Answers to Preparation Questions for Exam #2

1. *A Model of Income Determination: Use the following information to answer parts a – e where Y is aggregate income/output, Y^d is disposable income, C is consumption, I is investment, G is government spending, and (X – IM) is net exports.*

$$Y = C + I + G + (X - IM)$$
$$Y^d = 0.75 \times Y$$
$$C = 300 + 0.85 \times Y^d$$
$$I = 550$$
$$G = 350$$
$$(X - IM) = 50 - 0.05 \times Y^d$$

a. *What is equilibrium output, consumption, and net exports for the given data?*

Substitute in the values for C, I, G, (X – IM), and Y^d into the income identity:

$$Y = 300 + 0.85\times0.75\times Y + 550 + 350 + 50 - 0.05\times0.75\times Y$$
$$Y = 1{,}250 + 0.80\times0.75\times Y$$
$$Y = 1{,}250 + 0.60\times Y$$
$$0.40\times Y = 1{,}250$$
$$Y = 1{,}250/0.40$$
$$Y^{**} = 3{,}125.$$

The values for consumption and net exports are

$$C^{**} = 300 + 0.85\times0.75\times Y^{**}$$
$$C^{**} = 300 + 0.85\times0.75\times3{,}125$$
$$C^{**} = 300 + 1{,}992.19$$
$$C^{**} = 2{,}292.19.$$

$$(X - IM)^{**} = 50 - 0.05 \times 0.75 \times Y^{**}$$
$$(X - IM)^{**} = 50 - 0.05 \times 0.75 \times 3{,}125$$
$$(X - IM)^{**} = 50 - 117.19$$
$$(X - IM)^{**} = -67.19.$$

b. *Calculate private savings, government savings and direct foreign investment.*

Private savings: $S_p = Y^d - C^{**}$

$$S_p = 0.75 \times Y^{**} - C^{**}$$
$$S_p = 0.75 \times 3{,}125 - 2{,}292.19$$
$$S_p = 3{,}343.75 - 2{,}292.19$$
$$S_p = 51.56.$$

Government savings: $S_g = t \times Y^{**} - G$

$$S_g = 0.25 \times 3{,}125 - 350$$
$$S_g = 781.25 - 350$$
$$S_g = 431.25.$$

Direct foreign investment: $S_w = -(X - IM)$**

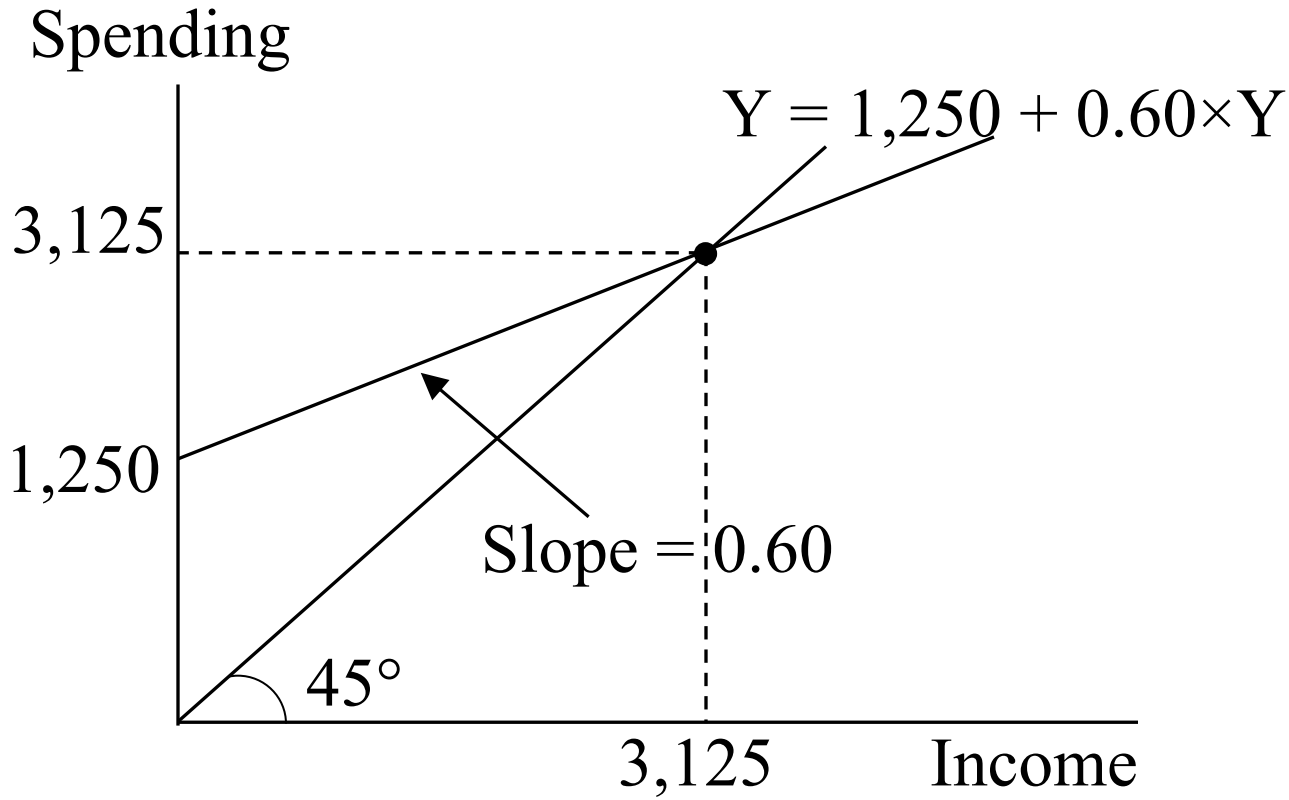
$$S_w = 67.19.$$

c. *What change in government spending is required to increase equilibrium output by $500?*

