Foreign Trade and the Exchange Rate

This lecture examines the determinants of net exports and exchange rates. Specific emphasis is given to the ways that changes in trade affect the domestic economy and how policy can respond to it.

Foreign Trade and Aggregate Demand

A. Foreign trade influences U.S. aggregate demand in two ways.

   1. Consumers who purchase imports in place of domestic goods contribute to aggregate demand in the rest of the world and not in the U.S.

   2. Foreigners who purchase our exports contribute to U.S. aggregate demand.

B. The terms of trade is the ratio of the price of exports to the price of imports ($TT=P_X/P_{IM}$).

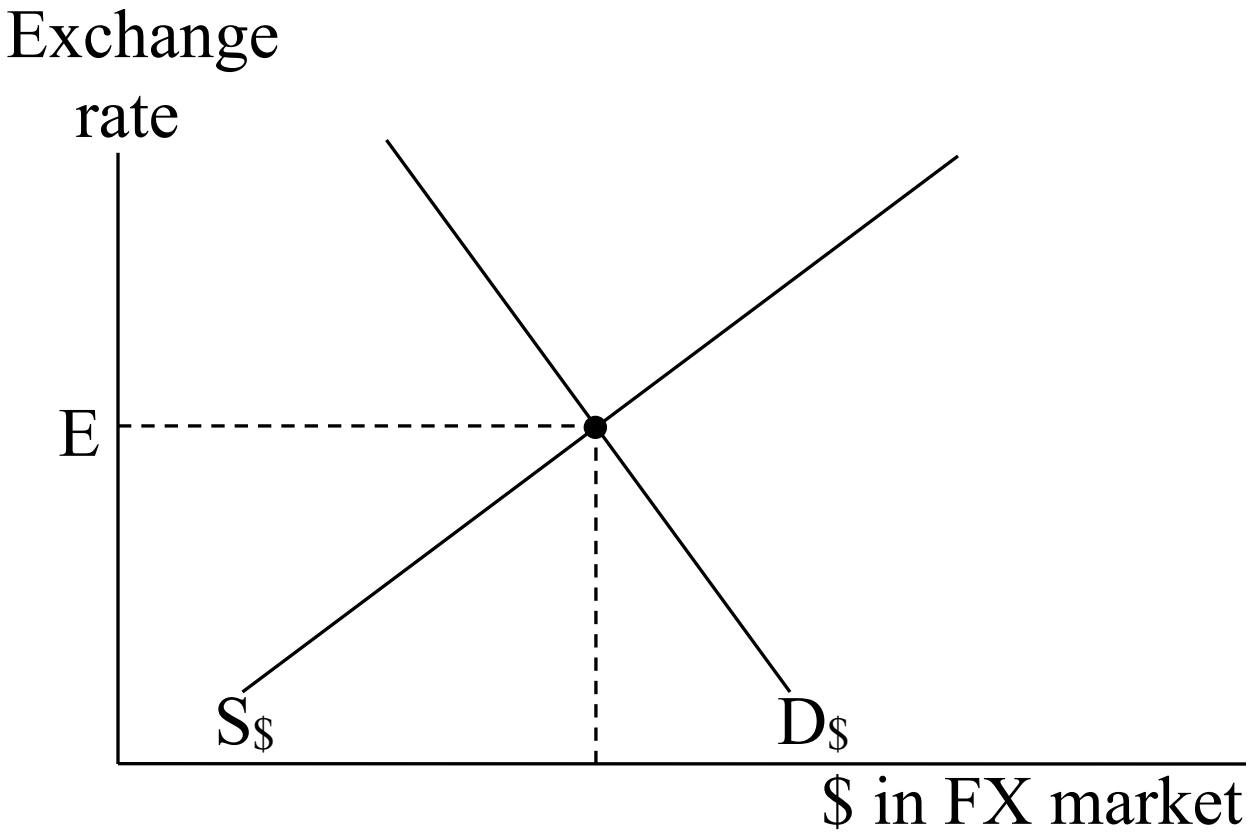
1. When the price of exports rises or the price of imports falls, the terms of trade for U.S. residents improves but the amount of net exports fall.
2. When the price of exports falls or the price of imports rises, the terms of trade for U.S. residents worsens but the amount of net exports rise.
3. When the value of imports (price multiplied by quantity) exceeds the value of exports, Americans must finance the difference abroad. This amount of foreign borrowing is call direct foreign investment.

The Exchange Rate

A. The foreign exchange (FX) market

1. The foreign exchange market is where dollars and other currencies are traded freely.
2. The exchange rate (E) is the amount of foreign currency exchanged for one U.S. Dollar.
    a. Ex., Suppose the exchange rate between the Japanese Yen and the U.S. Dollar is 95 Yen per Dollar. If you want to exchange $100 in the foreign exchange market, you will receive 9,500 Yen.
    b. The U.S. Dollar appreciates (i.e., its value increases) when E rises.
    c. The U.S. Dollar depreciates (i.e., its value decreases) when E falls.

