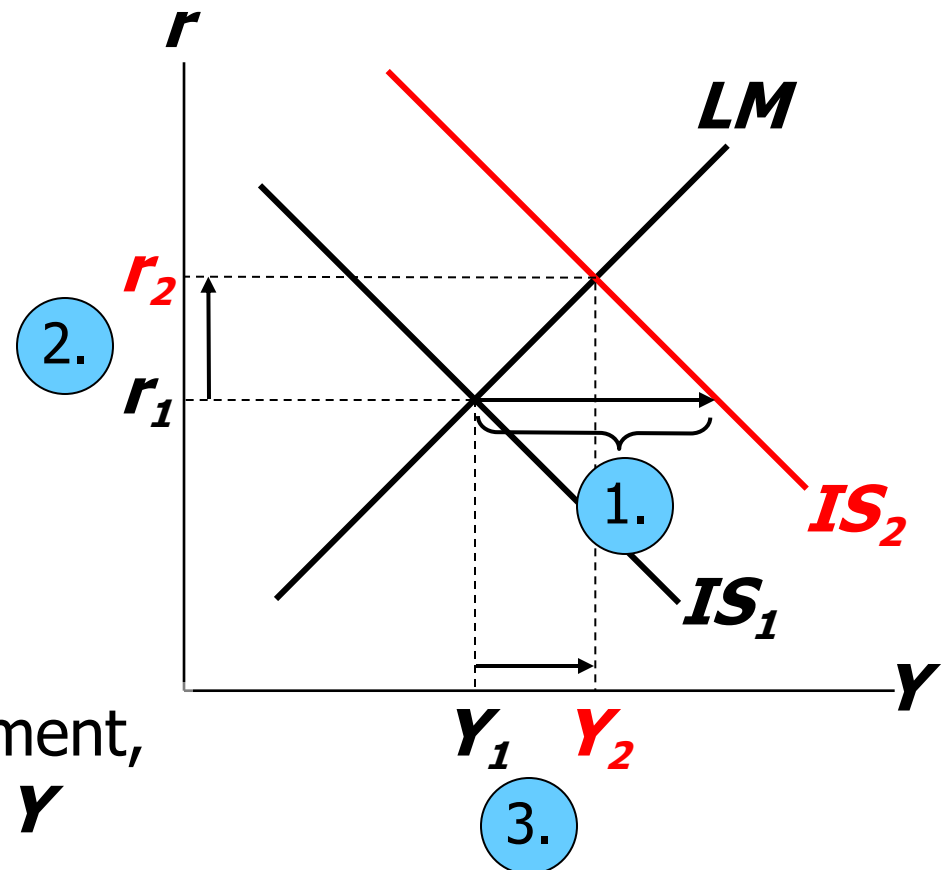# An increase in government purchases

1. *IS* curve shifts right by $\dfrac{1}{1-\text{MPC}}\Delta \boldsymbol{G}$ 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 $\boldsymbol{Y}$ is smaller than $\dfrac{1}{1-\text{MPC}}\Delta \boldsymbol{G}$
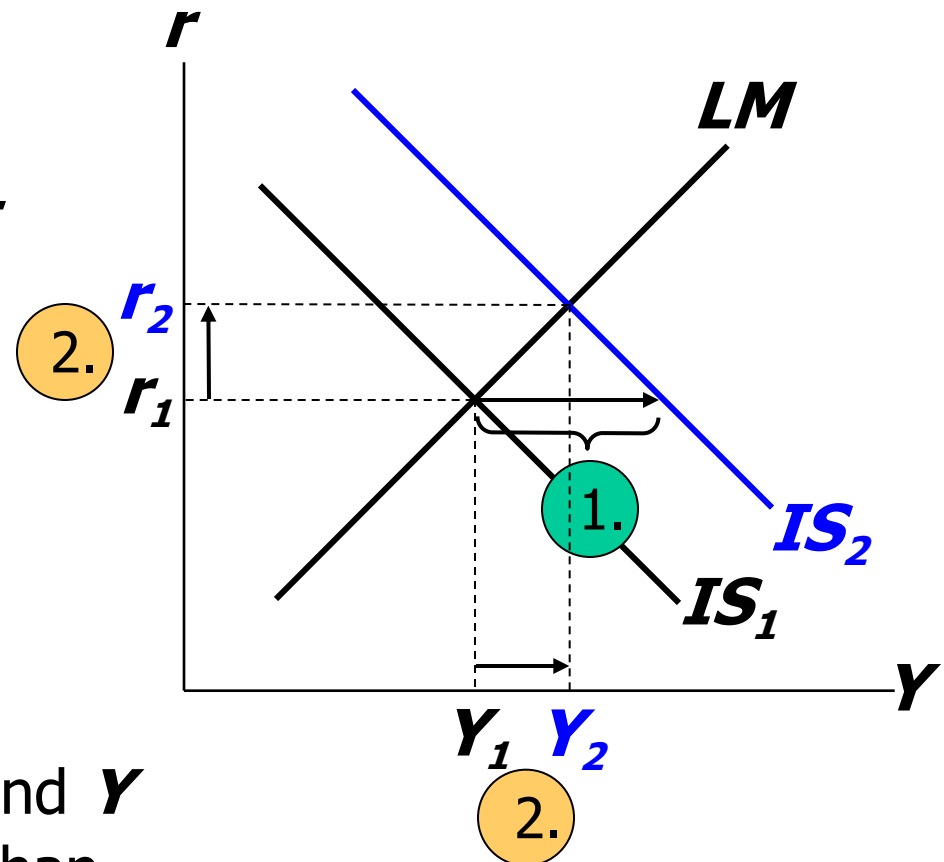
A tax cut