Calculate the change in government spending?

$$\Delta Y = [1/(1 - (b - m)\times(1 - t))]\times\Delta G$$
$$500 = [1/(1 - (0.85–0.05)\times(1 - 0.25))]\times\Delta G$$
$$500 = [1/(1 - 0.80\times0.75)]\times\Delta G$$
$$500 = [1/(1 - 0.60)]\times\Delta G$$
$$500 = [1/0.4]\times\Delta G$$
$$\Delta G = 500\times0.4$$
$$\Delta G = 200.$$

d. *Draw the income-spending graph for this model. Be sure to include equation, the intercept, the slope of the pending line, and the equilibrium level of output on the graph.*



2. *The IS Curve Equation*: *Use the information below for parts a – c.*

Autonomous consumption	*$80*
Autonomous exports	*380*
Autonomous imports	*30*
Autonomous investment	*920*
Government spending	*370*
Interest sensitivity of exports	*3,000*
Interest sensitivity of imports	*2,000*
Interest sensitivity of investment	*5,000*
Marginal income tax rate	*0.25*
Marginal propensity to consume	*0.88*
Marginal propensity to import	*0.12*

a. *What are the consumption, investment, and net exports functions for the given data?*

The consumption function is

$$C = a + b \times (1 - t) \times Y$$
$$C = 80 + 0.88 \times (1 - 0.25) \times Y$$
$$C = 80 + 0.66 \times Y.$$

The investment function is

$$I = e - d \times R$$
$$I = 920 - 5{,}000 \times R.$$

The net exports function is

$$(X - IM) = (g_X - g_{IM}) - (n_X + n_{IM}) \times R - m \times (1 - t) \times Y$$
$$(X - IM) = (380 - 30) - (3{,}000 + 2{,}000) \times R - 0.12 \times (1 - 0.25) \times Y$$
$$(X - IM) = 350 - 5{,}000 \times R - 0.09 \times Y.$$

b. *Write the equation for the IS curve.*

Substitute in the consumption, investment, and net exports functions and the value of G into the income identity:

$$Y = C + I + G + (X - IM)$$
$$Y = 80 + 0.66 \times Y + 920 - 5{,}000 \times R + 370 + 350 - 5{,}000 \times R - 0.09 \times Y$$
$$Y = 1{,}720 + 0.57 \times Y - 10{,}000 \times R$$
$$0.43 \times Y = 1{,}720 - 10{,}000 \times R.$$

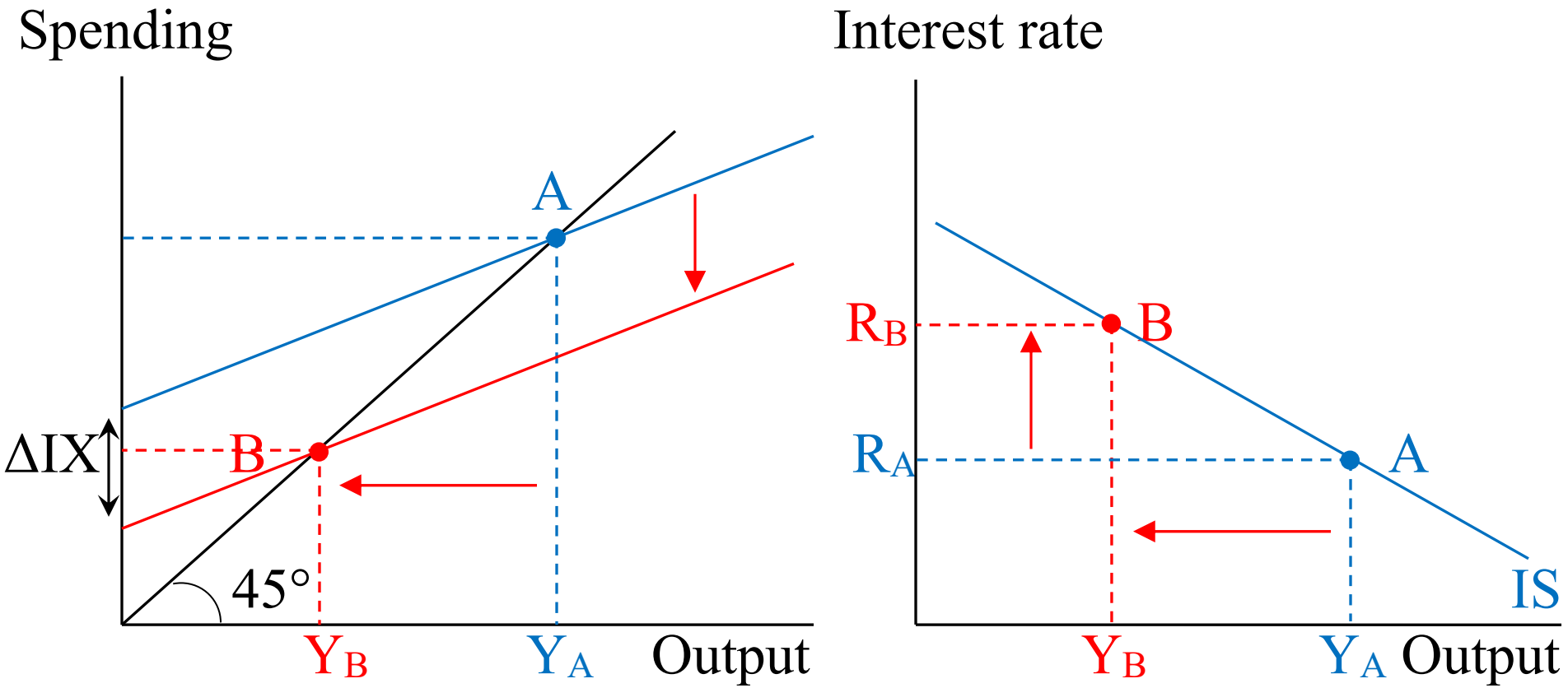
c. *Find the slope of the IS curve in part b.*

