The IS-LM Model - Part 2

EC 313, Macroeconomics

Alex Li

Book Chapter 5

Review

Review

The IS relation:

The IS relation: $Y = f^C(Y - T, i) + f^I(Y, i) + G$

- The IS relation follows from the goods market equilibrium (Y = Z). It tells us how the **interest rate affects output**.

- The IS curve is constructed by **varying i** and analyzing the goods market equilibrium change in Y.

Review

The LM relation:

The LM relation: $\frac{M}{P} = YL(i)$

- The LM relation follows from the real money market equilibrium. It tells us how **output affects the interest rate**.

- The LM curve is constructed by **varying Y** and analyzing the money market equilibrium change in i.

General Equilibrium

General Equilibrium

General Equilibrium

General Equilibrium (or economy-wide equilibrium) requires **both the goods market and money market to be in equilibrium**!
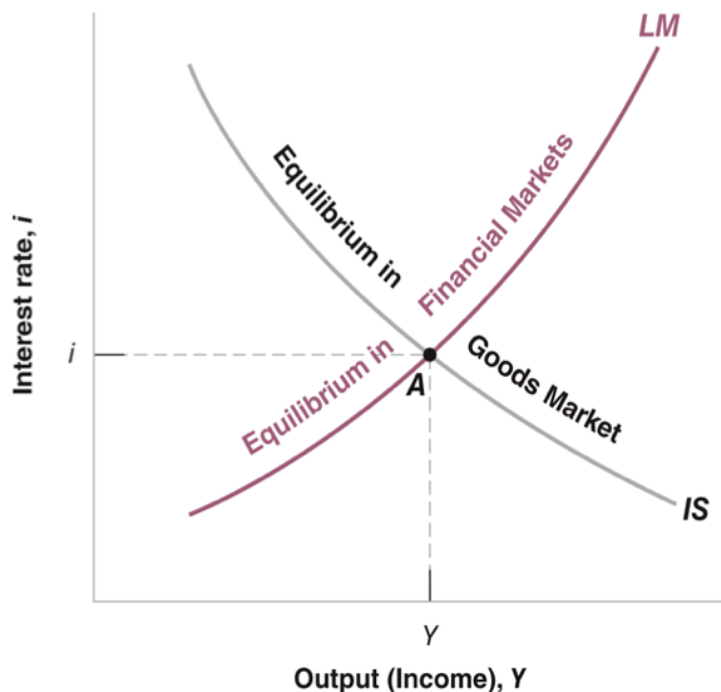
- Every point on the IS curve represents a **unique** Goods Market Equilibrium.

- Every point on the LM curve represents a **unique** Money Market Equilibrium.

General Equilibrium

General Equilibrium

General Equilibrium (or economy-wide equilibrium) requires **both the goods market and money market to be in equilibrium**!

Figure 5-6 The *IS–LM* Model

General Equilibrium

General Equilibrium

Note: All shifts of the IS and LM graphs can be constructed by analyzing the Goods Market and Money Market as we have in class. However, the following table should help you to check your intuition:

	Shift of *IS*	Shift of *LM*	Movement in Output	Movement in Interest Rate
Increase in taxes	left	none	down	down
Decrease in taxes	right	none	up	up
Increase in spending	right	none	up	up
Decrease in spending	left	none	down	down
Increase in money	none	down	up	down
Decrease in money	none	up	down	up

General Equilibrium

General Equilibrium

By exploring equilibrium in the **goods market (IS relation)** and the **money market (LM relation)**, we can derive the IS and LM Curves to study Short Run General Equilibrium.

Q: Why should we care about General Equilibrium?

General Equilibrium

By exploring equilibrium in the **goods market (IS relation)** and the **money market (LM relation)**, we can derive the IS and LM Curves to study Short Run General Equilibrium.

Q: Why should we care about General Equilibrium?

- Recall: **Fiscal Policy** refers to changes in taxes (T) or government spending (G) initiated by the government.

General Equilibrium

By exploring equilibrium in the **goods market (IS relation)** and the **money market (LM relation)**, we can derive the IS and LM Curves to study Short Run General Equilibrium.

Q: Why should we care about General Equilibrium?

- Recall: **Fiscal Policy** refers to changes in taxes (T) or government spending (G) initiated by the government.

- Recall: **Monetary Policy** refers to changes in the Money Supply (M) initiated by the Central Bank.

General Equilibrium

Comparative Statics

Comparative Statics refers to analyzing the change in endogenous variables (Y, i) when exogenous variables change!