3. Graph of the foreign exchange market.



B. The exchange rate and relative prices

1. The rest of the world is specified as a weighted average of foreign countries so there is one foreign output, (Y_W), and one foreign price level, (P_W).

2. The real exchange rate (E_R) is an exchange rate measure that adjusts for the difference in the price level between the U.S. and the rest of the world

$$E_R = (E \times P)/P_W.$$

   a. ($E \times P$) is the average price of U.S. goods in the foreign currency. (Ex., The average price of U.S. goods in the Japanese Yen.)

   b. P_W is the average price of foreign goods in the foreign currency. (Ex., The average price of Japanese goods in Japanese Yen.)

c. When E_R is high ($E_R > 1$), U.S. goods are expensive for foreigners while foreign goods are inexpensive in the U.S.

d. When E_R is low ($E_R < 1$), U.S. goods are inexpensive for foreigners while foreign goods are expensive in the U.S.

3. The purchasing power parity (PPP) says that prices of goods across countries should be equal. That is, $E_R = 1$.

   a. Since goods across countries are not perfect substitutes, prices do not have to be equal across countries.

   b. PPP does not need to hold, especially in the short run.

   c. PPP has influence on E_R and works well in the long run.

4. Assumptions about the real exchange rate.

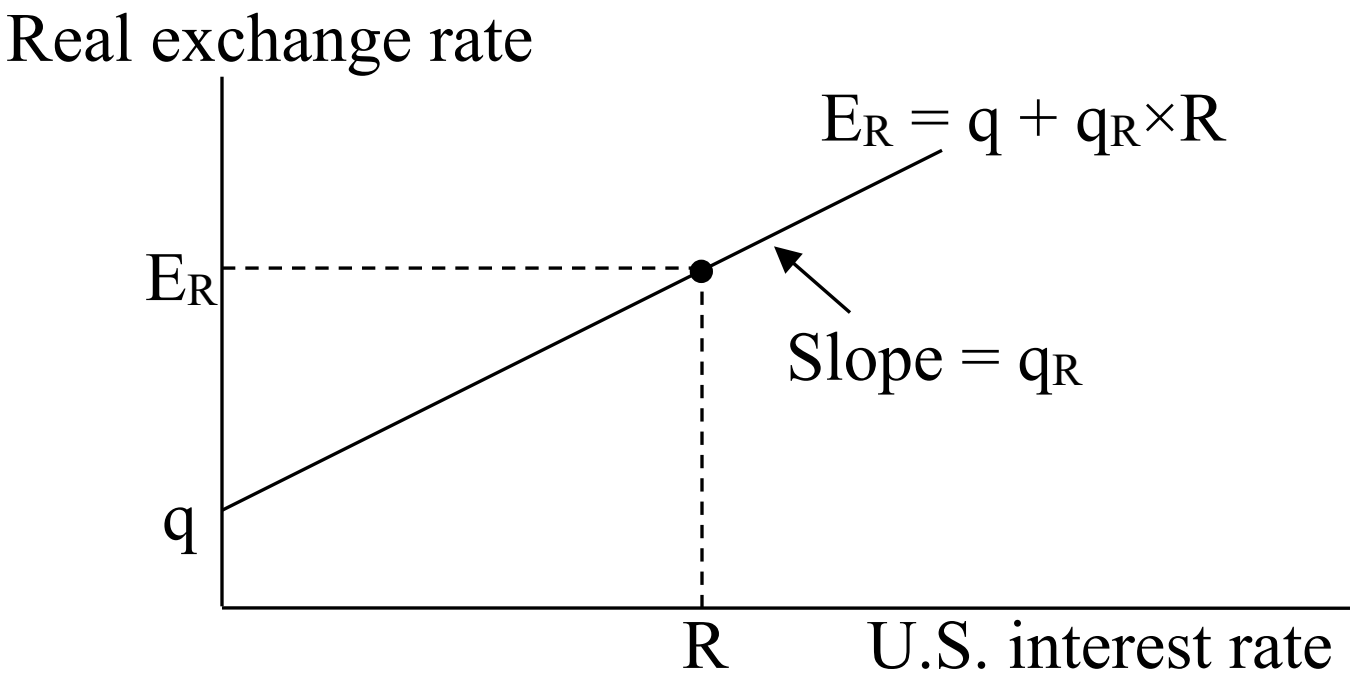
   a. P and P_W are fixed in the short run but flexible in the long run.

   b. E is completely flexible in both the short and long run.