$$Y = 1{,}720 + 0.57 \times Y - 10{,}000 \times R$$
$$10{,}000 \times R = 1{,}720 - 0.43 \times Y$$
$$R = (1{,}720 - 0.43 \times Y)/10{,}000.$$

The slope of the IS curve is – 0.000043.

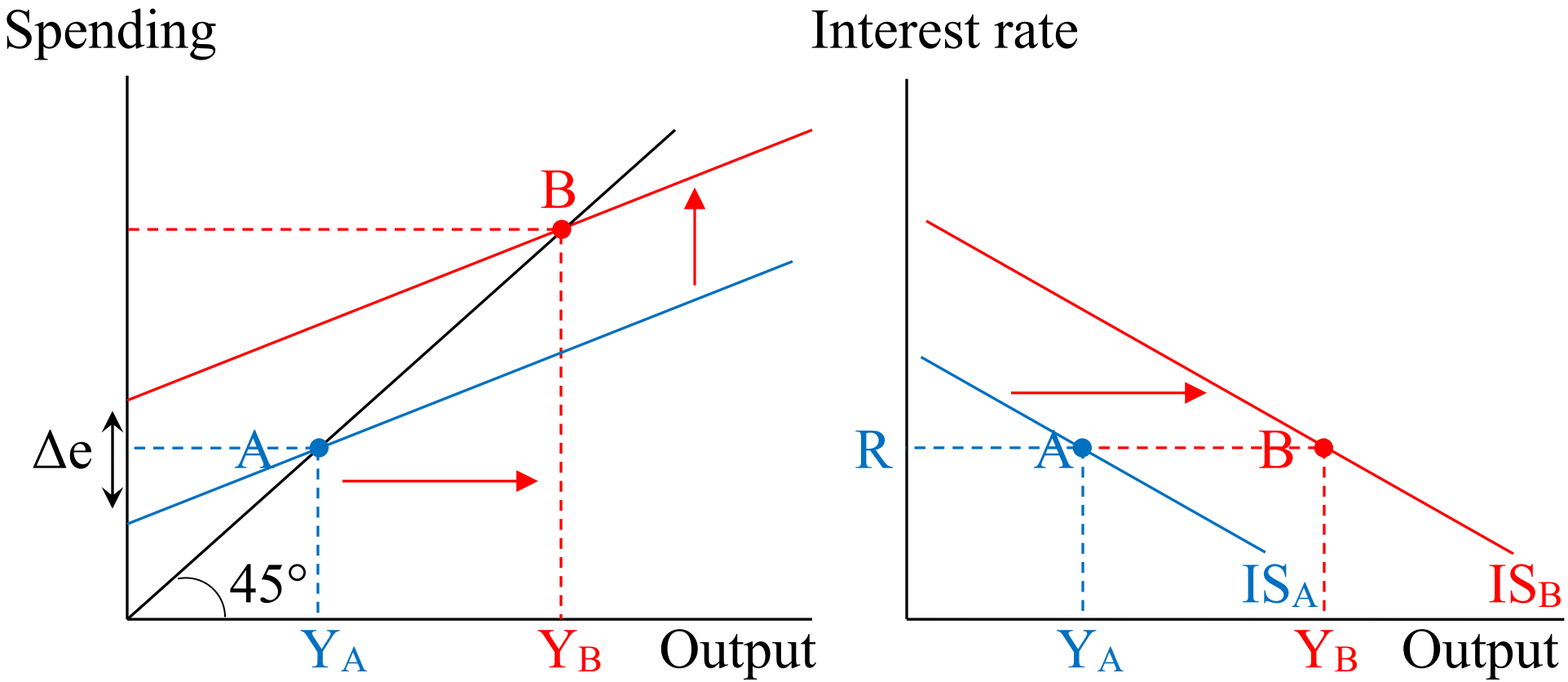
3. *Deriving the IS Curve*: *Use an income/spending graph and IS curve graph to show the short-run impact of an increase in the interest rate on output in the goods market. Include a brief explanation in your answer and be sure to properly label your graphs.*

[R↑ → I↓ & (X – IM)↓ → Y↓]