Initially: We are in equilibrium, and then some exogenous variable (G, T, M, or P) changes:

- Ask yourself how the change affects equilibrium in the goods market and how it affects equilibrium in the money market.

General Equilibrium

Comparative Statics

Comparative Statics refers to analyzing the change in endogenous variables (Y, i) when exogenous variables change!

Initially: We are in equilibrium, and then some exogenous variable (G, T, M, or P) changes:

- Ask yourself how the change affects equilibrium in the goods market and how it affects equilibrium in the money market.

    - That is, does it shift the Goods Demand, Money Demand, or Money Supply?

General Equilibrium

Comparative Statics

Comparative Statics refers to analyzing the change in endogenous variables (Y, i) when exogenous variables change!

Initially: We are in equilibrium, and then some exogenous variable (G, T, M, or P) changes:

- Characterize the effect of these shifts on the IS and LM curve.

General Equilibrium

Comparative Statics

Comparative Statics refers to analyzing the change in endogenous variables (Y, i) when exogenous variables change!

Initially: We are in equilibrium, and then some exogenous variable (G, T, M, or P) changes:

- Characterize the effect of these shifts on the IS and LM curve.

    - Does the IS shift? Does the LM shift? If so, by how much?

General Equilibrium

Comparative Statics

Comparative Statics refers to analyzing the change in endogenous variables (Y, i) when exogenous variables change!

Initially: We are in equilibrium, and then some exogenous variable (G, T, M, or P) changes:

- Find the new equilibrium where IS and LM intersect **after, taking into account all shifts**!

General Equilibrium

Solution Methods

There are several ways to solve comparative statics problems. Exam questions may prompt you to use a specific method, or you may be given the choice of your favorite:

- Draw or describe the initial effect of an exogenous change in the Goods Market and Money Market. Show how this effect impacts the IS and LM curve. Find the new IS-LM equilibrium.

General Equilibrium

Solution Methods

There are several ways to solve comparative statics problems. Exam questions may prompt you to use a specific method, or you may be given the choice of your favorite:

- Draw the initial effect of an exogenous change in the Goods Market and Money Market. Show how this effect impacts the IS and LM curve. Find the new IS-LM equilibrium. Show that the Goods Market and Money Market are in equilibrium at this new point.

General Equilibrium

Solution Methods

There are several ways to solve comparative statics problems. Exam questions may prompt you to use a specific method, or you may be given the choice of your favorite:

- Look at the IS relation and LM relation equations. Show how a change in some exogenous variables impacts the IS curve and LM curve. Find the new IS-LM equilibrium.

Fiscal Policy in General Equilibrium

Fiscal Policy in General Equilibrium

Fiscal Policy

Recall: The budget deficit is the difference between government revenue (Taxes) and Government spending. In our model, $T - G$.

Fiscal Policy can be divided into two types:

- **Fiscal contraction**: Government policies that reduce the budget deficit.

    - Increase Taxes

    - A decrease in Government Spending

Fiscal Policy in General Equilibrium

Fiscal Policy

Recall: The budget deficit is the difference between government revenue (Taxes) and Government spending. In our model, $T - G$.

Fiscal Policy can be divided into two types:

- **Fiscal expansion**: Government policies that increase the budget deficit.

    - Decrease Taxes

    - Increase in Government Spending

Fiscal Policy in General Equilibrium

Describing What Happens (Method 1)

Shock: The government wants to reduce the budget deficit, so taxes increase.

(1) What is the initial impact of this effect on the goods market and money market? What is the general equilibrium effect of this policy?

- **Goods Market and IS**:

  - Increased T leads to **decrease in the goods demand**.

  - For every value of i, **equilibrium output** is now lower.

  - The **IS** curve **Shifts Left**.

Fiscal Policy in General Equilibrium

Describing What Happens (Method 1)

Shock: The government wants to reduce the budget deficit, so taxes increase.

(1) What is the initial impact of this effect on the goods market and money market? What is the general equilibrium effect of this policy?

- **Money Market and LM**:

    - T does not affect M^D or M^S, so nothing changes in the money market.