The Real Exchange Rate and the Net Exports

A. A model of the real exchange rate

1. Suppose that the U.S. interest rate (R) rises. The higher R boosts foreign demand for U.S. assets, which increases the demand for U.S. Dollars and drives up E and E_R.
2. The positive relationship between R and E_R is shown as follows



3. Algebraically, the positive relationship between R and E_R can be expressed as

$$E_R = (E \times P)/P_W = q + q_R \times R, \qquad (1)$$

where q and q_R are constants.

B. The net exports function

1. A higher R encourages foreigners to increase their savings in U.S. assets, which raises E_R.

   a. This makes U.S. products more expensive overseas so exports (X) decline. [$E_R\uparrow \rightarrow X\downarrow$]

   b. This makes foreign products cheaper in the U.S. so imports (IM) rise. [$E_R\uparrow \rightarrow IM\uparrow$]

2. A higher disposable income (Y_D) encourages consumers to spend more on imports (IM). [$Y_D\uparrow \rightarrow IM\uparrow$]

3. The algebraic description

   a. Exports

$$X = g_{EX} - v_X \times E_R,$$

   where g_{EX} and v_X are constants.

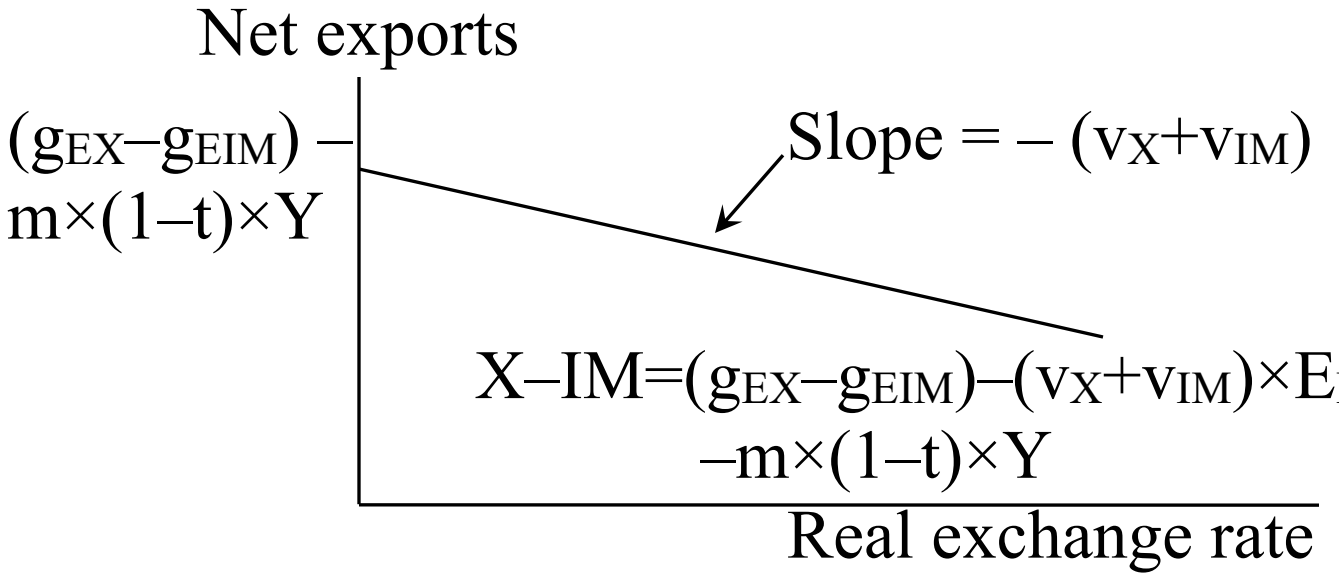
   b. Imports

$$IM = g_{EIM} + v_{IM} \times E_R + m \times (1 - t) \times Y,$$

   where g_{EIM}, v_{IM}, and m are constants.

c. Net Exports

$$(X–IM) = (g_{EX}–g_{EIM})–(v_X+v_{IM})\times E_R–m\times(1–t)\times Y. \qquad (2)$$



4. A lower foreign interest rate (R_W) encourages foreigners to increase their savings in U.S. assets, which drives up E_R.

   a. This makes U.S. products more expensive overseas so exports (X) declines. [$E_R\uparrow \rightarrow X\downarrow$]

   b. This makes foreign products cheaper in the U.S. so imports (IM) rise. [$E_R\uparrow \rightarrow IM\uparrow$]