4. *Shifting the IS Curve*: *Use an income/spending graph and IS curve graph to show the short-run impact of an increase in autonomous investment on output in the goods market. Include a brief explanation in your answer and be sure to properly label your graphs.*

[e↑ → Y↑]



5. *Solving the IS-LM Model*: *Use the information below for parts a – c.*

Autonomous consumption	*$88*
Autonomous exports	*1,000*
Autonomous imports	*766*
Autonomous investment	*1,490*
Government spending	*1,500*
Interest sensitivity of exports	*2,500*
Interest sensitivity of imports	*2,500*
Interest sensitivity of investment	*3,000*
Interest sensitivity of money demand	*20,000*
Marginal income tax rate	*0.20*
Marginal propensity to consume	*0.90*
Marginal propensity to import	*0.05*
Money supply	*13,500*
Output sensitivity of money demand	*1*
Price level	*1.5*

a. *Find the equilibrium values of output and the interest rate.*

The income identity and the consumption, investment, and net exports functions are

$$Y = C + I + G + (X - IM)$$
$$C = 88 + 0.90\times(1 - 0.20)\times Y$$
$$I = 1{,}490 - 3{,}000\times R$$
$$(X - IM) = (1{,}000 - 766) - (2{,}500 + 2{,}500)\times R - 0.05\times(1 - 0.20)\times Y.$$

Combine these four equations to get the IS curve equation:

$$Y = 88 + 0.72\times Y + 1{,}490 - 3{,}000\times R + 1{,}500 + 234 - 5{,}000\times R - 0.04\times Y$$
$$Y = 3{,}312 + 0.68\times Y - 8{,}000\times R$$
$$8{,}000\times R = 3{,}312 - 0.32\times Y$$
$$2.5\times(8{,}000\times R) = 2.5\times(3{,}312 - 0.32\times Y)$$
$$20{,}000\times R = 8{,}280 - 0.80\times Y.$$

The M^D/M^S equation is the LM curve equation:

$$M^S = (k \times Y - h \times R) \times P$$
$$13{,}500 = (Y - 20{,}000 \times R) \times 1.5$$
$$13{,}500/1.5 = (Y - 20{,}000 \times R)$$
$$20{,}000 \times R = Y - 9{,}000.$$

Combine the equations for the IS and LM curves

$$8{,}280 - 0.80 \times Y = Y - 9{,}000$$
$$1.80 \times Y = 17{,}280$$
$$Y^{**} = 9{,}600.$$

Substituting the value for Y into the LM (or IS curve, not shown), we get

$$20{,}000 \times R = 9{,}600 - 9{,}000$$
$$R^{**} = 600/20{,}000$$
$$R = 0.03 = 3\%.$$

b. *Calculate equilibrium consumption, investment, and net exports.*

Substitute the equilibrium values for Y and R into the consumption, investment, and net exports functions:

Consumption: $C^{**} = 88 + 0.90 \times 0.80 \times Y^{**}$

$$C^{**} = 88 + 0.72 \times 9{,}600$$

$$C^{**} = 88 + 6{,}912$$

$$C^{**} = 7{,}000.$$

Investment: $I^{**} = 1{,}490 - 3{,}000 \times R^{**}$

$$I^{**} = 1{,}490 - 3{,}000 \times 0.03$$

$$I^{**} = 1{,}490 - 90$$

$$I^{**} = 1{,}400.$$

Net exports: $(X-IM)^{**} = 234 - 5{,}000 \times R^{**} - 0.05 \times 0.08 \times Y^{**}$