    - The **LM** curve **Doesn't Shift**.
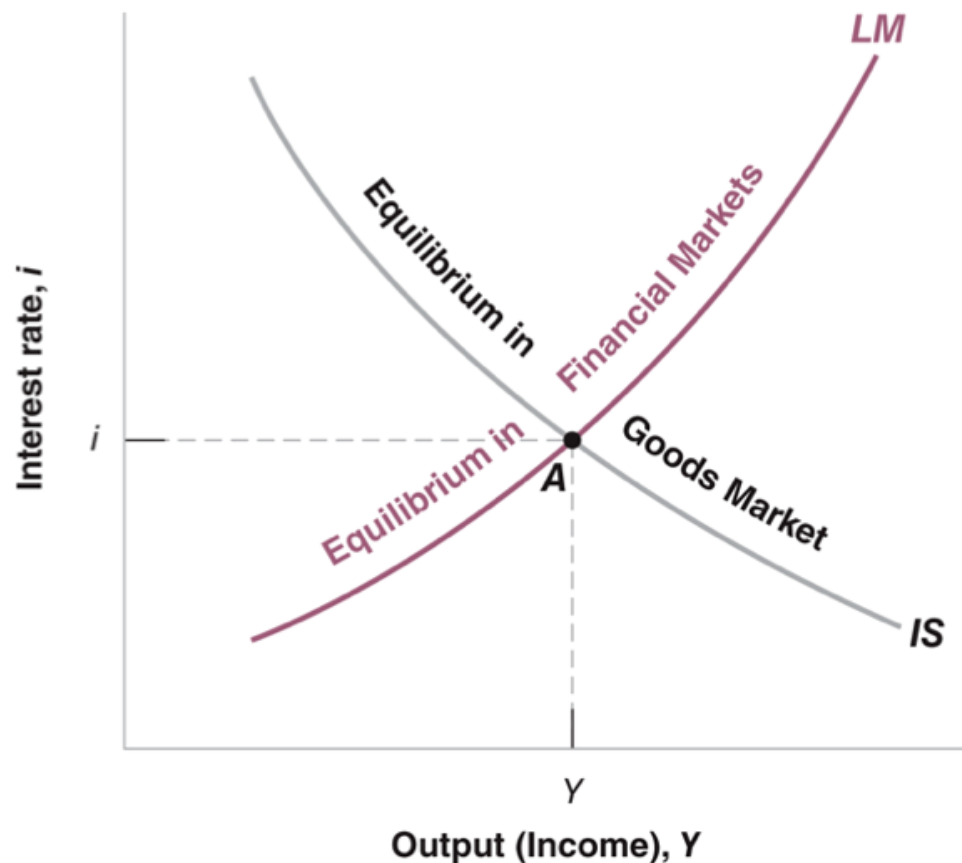
Describing What Happens (Method 1)

Figure 5-6 The *IS–LM* Model

Describing What Happens (Method 1)

Figure 5-6 The *IS–LM* Model

Fiscal Policy in General Equilibrium
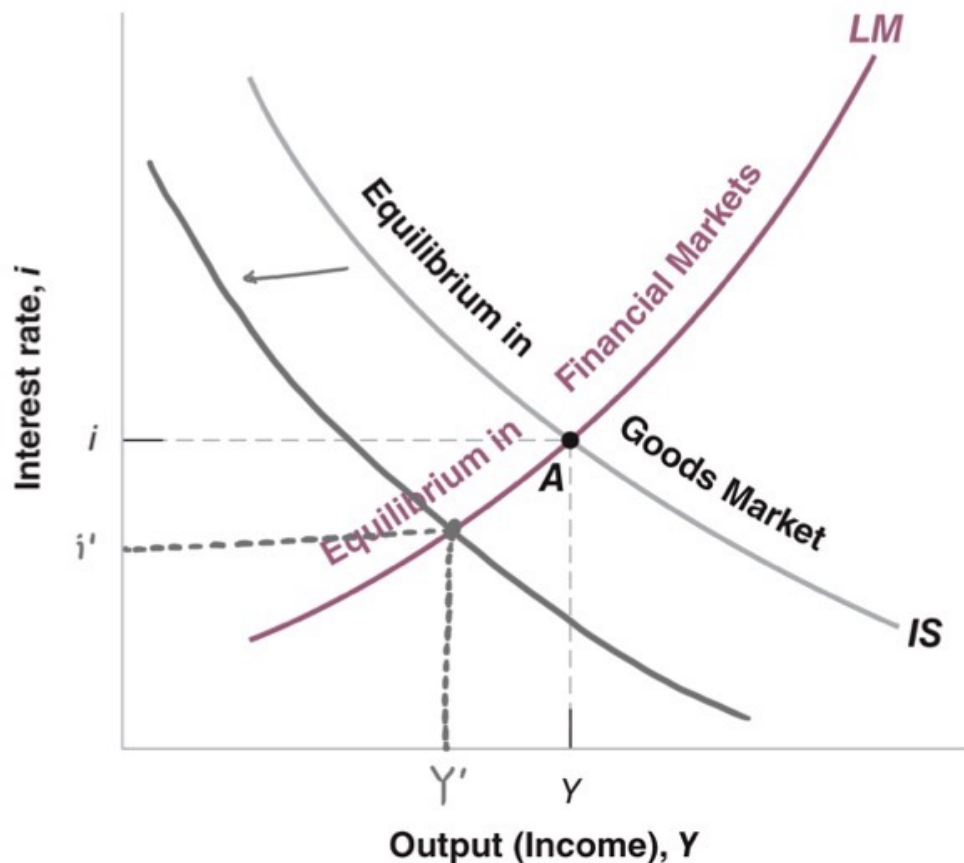
Describing What Happens (Method 2)