Because consumers save $(1-MPC)$ of the tax cut, the initial boost in spending is smaller for ΔT than for an equal ΔG...
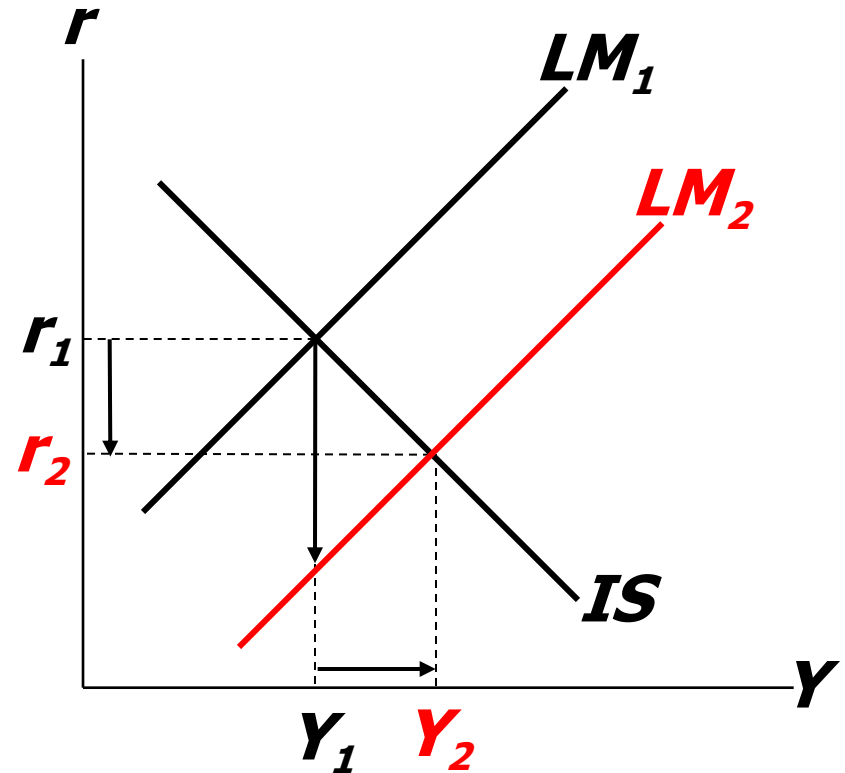
and the *IS* curve shifts by

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

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

Monetary Policy: an increase in *M*

1. Δ*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

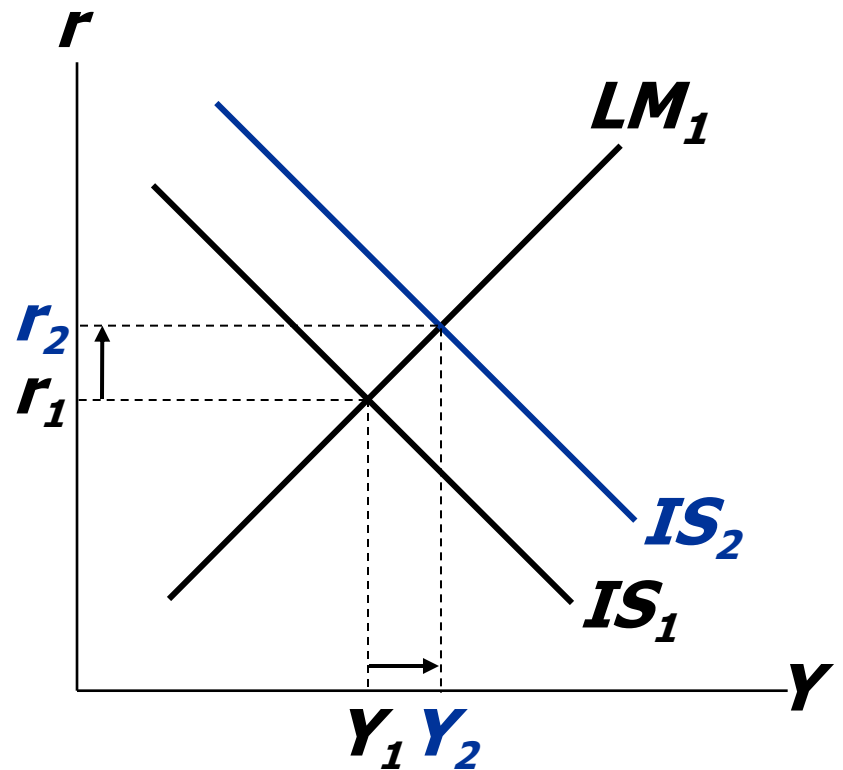- In each case, the effects of the ΔG are different:

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:

$$\Delta \boldsymbol{Y} = \boldsymbol{Y}_2 - \boldsymbol{Y}_1$$

$$\Delta \boldsymbol{r} = \boldsymbol{r}_2 - \boldsymbol{r}_1$$
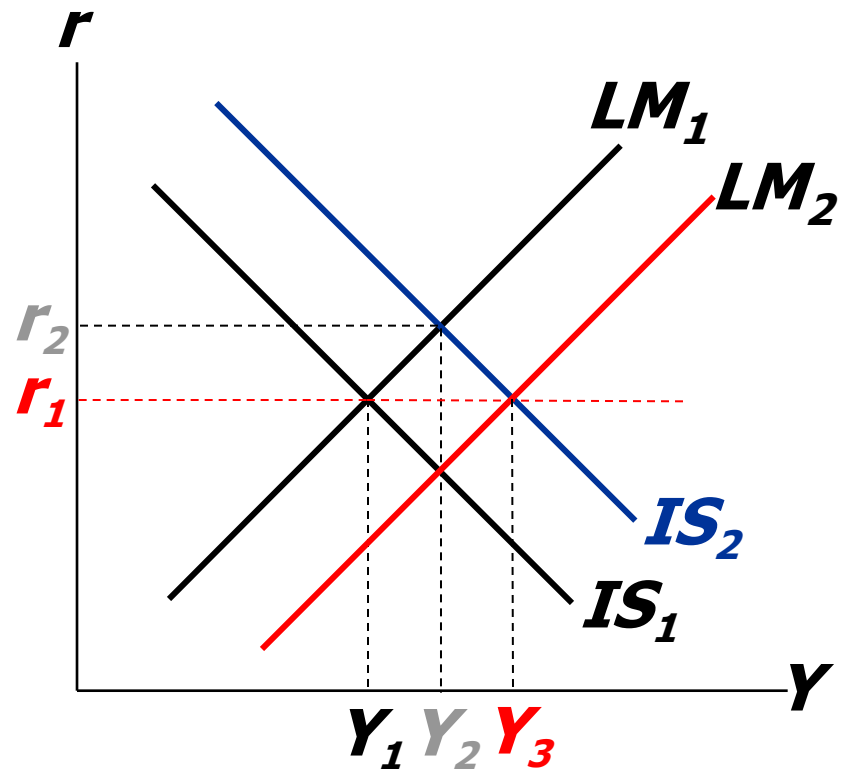
Response 2:   hold r constant