$$(X-IM)^{**} = 234 - 5{,}000 \times 0.03 - 0.04 \times 9{,}600$$

$$(X-IM)^{**} = 234 - 150 - 384$$

$$(X-IM)^{**} = -300.$$

c. *Compute private savings, government savings, and direct foreign investment.*

Private savings: $S_p = Y^d - C^{**}$

$$S_p = (1 - 0.20) \times Y^{**} - C^{**}$$

$$S_p = 0.80 \times 9{,}600 - 7{,}000$$

$$S_p = 7{,}680 - 7{,}000$$

$$S_p = 680.$$

Government savings: $S_g = t \times Y^{**} - G$

$$S_g = 0.20 \times 9{,}600 - 1{,}500$$

$$S_g = 1{,}920 - 1{,}500$$

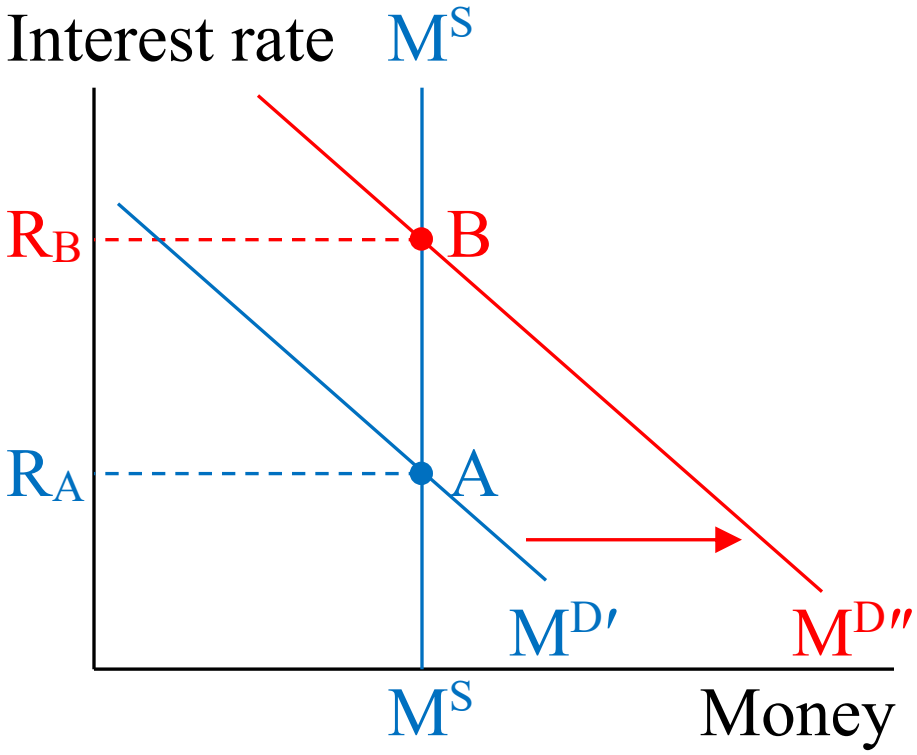
$$S_g = 420.$$

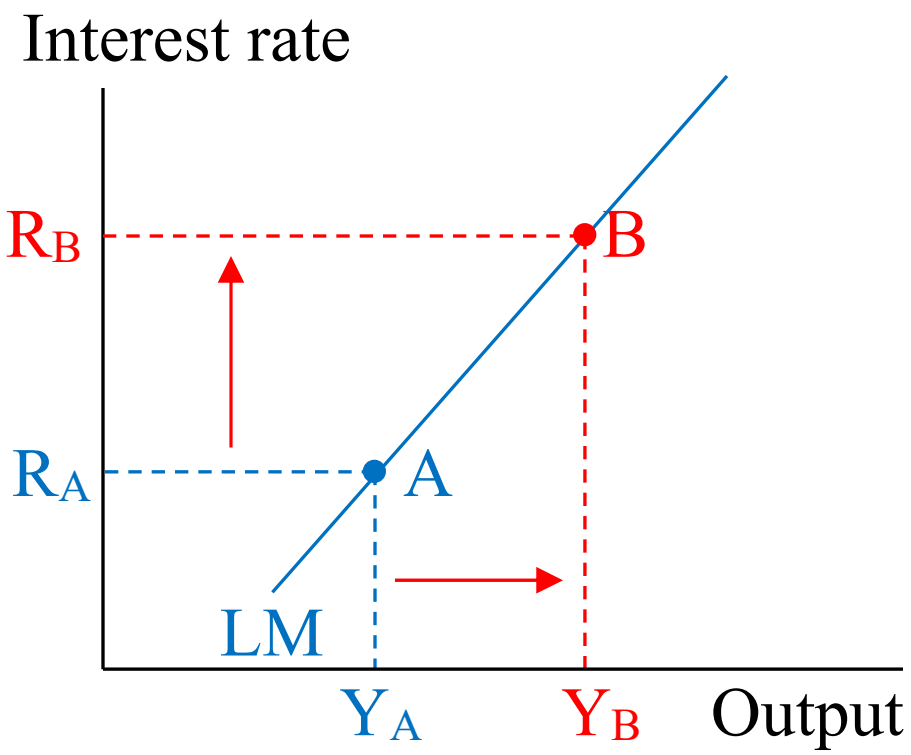
Direct foreign investment: $S_w = -(X - IM)^{**}$

$$S_w = 300.$$

6. *Deriving the LM Curve: Use a money demand/supply graph and LM curve graph to show the short-run impact of an increase in output on the interest rate in the money market. Include a brief explanation in your answer and be sure to properly label your graphs.*

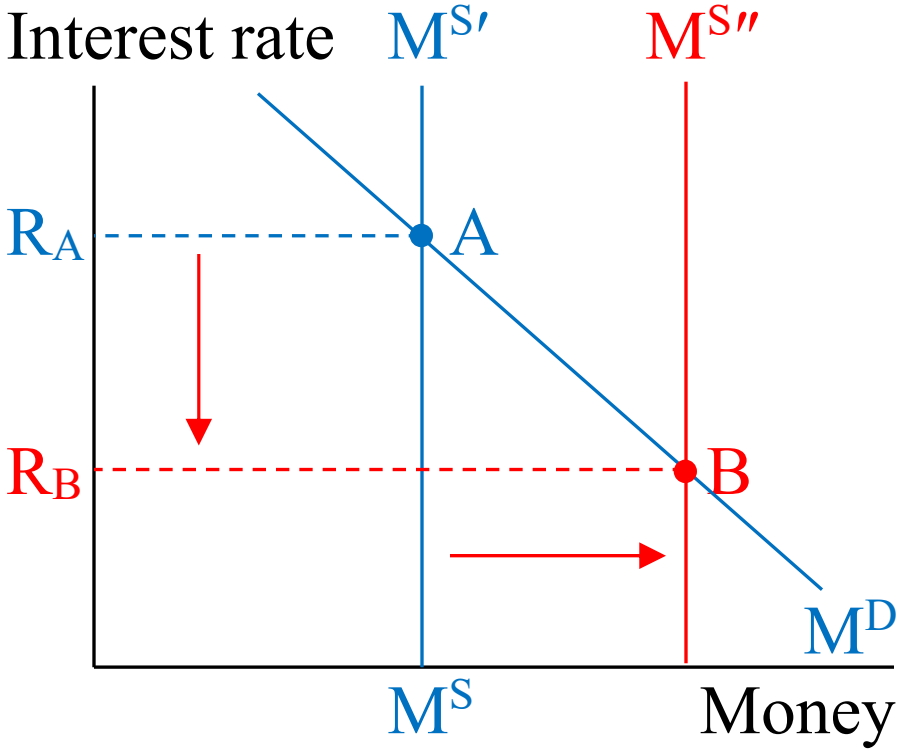
[$Y\uparrow \rightarrow M^D\uparrow \rightarrow R\uparrow$]