Shock: The government wants to reduce the budget deficit, so taxes increase.

(2) What is the general equilibrium effect of this policy on Output and the interest rate? Hint: Look at the IS and LM relation equations!
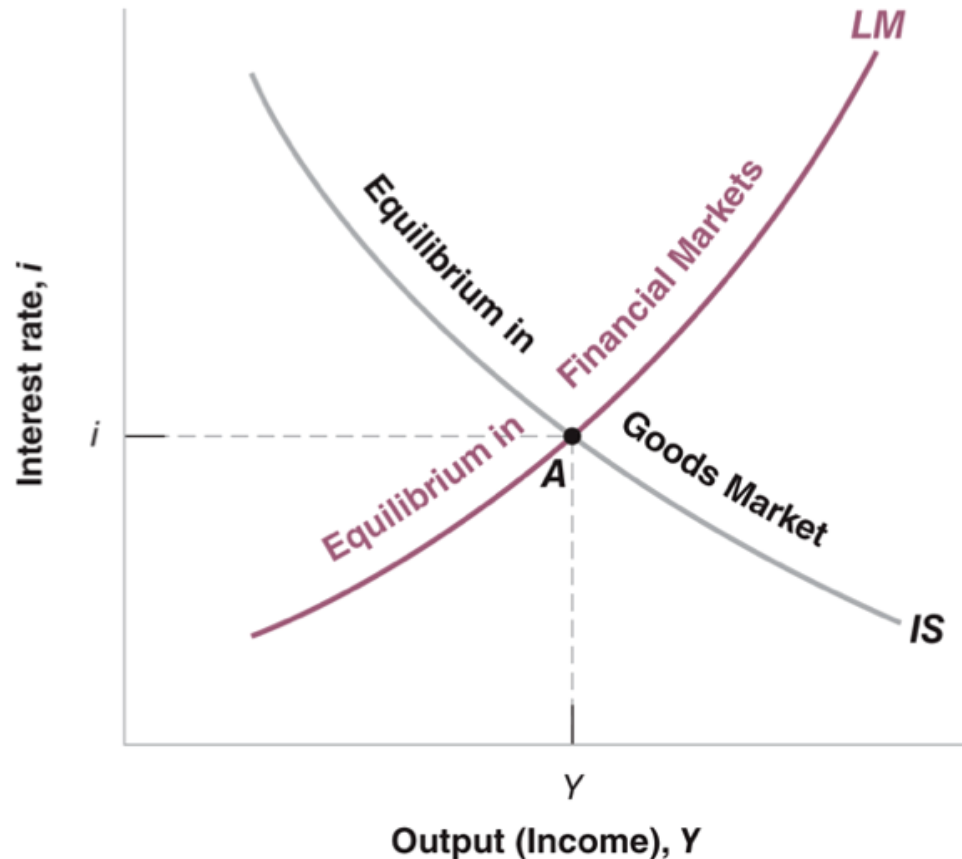
$$IS : Y = f^C(Y - T, i) + f^I(Y, i) + G$$
$$LM : M = YL(i)$$

- If T increases, then $f^C(Y - T, i)$ decreases, and Y is lower for all values of i. Thus, IS shifts left to IS'.

- LM curve is unaffected by a change in T, so the LM does not shift.