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

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

Results:

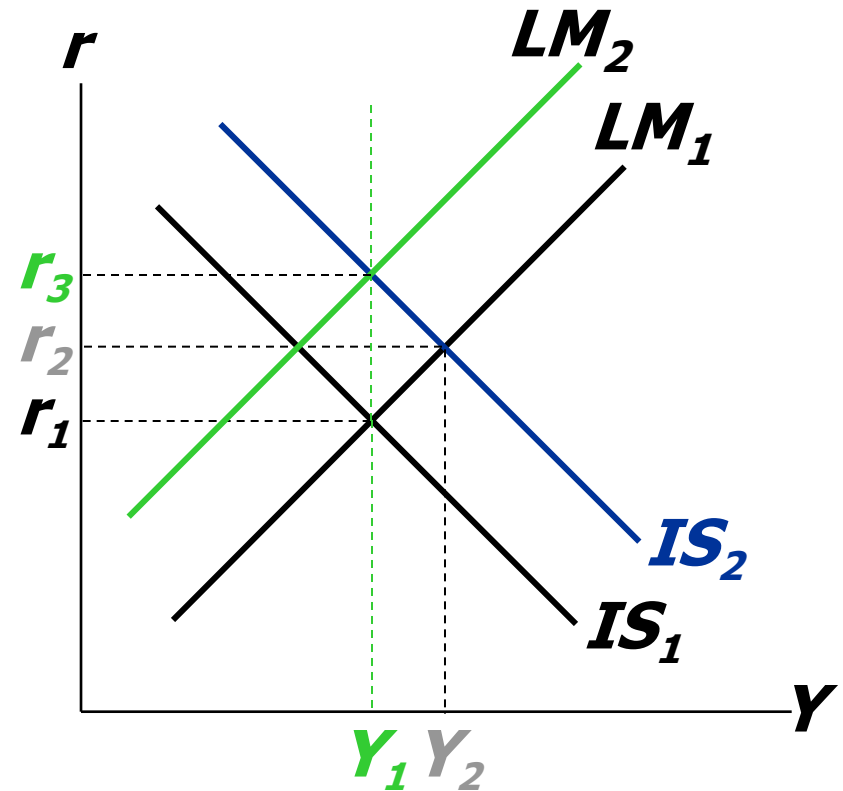$$\Delta Y = Y_3 - Y_1$$

$$\Delta r = 0$$

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:

$$\Delta \boldsymbol{Y} = 0$$

$$\Delta \boldsymbol{r} = \boldsymbol{r}_3 - \boldsymbol{r}_1$$

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 makes consumers wealthier.
2. After a wave of credit card fraud, consumers use 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. economic slowdown of 2001

~What happened~

1. Real GDP growth rate
   1994-2000: 3.9% (average annual)
   2001: 1.2%

2. Unemployment rate
   Dec 2000: 4.0%
   Dec 2001: 5.8%

CASE STUDY
The U.S. economic slowdown of 2001

~Shocks that contributed to the slowdown~

1. Falling stock prices

   From Aug 2000 to Aug 2001: -25%

   Week after 9/11:   -12%

2. The terrorist attacks on 9/11
   - increased uncertainty
   - fall in consumer & business confidence

Both shocks reduced spending and shifted the IS curve left.

CASE STUDY
The U.S. economic slowdown of 2001

~The policy response~

1. Fiscal policy
   - large long-term tax cut,
     immediate $300 rebate checks
   - spending increases:
     aid to New York City & the airline industry,
     war on terrorism

2. Monetary policy
   - Fed lowered its Fed Funds rate target
     11 times during 2001, from 6.5% to 1.75%
   - Money growth increased, interest rates fell

CASE STUDY
The U.S. economic slowdown of 2001

~*What's happening now*~

- In the first quarter of 2002, Real GDP grew at an annual rate of 6.1%, according to final figures released by the Bureau of Economic Analysis on June 27, 2002.

- However, in its news release of June 7, 2002, the NBER Business Cycle Dating Committee had not yet determined the date of the trough in economic activity, though it acknowledges that the economy seems to be picking up.

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 the *LM* curve and therefore affect **Y**.

- The **aggregate demand curve** (*introduced in chap. 8*) captures this relationship between **P** and **Y**
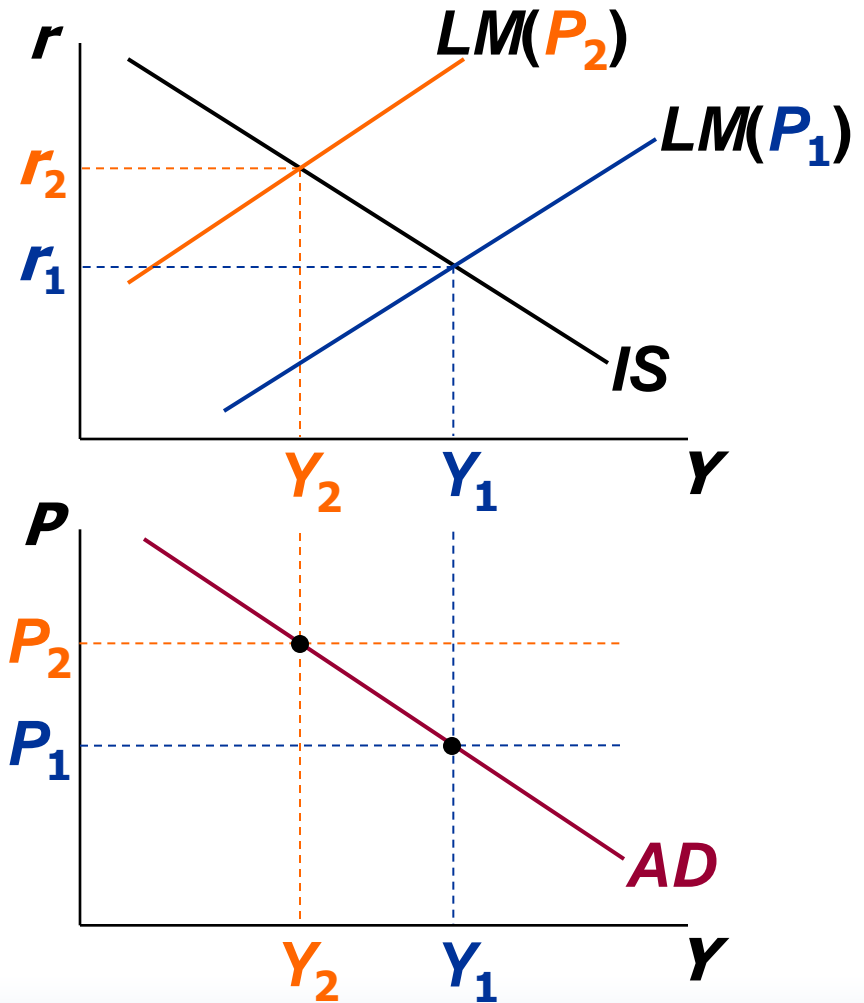
Deriving the *AD* curve