5. The net exports function from the short-run model can easily be derived by substituting equation (3) into equation (4):

$$E_R = (E \times P)/P_W = q + q_R \times R, \qquad (3)$$

$$(X - IM) = (g_{EX} - g_{EIM}) - (v_X + v_{IM}) \times E_R - m \times (1 - t) \times Y, \qquad (4)$$

such that

$$(X - IM) = (g_{EX} - g_{EIM}) - (v_X + v_{IM}) \times (q + q_R \times R) - m \times (1 - t) \times Y.$$

By rearranging the net exports function, we get

$$(X - IM) = [(g_{EX} - q \times v_X) - (g_{EIM} + v_{IM} \times q)] - [(v_X \times q_R) + v_{IM} \times q_R)] \times R - m \times (1 - t) \times Y.$$

If we set $g_X = (g_{EX} - q \times v_X)$, $g_{IM} = (g_{EIM} + v_{IM} \times q)$, $n_X = (v_X \times q_R)$, and $n_{IM} = (v_{IM} \times q_R)$, we get the net export function from the short-run model:

$$(X - IM) = (g_X - g_{IM}) - (n_X + n_{IM}) \times R - m \times (1 - t) \times Y.$$

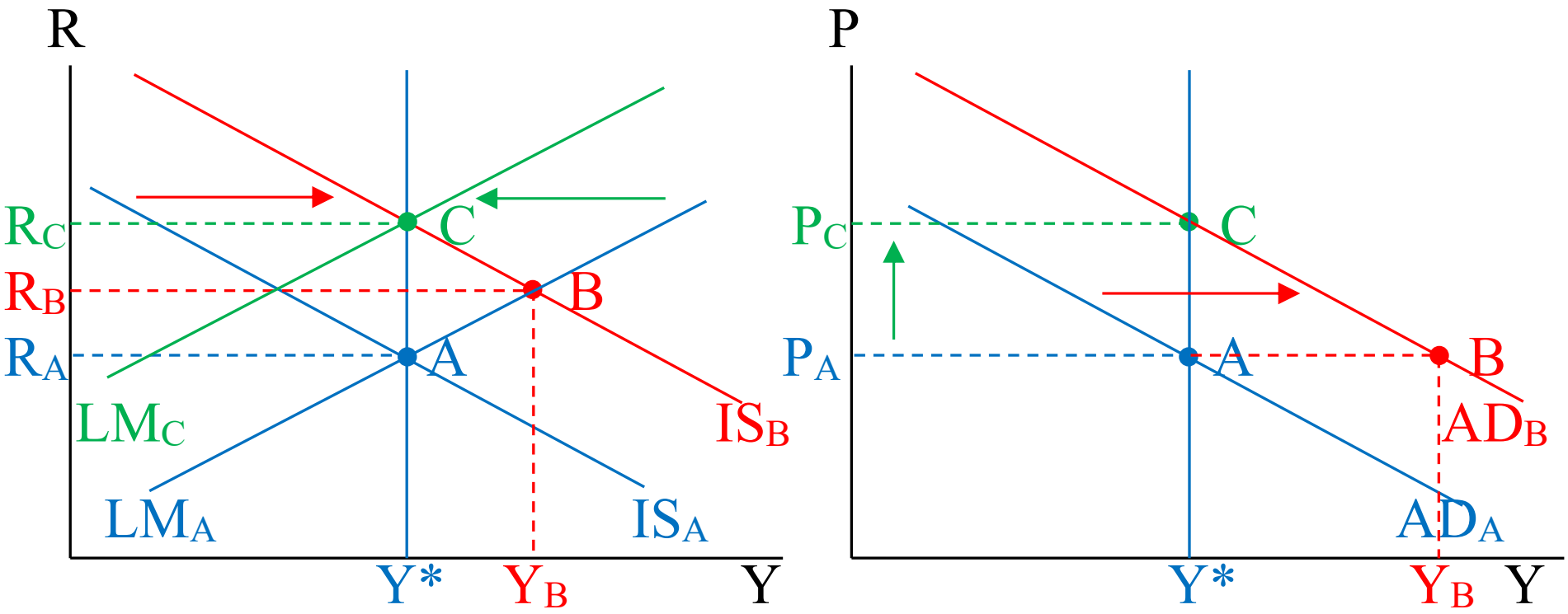
The Effects of Monetary and Fiscal Policy with Exchange Rates.