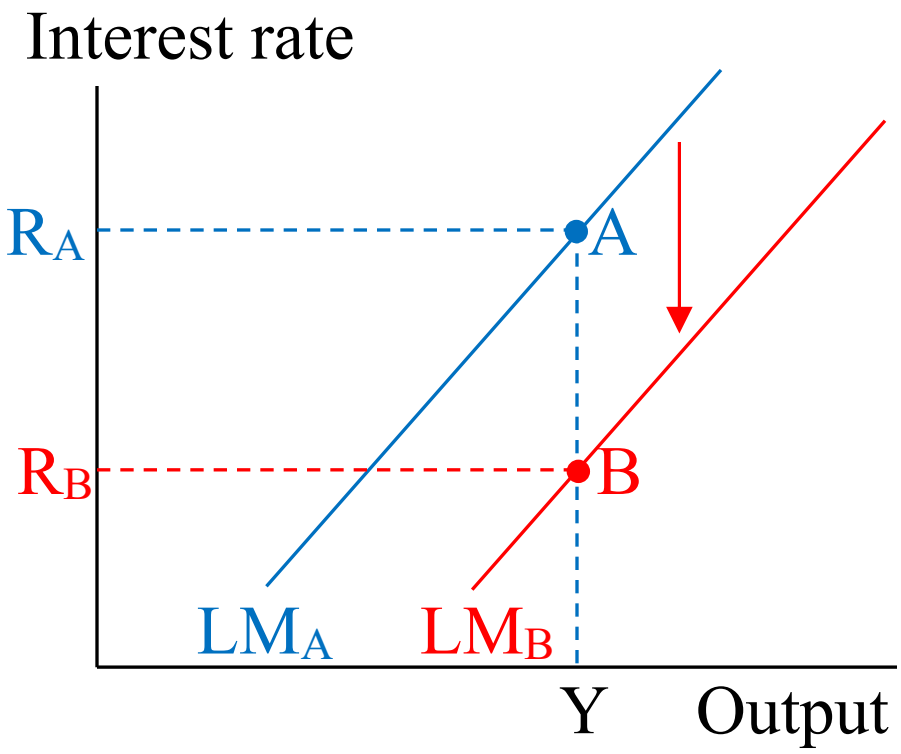




7. *Shifting the LM Curve (1): Use a money demand/supply graph and LM curve graph to show the short-run impact of an increase in the money supply on the interest rate in the money market. Include a brief explanation in your answer and be sure to properly label your graphs.*

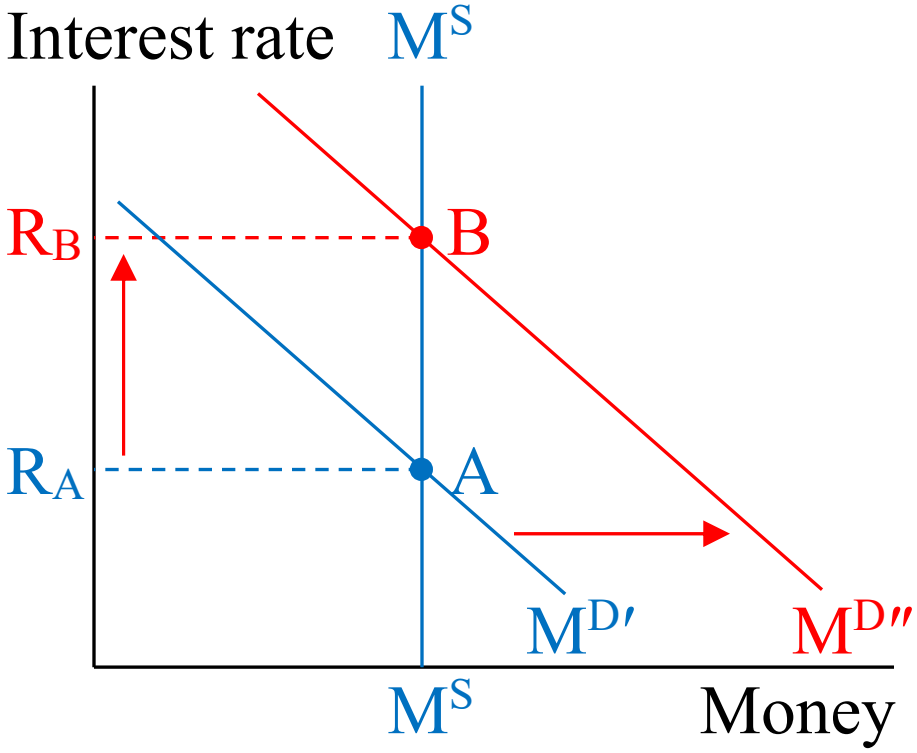
[$M^S\uparrow \rightarrow R\downarrow$]