Intuition for slope
of *AD* curve:

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

$\qquad \Rightarrow LM$ shifts left

$\qquad \Rightarrow \uparrow r$
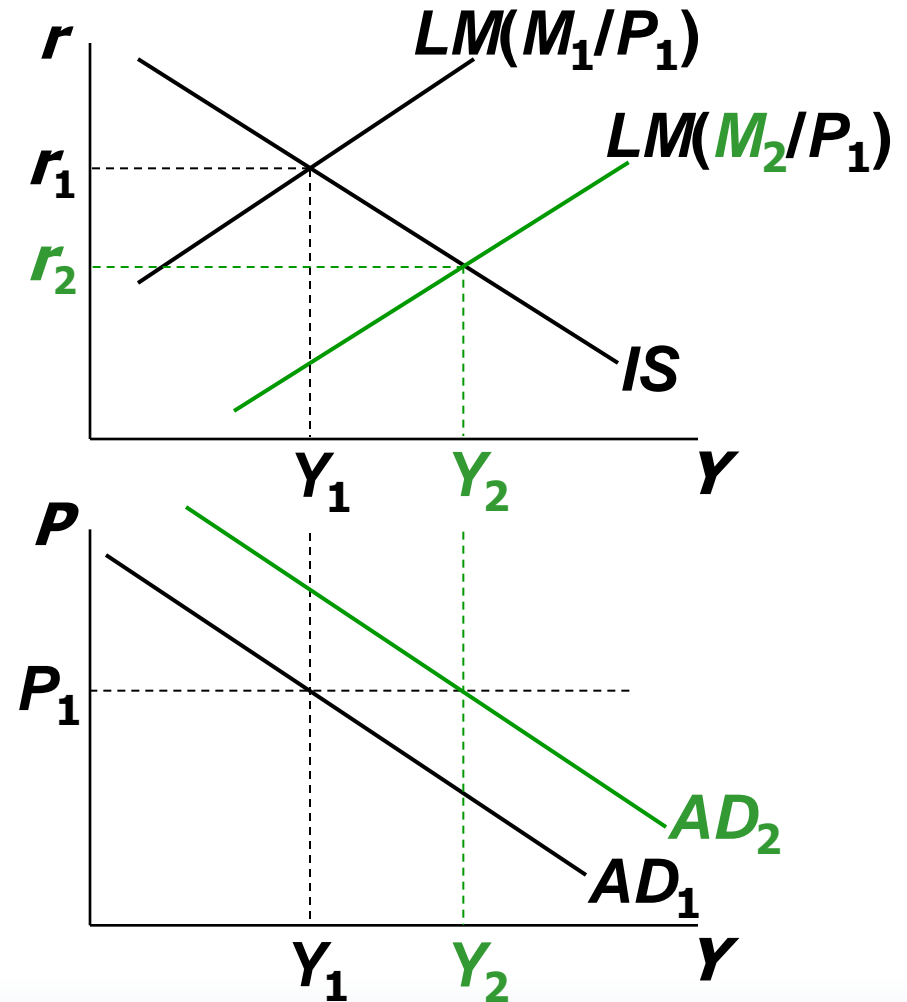
$\qquad \Rightarrow \downarrow I$

$\qquad \Rightarrow \downarrow Y$

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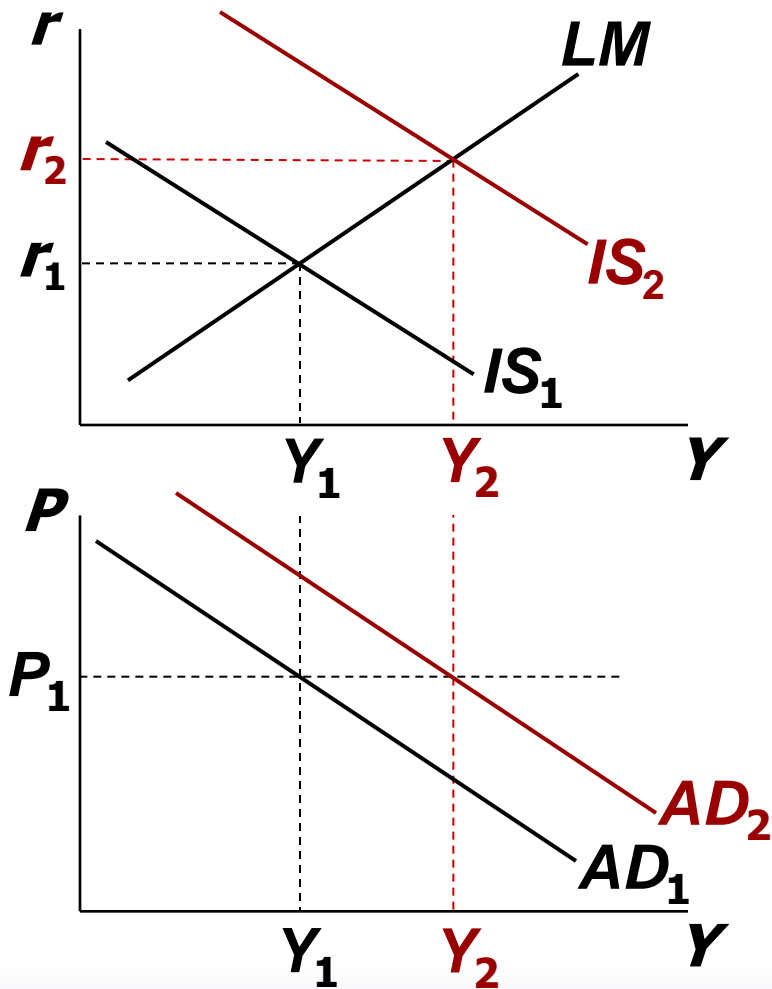($\uparrow$**G** and/or $\downarrow$**T**)
increases agg. demand:

$\downarrow$**T** $\Rightarrow$ $\uparrow$**C**

$\quad\Rightarrow$ IS shifts right

$\quad\Rightarrow$ $\uparrow$**Y** at each
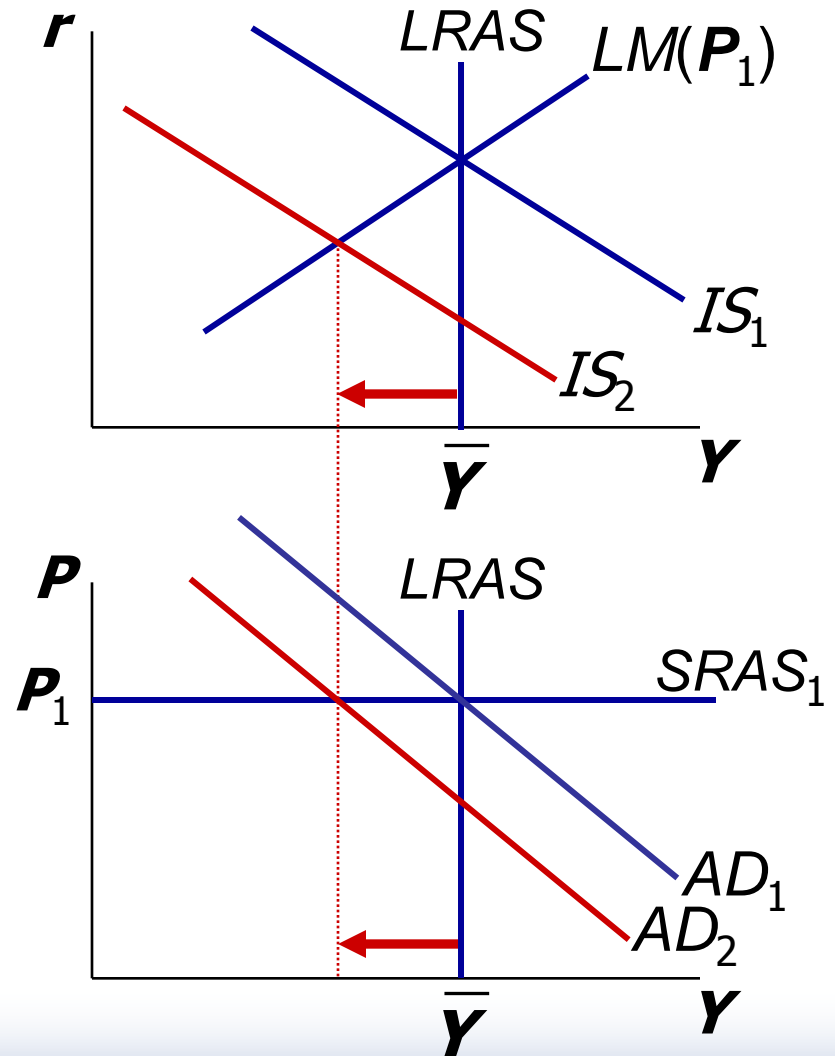
$\qquad\qquad$ value

of **P**

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

Recall from Chapter 8:   The force that moves the economy from the short run to the long run is the gradual adjustment of prices.

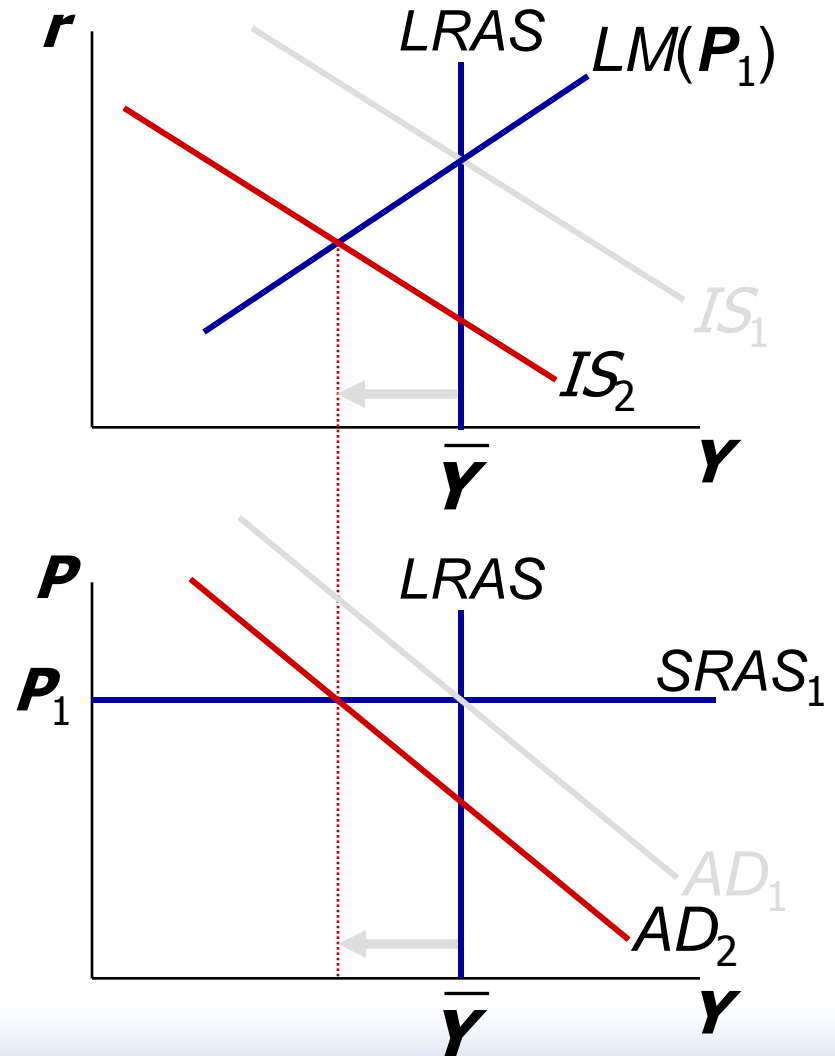| In the short-run equilibrium, if	then over time, the price level will
$Y > \bar{Y}$	rise
$Y < \bar{Y}$	fall
$Y = \bar{Y}$	remain constant