Describing What Happens (Method 2)

Figure 5-6 The *IS–LM* Model

Describing What Happens (Method 2)

Figure 5-6 The *IS–LM* Model
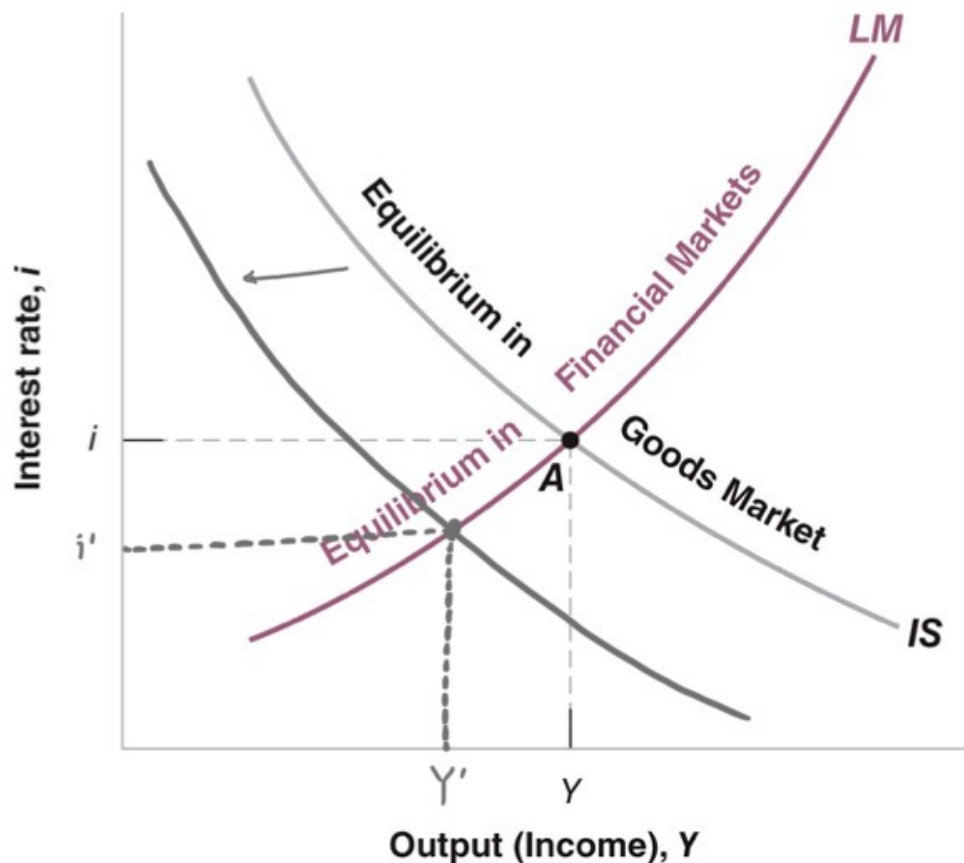
Why General Equilibrium (IS-LM)

Fiscal Policy in General Equilibrium

Why General Equilibrium (IS-LM)

If we only look at the goods market:

- A tax decrease would appear to have a significant impact on output, reducing equilibrium from Y_0 to Y'.

If we only look at the money market:

- A tax decrease would appear not to affect interest rates.

Fiscal Policy in General Equilibrium

Why General Equilibrium (IS-LM)

By looking at the IS-LM SR equilibrium:

- A tax decrease leads to **output decreasing** from Y_0 to Y_A (a smaller change than the goods market alone predicts).

- A tax decrease leads to the **interest rate decreasing** (a larger change than the money market alone predicts).

NOTE: The general equilibrium output decreases by less than what the goods market alone predicts exactly **because** the interest rate decreases in general equilibrium!

Fiscal Policy in General Equilibrium

Equilibrium Changes

Q: When taxes increase, what happens to the components of demand?

- G: by assumption, G is unchanged.

Fiscal Policy in General Equilibrium

Equilibrium Changes

Q: When taxes increase, what happens to the components of demand?

- G: by assumption, G is unchanged.

- Y^D: In equilibrium, income is lower, and taxes are higher, so disposable income has decreased.

Fiscal Policy in General Equilibrium

Equilibrium Changes

Q: When taxes increase, what happens to the components of demand?

- G: by assumption, G is unchanged.

- Y^D: In equilibrium, income is lower, and taxes are higher, so disposable income has decreased.

- C: consumption $f^C(Y_D, i)$ depends on both disposable income (+) and interest rate (-). First, disposable income decreases, consumption decreases. Second, interest rate decreases, consumption increases. Change in Consumption is unclear.

Fiscal Policy in General Equilibrium

Equilibrium Changes

Q: When taxes increase, what happens to the components of demand?

- G: by assumption, G is unchanged.