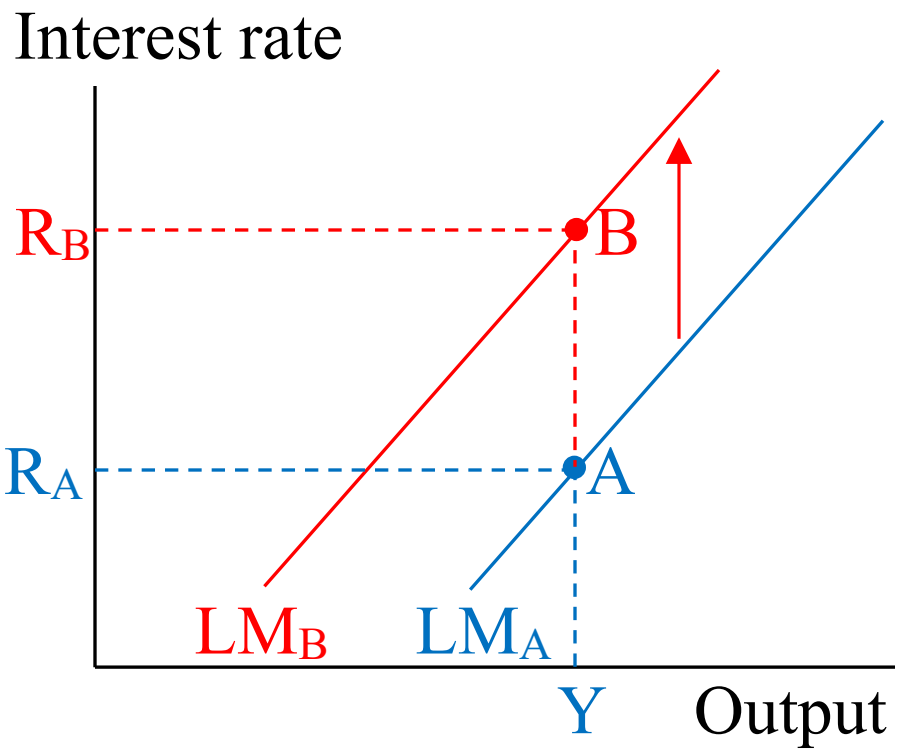




8. *Shifting the LM Curve (2): Use a money demand/supply graph and LM curve graph to show the short-run impact of an increase in the price level on the interest rate in the money market. Include a brief explanation in your answer and be sure to properly label your graphs.*

[$P\uparrow \rightarrow M^{D}\uparrow \rightarrow R\uparrow$]