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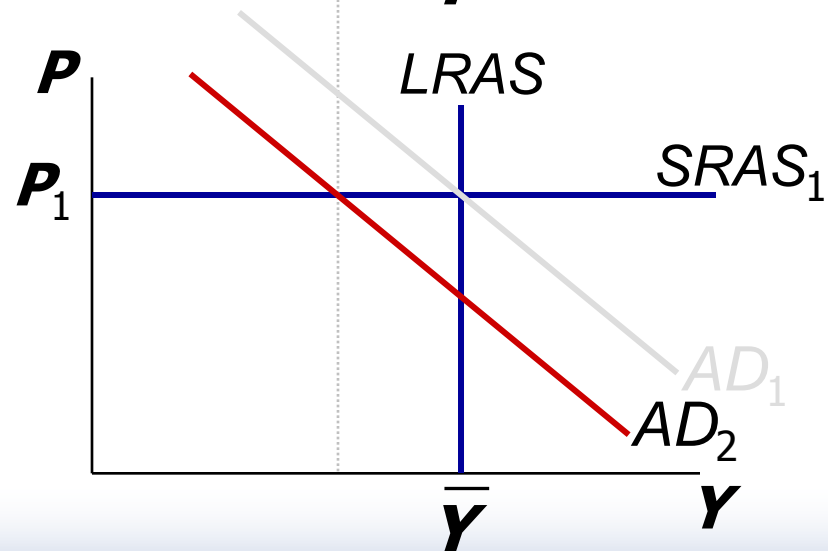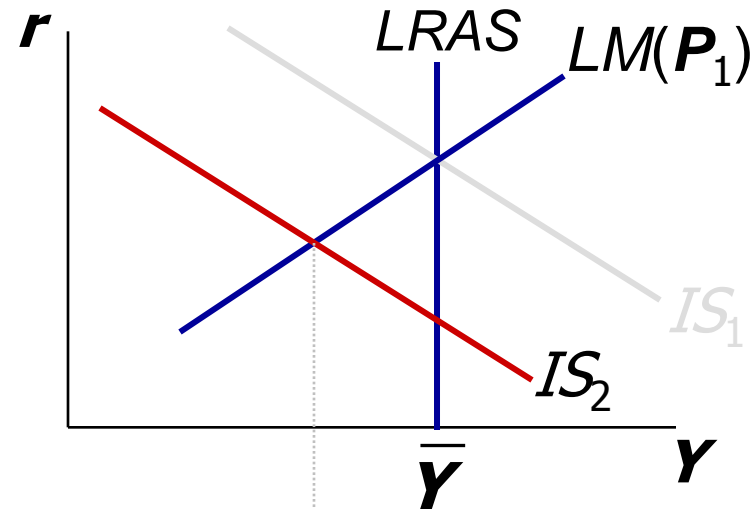
In the new short-run equilibrium, $Y < \overline{Y}$

The SR and LR effects of an *IS* shock

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

Over time,
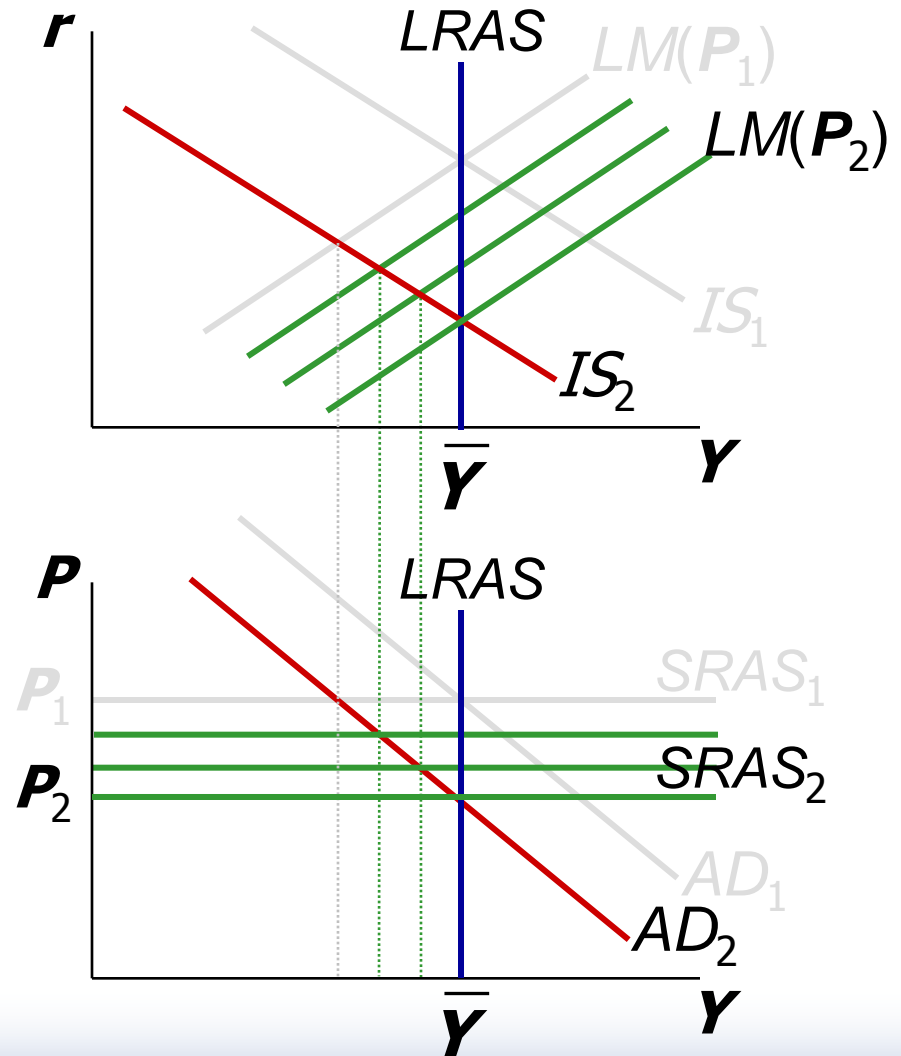P gradually falls, which causes
- *SRAS* to move down
- M/P to increase, which causes *LM* to move down