- Y^D: In equilibrium, income is lower, and taxes are higher, so disposable income has decreased.

- C: consumption $f^C(Y_D, i)$ depends on both disposable income (+) and interest rate (-). First, disposable income decreases, consumption decreases. Second, interest rate decreases, consumption increases. Change in Consumption is unclear.

- I: investment $f^I(Y, i)$ depends on both income (+) and interest rate (-). First, income decreases, investment decreases. Second, interest rate decreases, investment increases. Change in Investment in unclear.

Monetary Policy in General Equilibrium

Monetary Policy in General Equilibrium

Monetary Policy

Recall: Monetary Policy can be divided into two types:

Monetary contraction: The Fed decreases money supply M.

Monetary expansion: The Fed increases money supply M.

Describe What Happens (Method 1)

Shock: The Fed decides to increase the Money Supply. What Happens? (Be sure you understand how to apply both two solution methods!)

- **Goods Market and IS**:

  - M does not affect goods market demand.
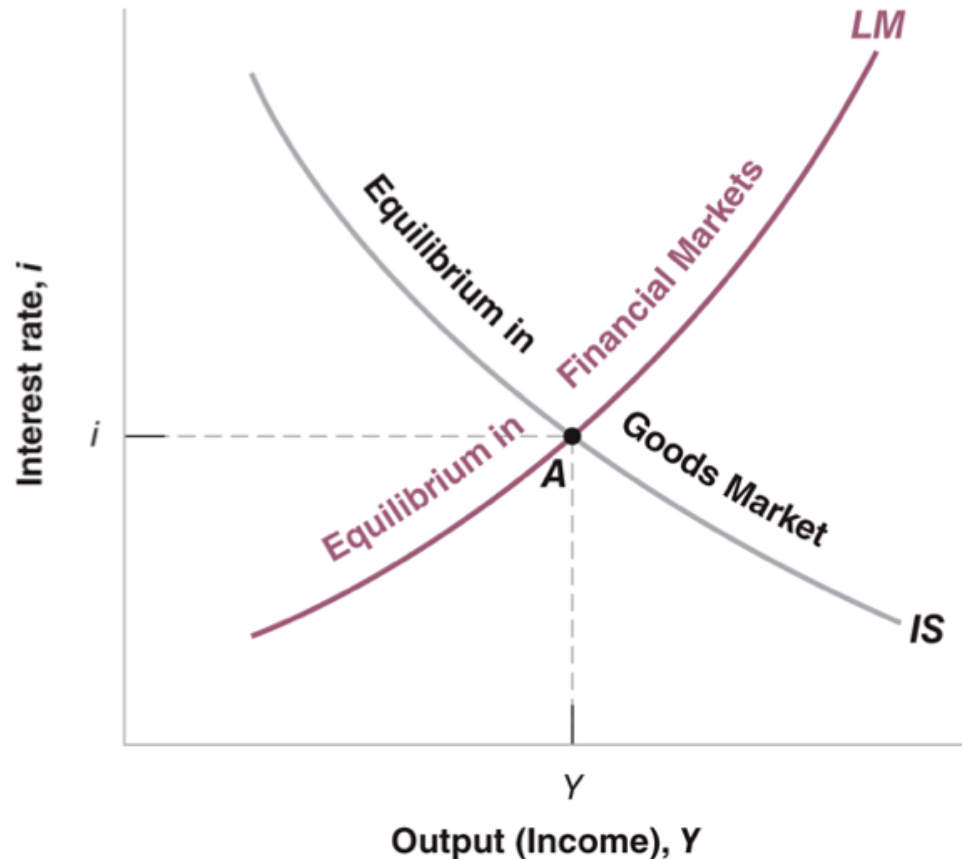
  - The IS curve is unaffected.

- **Money Market and LM**:

  - Increased M leads to increased Money Supply.

  - For every value of Y, equilibrium interest is now lower.

  - The LM curve Shifts Down.