A. Suppose output starts at its potential (Y^*) and government spending (G) increases.

   1. In the short run, a rise in G pushes up Y to Y_B, which causes the IS curve to shift rightward and R to increase. The higher R raises demand for U.S. assets, which leads to an increase in E_R. Since P and P_W remains at P_A and P_W', respectively, E must increase, and the AD curve shifts rightward from AD_A to AD_B. [$G\uparrow \rightarrow Y\uparrow \rightarrow M^D\uparrow \rightarrow R\uparrow \rightarrow E_R\uparrow \rightarrow E\uparrow$]

   2. In the long run, P rises from P_A to P_C, which causes M^D and R to rise. The higher R further increases demand for U.S. assets, which leads to a further increase in E_R. A higher R and E_R force down I and (X – IM), which causes Y to return to Y^*. Therefore, in the long run an increase in G leads to a rise in R and E_R and a decline in I and (X – IM). [$Y > Y^* \rightarrow P\uparrow \rightarrow M^D\uparrow \rightarrow R\uparrow \rightarrow I\downarrow$ & $(X–IM)\downarrow \rightarrow Y\downarrow$] & [$R\uparrow \rightarrow E_R\uparrow \rightarrow E?$]

3. Graph of the effects of an increase in G.



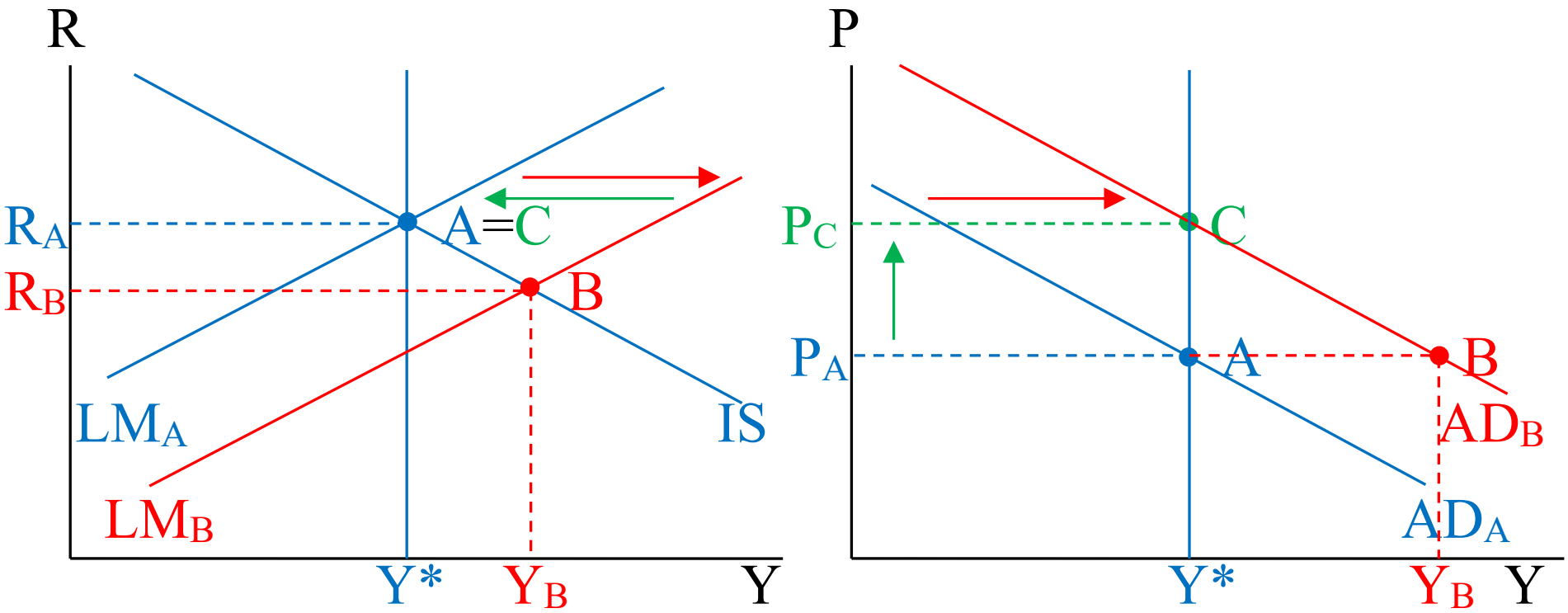
Short run: Y↑, R↑, E_R↑, E↑, and P is unchanged
Long run: Y is unchanged, R↑, E_R↑, E?, and P↑

B. Suppose output starts at its potential (Y^*) and the money supply (M^S) increases.

1. In the short run, the rise in M^S pushes down R. This leads a decreased demand for U.S. assets, which causes E_R to fall. Since P and P_W remain unchanged, the decline in E_R forces down E. The combination of a lower R and E_R leads to an increase in I and (X – IM), which forces up Y to Y_B. As a result, the AD curve shifts rightward from AD_A to AD_B. [$M^S\uparrow \rightarrow R\uparrow \rightarrow (I\uparrow \,\&\, (X–IM)\uparrow) \rightarrow Y\uparrow) \,\&\, (E_R\uparrow \rightarrow E\uparrow)$]

2. In the long run, P rises from P_A to P_C, which causes M^D and R to rise. The higher R raises the demand for U.S. assets which leads E_R to return to its pre-shock level. A higher R also pushes down I and (X – IM), which causes Y to return to Y^*. Since P has increased and E_R is unchanged, E must fall. Thus, the long-run impact of a M^S increase is that P rises, E falls, and Y, R, and E_R remain unchanged. [$Y > Y^* \rightarrow P\uparrow \rightarrow M^D\uparrow \rightarrow R\uparrow \rightarrow I\downarrow \,\&\, (X–IM)\downarrow \rightarrow Y\downarrow$].