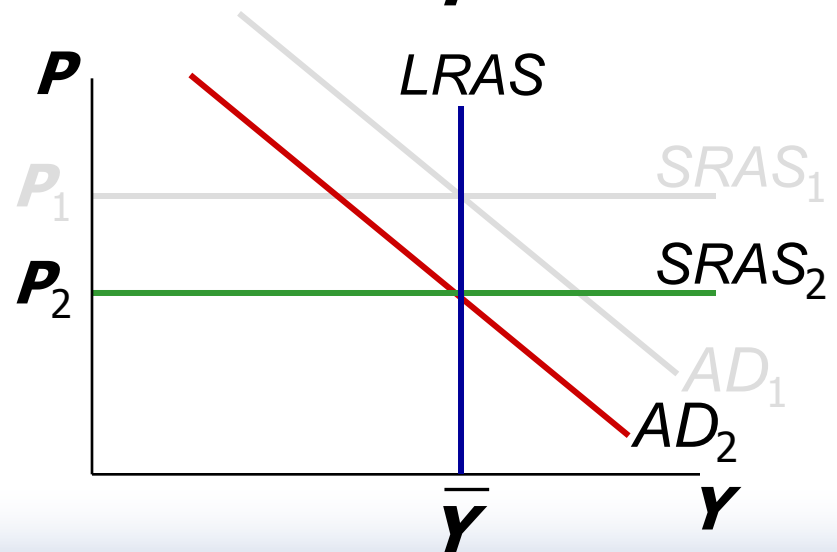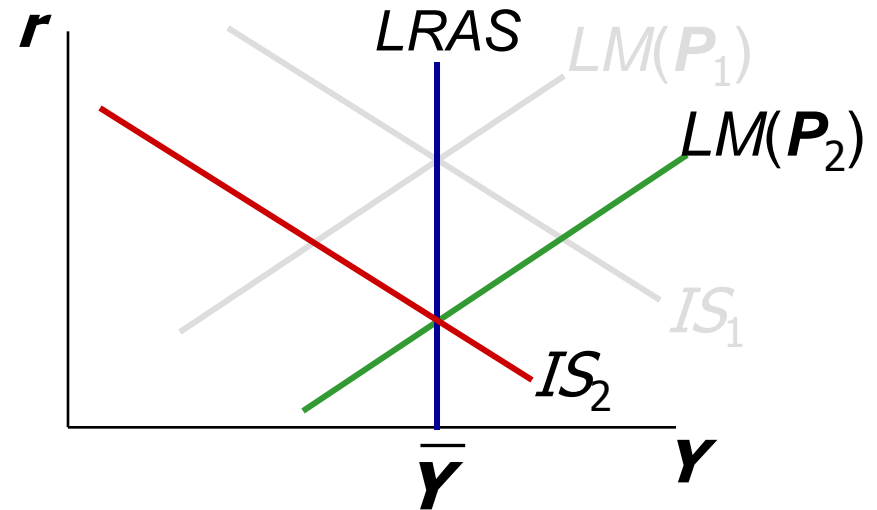# The SR and LR effects of an *IS* shock

Over time,
P gradually falls,
which causes
- *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 $Y = \overline{Y}$