Describe What Happens (Method 1)

Figure 5-6 The *IS–LM* Model

Describe What Happens (Method 1)

Figure 5-6 The *IS–LM* Model

Monetary Policy in General Equilibrium
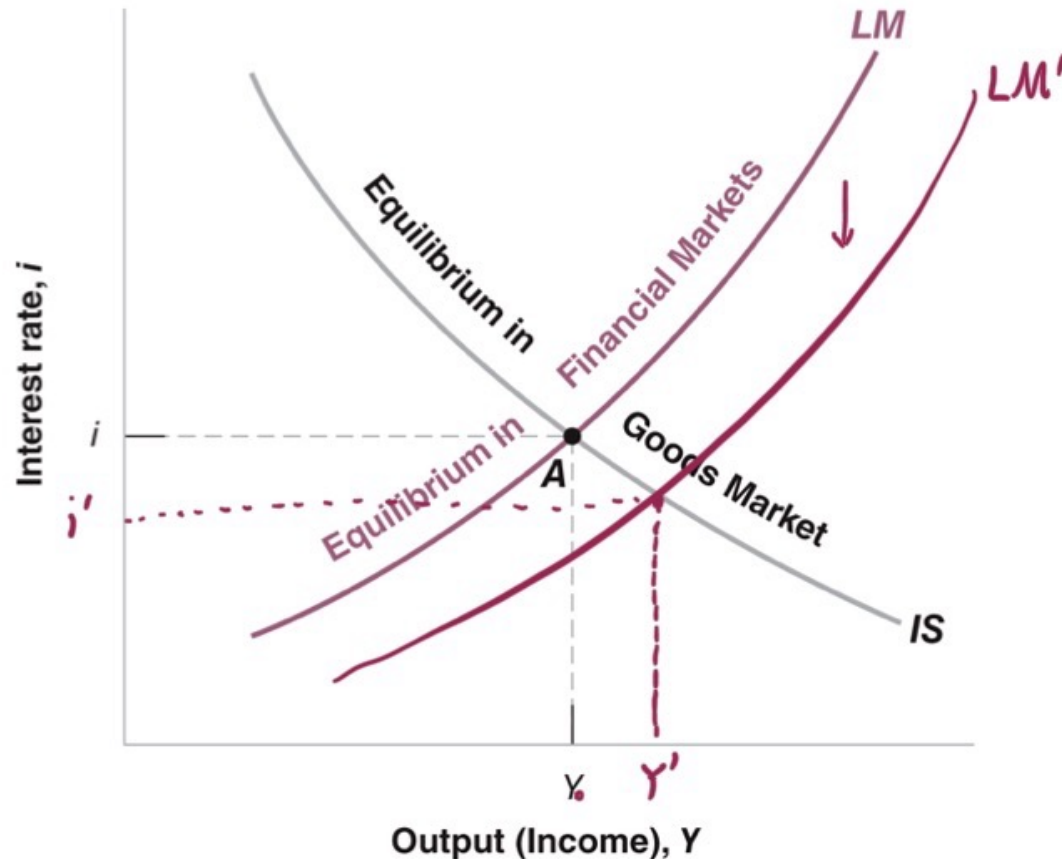
Describing What Happens (Method 2)

Shock: The Fed decides to increase the Money Supply.

(2) What is the general equilibrium effect of this policy on Output and the interest rate? Hint: Look at the IS and LM relation equations!
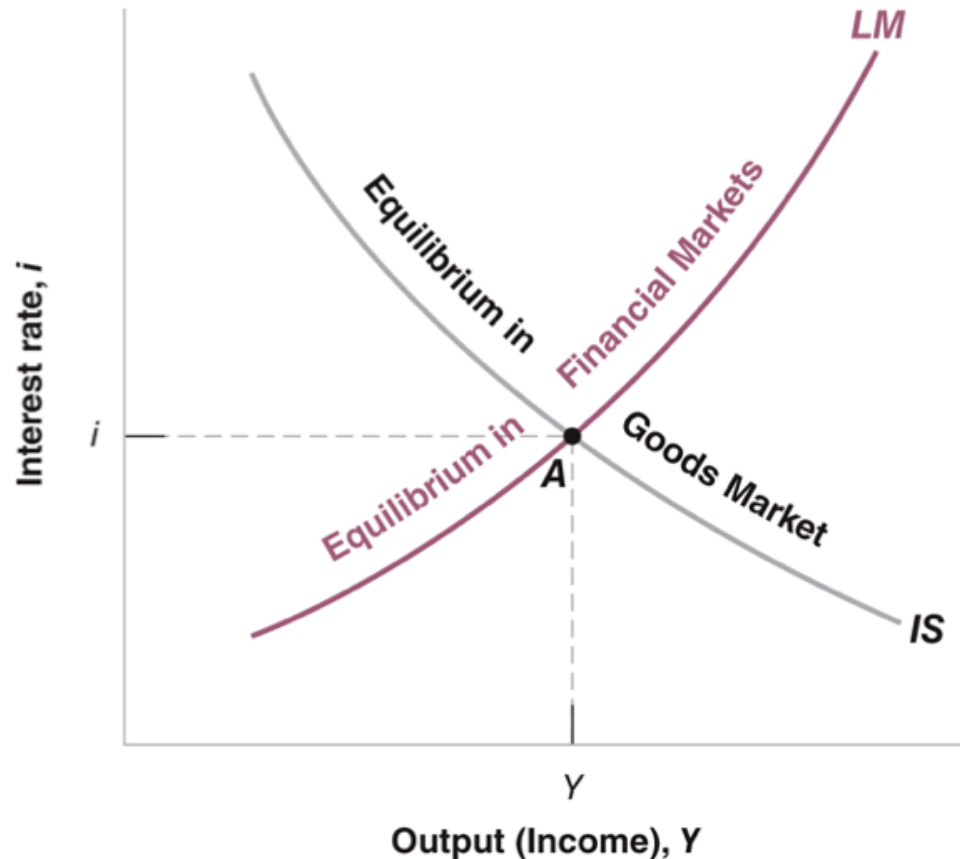
$$IS : Y = f^C(Y - T, i) + f^I(Y, i) + G$$
$$LM : \frac{M}{P} = YL(i)$$