3. Graph of the effects of an increase in M^S.

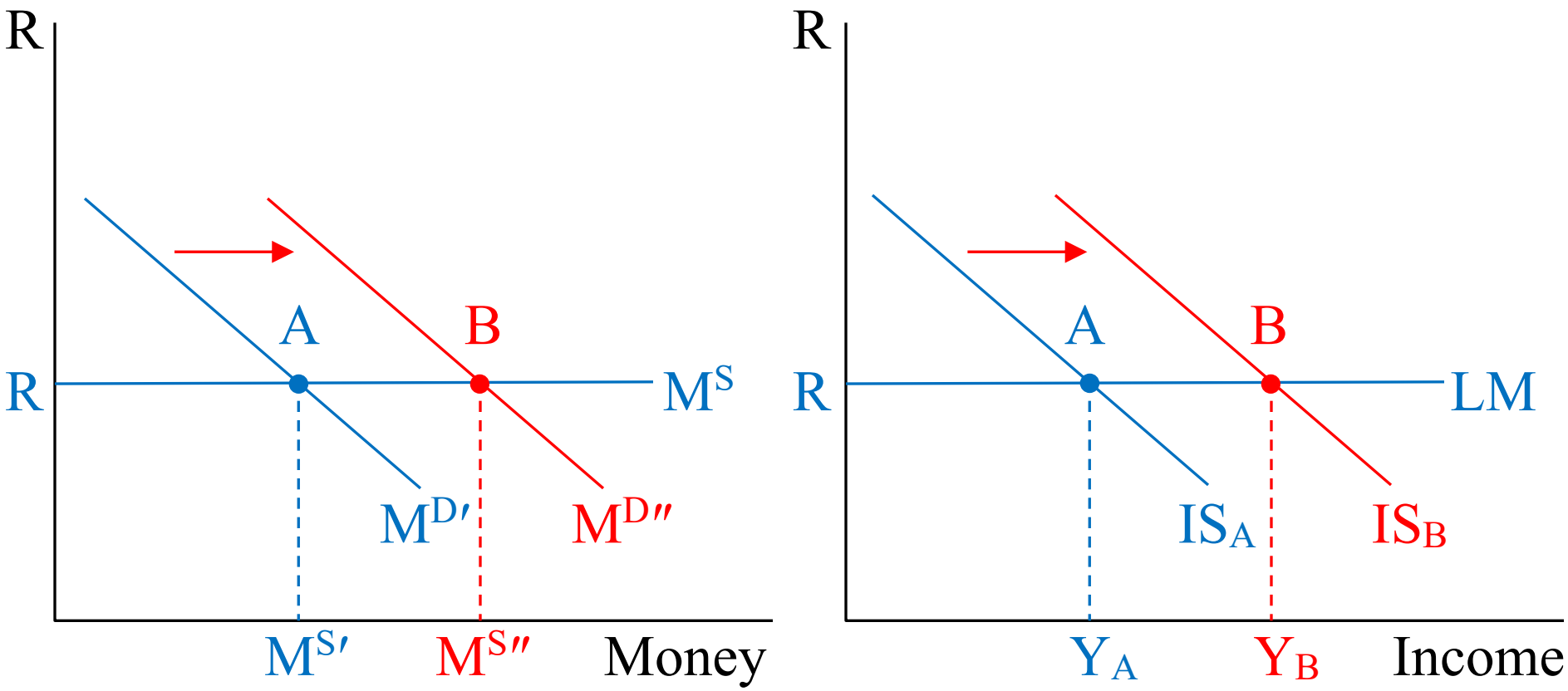


Short run: Y↑, R↓, E_R↓, E↓, and P is unchanged
Long run: Y, R, and E_R are unchanged, P↑, and E↓