EXERCISE:
Analyze SR & LR effects of ΔM

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?
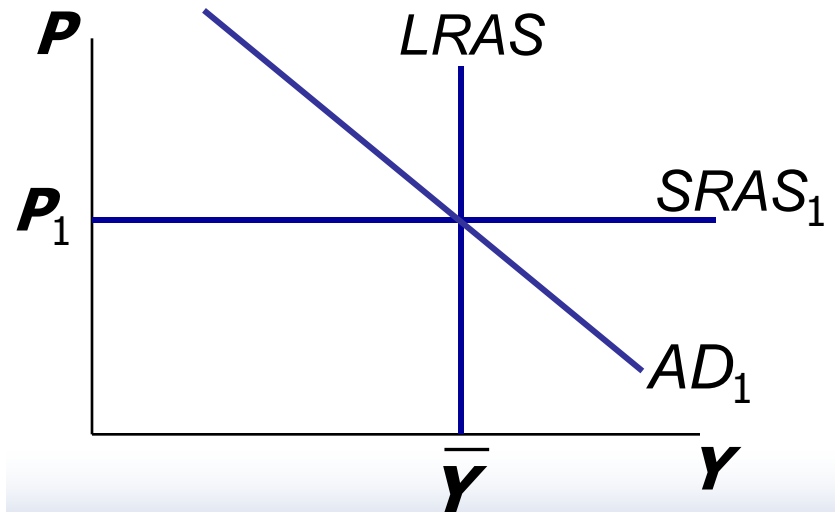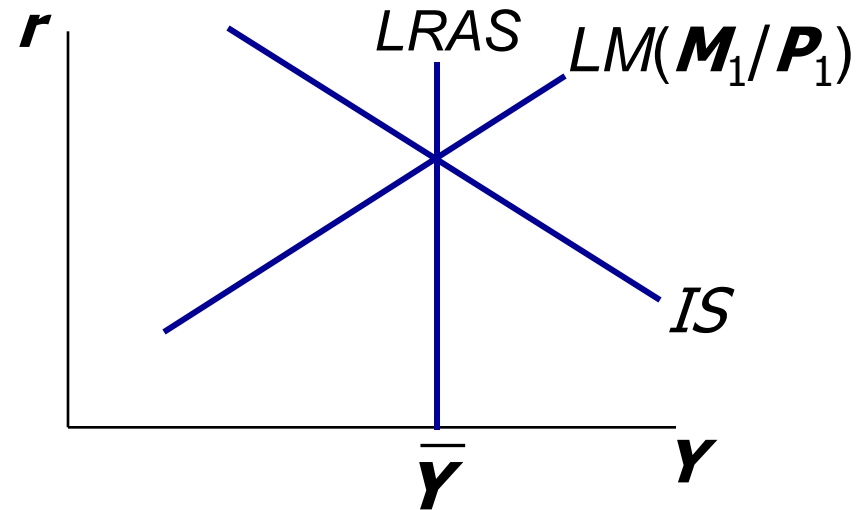
The Great Depression
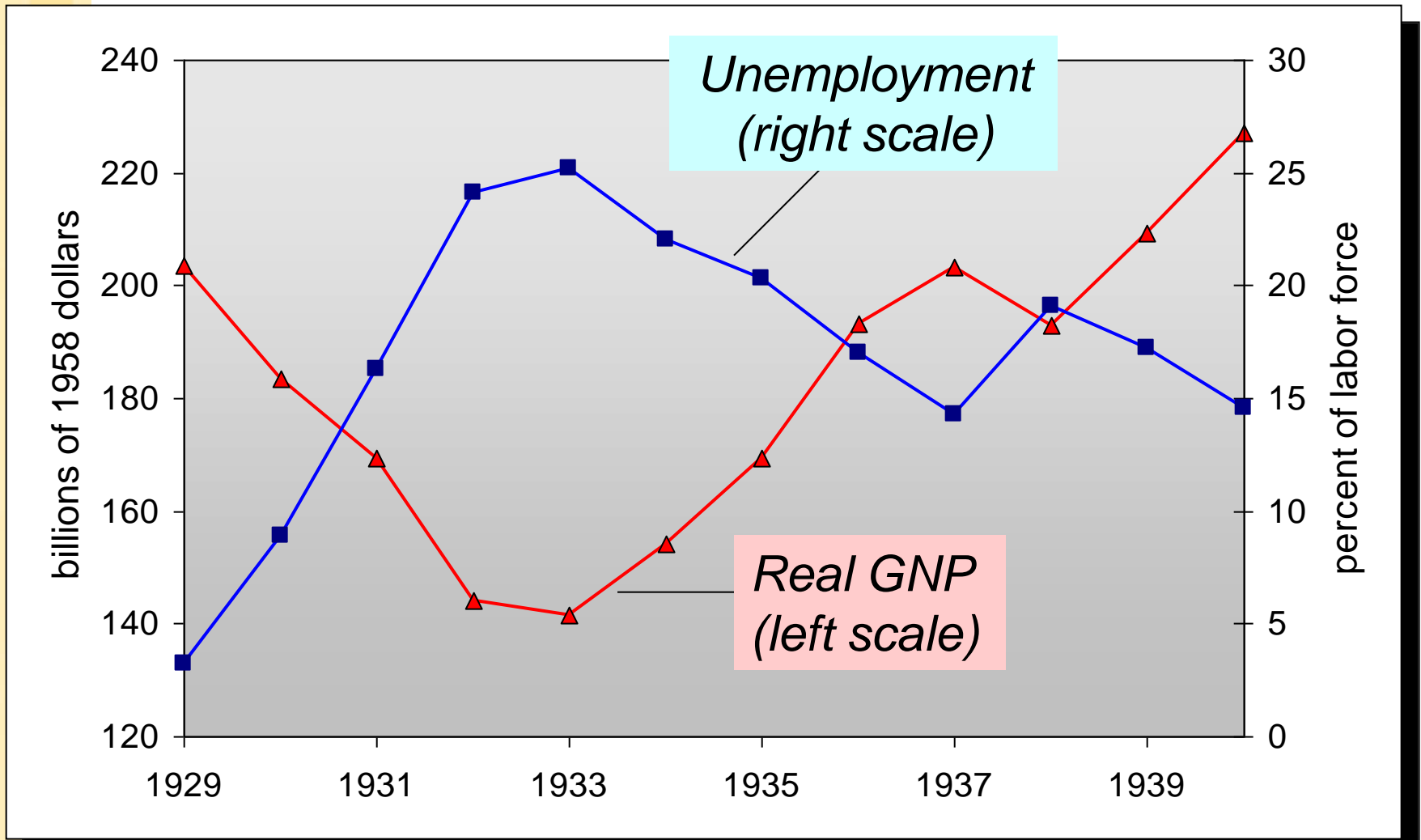
The Spending Hypothesis: *Shocks to the IS Curve*

- 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*

1. Stock market crash $\Rightarrow$ exogenous $\downarrow$$C$
   - Oct-Dec 1929: S&P 500 fell 17%
   - Oct 1929-Dec 1933: S&P 500 fell 71%

2. Drop in investment
   - "correction" after overbuilding in the 1920s
   - widespread bank failures made it harder to obtain financing for investment

3. Contractionary fiscal policy
   - in the face of falling tax revenues and increasing deficits, politicians raised tax rates and cut spending

The Money Hypothesis:
A Shock to the LM Curve

- asserts that the Depression was largely due to huge fall in the money supply
- evidence:
  M1 fell 25% during 1929-33.

But, two problems with this hypothesis:

1. *P* fell even more, so *M/P* actually rose slightly during 1929-31.
2. nominal interest rates fell, which is the opposite of what would result from a leftward *LM* shift.

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 <u>unexpected</u> 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

The Money Hypothesis Again: *The Effects of Falling Prices*

The destabilizing effects of <u>expected</u> 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 $\downarrow$

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.

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