- IS curve is unaffected by a change in M, so the IS does not shift.

- M increases, given a fixed level of Y, interest rate i decreases. LM curve shifts down.

Describe What Happens (Method 2)

Figure 5-6 The *IS–LM* Model

Describe What Happens (Method 2)

Figure 5-6 The *IS–LM* Model

Why General Equilibrium

Monetary Policy in General Equilibrium

Why General Equilibrium?

If we only look at the goods market:

- A money supply increases would appear not to affect equilibrium output.

If we only look at the money market:

- A money supply increases would appear to have a significant impact on interest rates, reducing equilibrium interest from i_0 to i'.

Why General Equilibrium?

By looking at the IS-LM SR equilibrium:

- An increase in M leads to output increasing (a larger change than the goods market alone predicts).

- An increase in M leads to interest rates decreasing from i_0 to i_A (a smaller change than the money market alone predicts).

NOTE: The general equilibrium interest rate decreases by less than what the money market alone predicts exactly **because** output increases in general equilibrium!

Monetary Policy in General Equilibrium

Equilibrium Changes

Q: When the money supply increases, what happens to the components of demand?

- Y^D: In equilibrium, income is higher, and taxes are unchanged, so disposable income increases.

Monetary Policy in General Equilibrium

Equilibrium Changes

Q: When the money supply increases, what happens to the components of demand?

- Y^D: In equilibrium, income is higher, and taxes are unchanged, so disposable income increases.

- C: consumption $f^C(Y_D, i)$ depends on both disposable income (+) and interest rate (-). First, disposable income increases, consumption increases. Second, the interest rate decreases consumption increases. Consumption must increase.

Monetary Policy in General Equilibrium

Equilibrium Changes

Q: When the money supply increases, what happens to the components of demand?

- Y^D: In equilibrium, income is higher, and taxes are unchanged, so disposable income increases.

- C: consumption $f^C(Y_D, i)$ depends on both disposable income (+) and interest rate (-). First, disposable income increases, consumption increases. Second, the interest rate decreases consumption increases. Consumption must increase.

- I: investment $f^I(Y, i)$ depends on both income (+) and interest rate (-). First, income increases, investment increases. Second, interest rate decreases, investment increases. Investment must increase

Applications

Applications

Government Spending in Bonds Market

Q: What is the effect of an increase in Government Spending (or a decrease in Taxes) on Bond Prices in the Short Run?

- Step 1: An increase in government spending will increase goods demand. It will not change the money demand or money supply.

- Step 2: Following Step 1, we know the IS curve shifts right, and the LM curve stays the same. This means equilibrium output and equilibrium interest rates are higher.

- Step 3: $P_B = \frac{F}{1+i}$. Thus, if equilibrium i increases, then in equilibrium bond prices must fall!

Applications

Policy Mix

When Bill Clinton was elected President in 1992, he prioritized reducing the budget deficit by reducing Government spending and increasing taxes.

Q: What is the effect of this policy on output?

Q: Would this be a popular policy?

To combat the reduction in output that would occur from contractionary fiscal policy, the Fed performed expansionary monetary policy (M increased).

Q: What is the net effect of contractionary Fiscal Policy and expansionary Monetary Policy on Y and i?