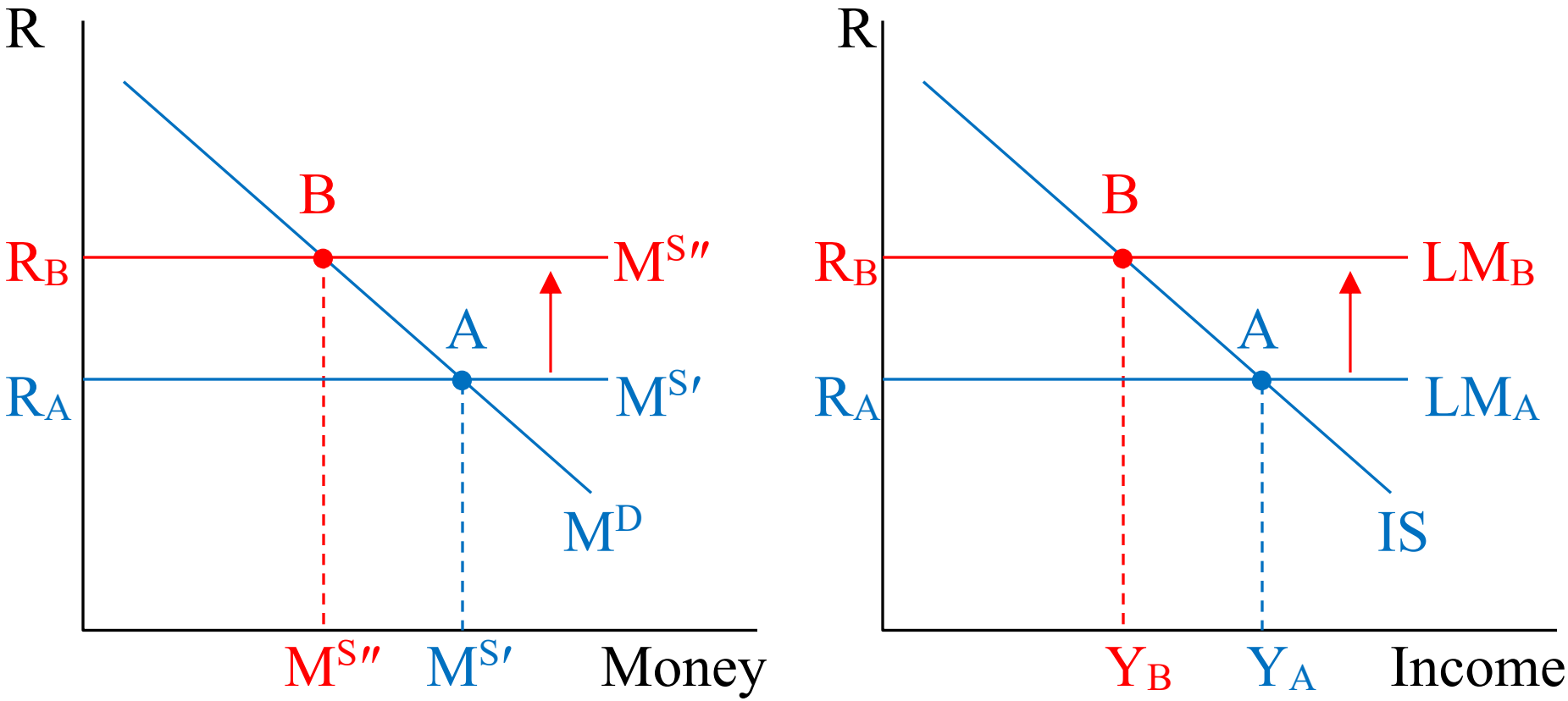
C. Suppose the Federal Reserve decides to make targeting the exchange rate the objective of monetary policy.

1. Recall, the exchange rate (E_R) increases when U.S interest rates (R) rise but decreases when foreign interest rates (R_W) rise.
2. Since E_R, responds to changes in R, the Federal Reserve must supply sufficient M^S to keep R constant.
3. Since the aim of monetary policy is to supply sufficient M^S to keep R constant, the M^S curve and the LM curve will be perfectly horizontal.
4. If the spending line shifts up (i.e., G increases), then the Fed must fully accommodate the increase in M^D from $M^{D\prime}$ to $M^{D\prime\prime}$ to keep E_R constant.
5. In the event R_W rises, the Federal Reserve must increase its target R from R_A to R_B to keep E_R constant.

6. Graphical example of an increase in G when the Federal Reserve is targeting E_R. (The same results hold for an increase in a, e, and g_X, or a decrease in g_{IM}.)



7. Graphical example of an increase in R_W when the Federal Reserve is targeting E_R.



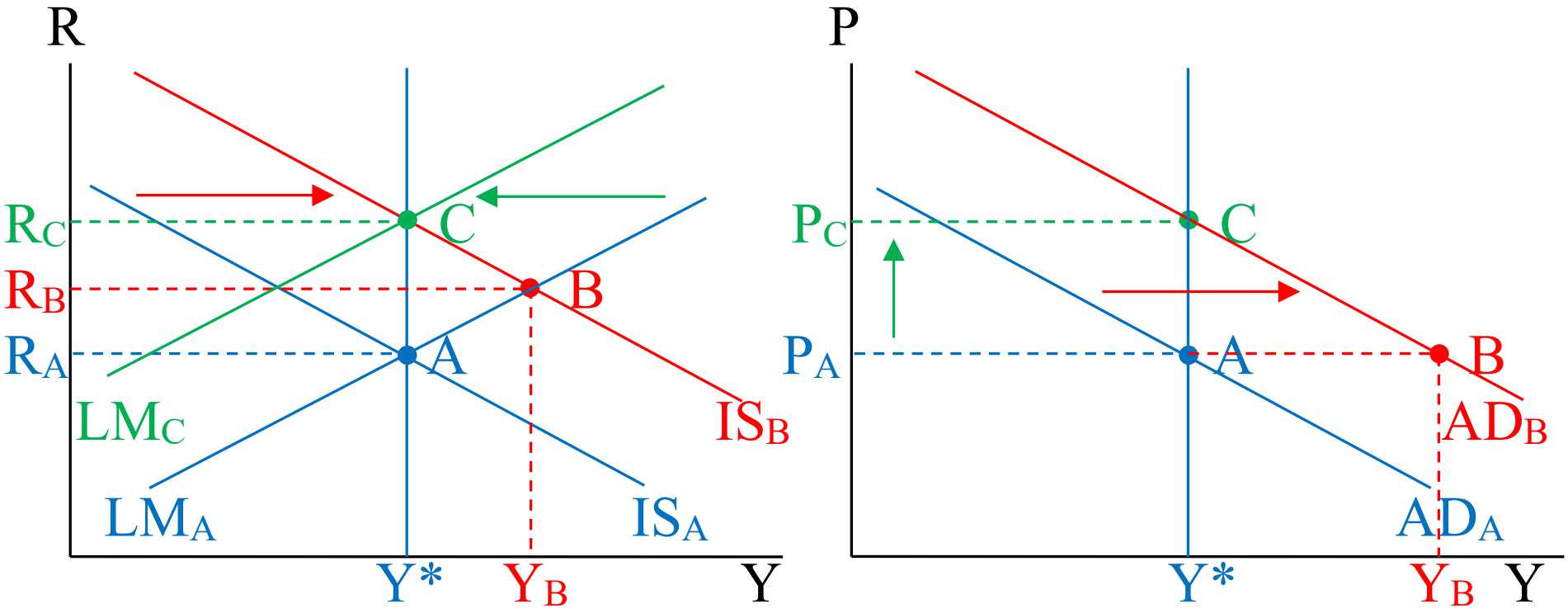
The Impact of Protectionism

A. Protection policies lessen foreign competition faced by domestic companies.
    1. Types of protection measures include
        a. Tariffs, which are a tax on imports.
        b. Quotas, which limit the quantity of imports.
        c. Outright bans of certain products.
    2. Protection policies help domestic companies because they face less competition, but these policies hurt consumers because they pay higher prices.

B. Suppose the government imposes protection policies [$g_{IM}\downarrow$].

1. In the short run, a decline in g_{IM} (i.e., X – IM rises) forces consumers to buy more domestic goods, which causes Y to rise to Y_B. This causes the IS curve to shift rightward and R to increase. The higher R increases demand for U.S. assets, which leads to an increase in E_R. Since P and P_W remains at P_A and P_W', respectively, E increases and the AD curve shifts rightward from AD_A to AD_B.
   [$g_{IM}\downarrow \rightarrow Y\uparrow \rightarrow M^D\uparrow \rightarrow R\uparrow \rightarrow E_R\uparrow \rightarrow E\uparrow$]

2. In the long run, P rises from P_A to P_C, which causes M^D and R to rise. The higher R further increases demand for U.S. assets, which leads to a further increase in E_R. A higher R and E_R combined force down I and moderate the increase in (X – IM), which causes Y to return to Y^*. Therefore, in the long run protectionist policies lead to increases in R, E_R, and (X – IM) and a decline in I. [$Y > Y^* \rightarrow P\uparrow \rightarrow M^D\uparrow \rightarrow R\uparrow \rightarrow I\downarrow$ & $(X–IM)\downarrow \rightarrow Y\downarrow$] & [$R\uparrow \rightarrow E_R\uparrow \rightarrow E?$]



Short run: Y↑, R↑, E_R↑, E↑, and P is unchanged
Long run: Y is unchanged, R↑, E_R↑, E?, and P↑

3. By enacting protectionist policies, the U.S. runs the risk of our trading partners retaliating with protection policies of their own, which would prevent the exportation of our goods [g_X↓]. This action would reverse any benefits from protectionism.