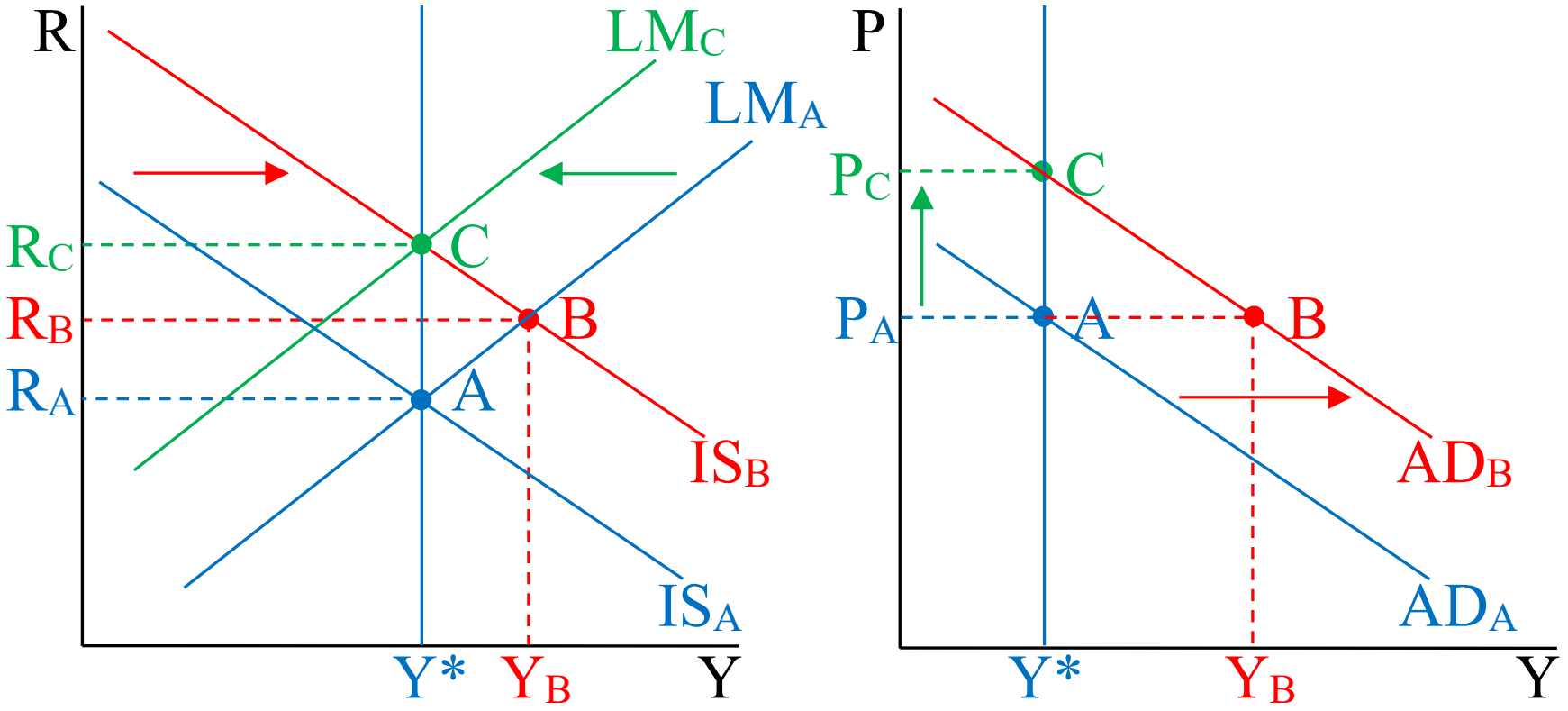


9. *A Change in the Autonomous Consumption*: *Suppose output is initially at its potential. Autonomous consumption then increases.*

   a. *Use an IS-LM graph and an aggregate demand graph to show the short-run and long-run effects of that increase on output, the interest rate, and the price level. Include a brief explanation in your answer and be sure to properly label your graphs.*

Short run: [a↑ → Y↑ → M^D↑ → R↑]

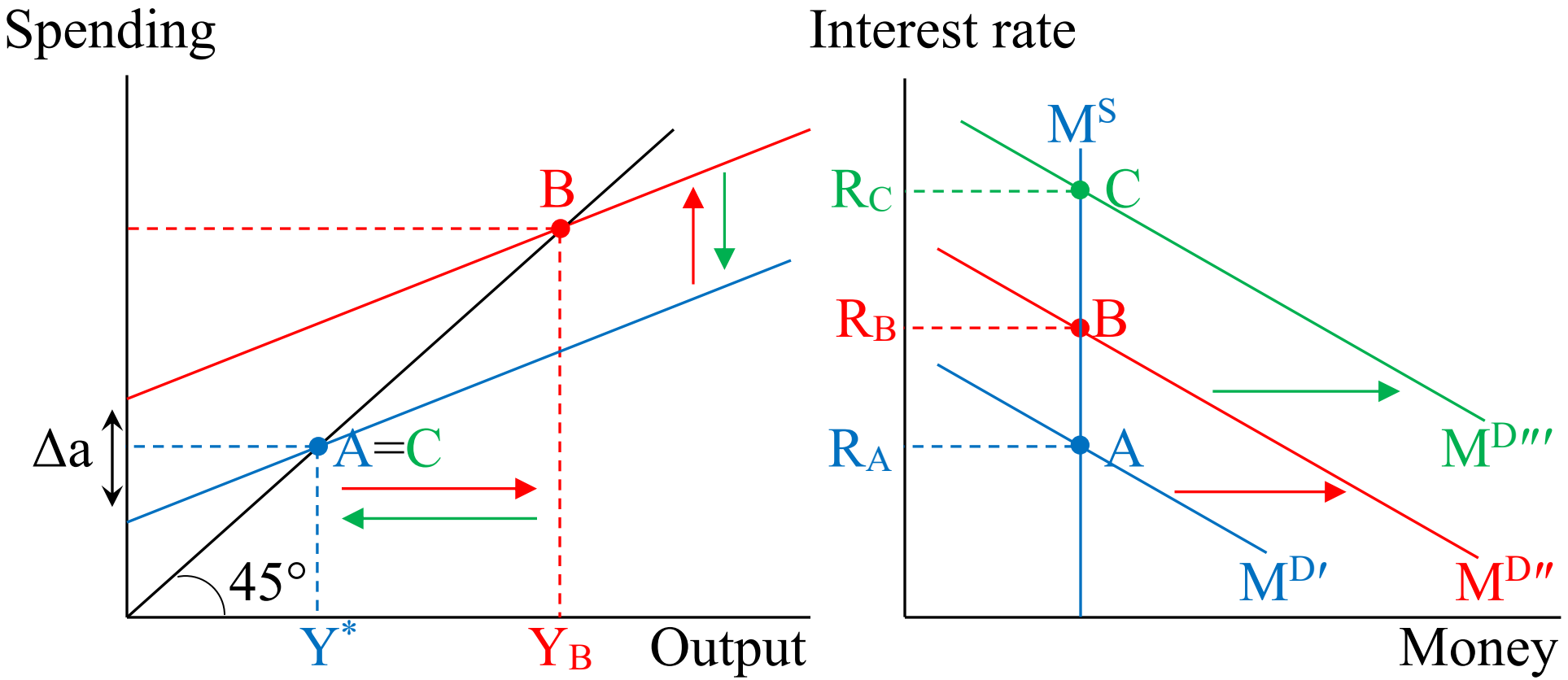
Long run: [Y>Y* → P↑ → M^D↑ → R↑ → I↓ & (X–IM)↓ → Y↓]



Short run: Y↑, R↑, and P is unchanged

Long run: Y=Y*, R↑, and P↑

b. *Use an income/spending graph and a money market graph to show the short-run and long-run effects of that increase on output and the interest rate. Be sure to properly label your graphs.*

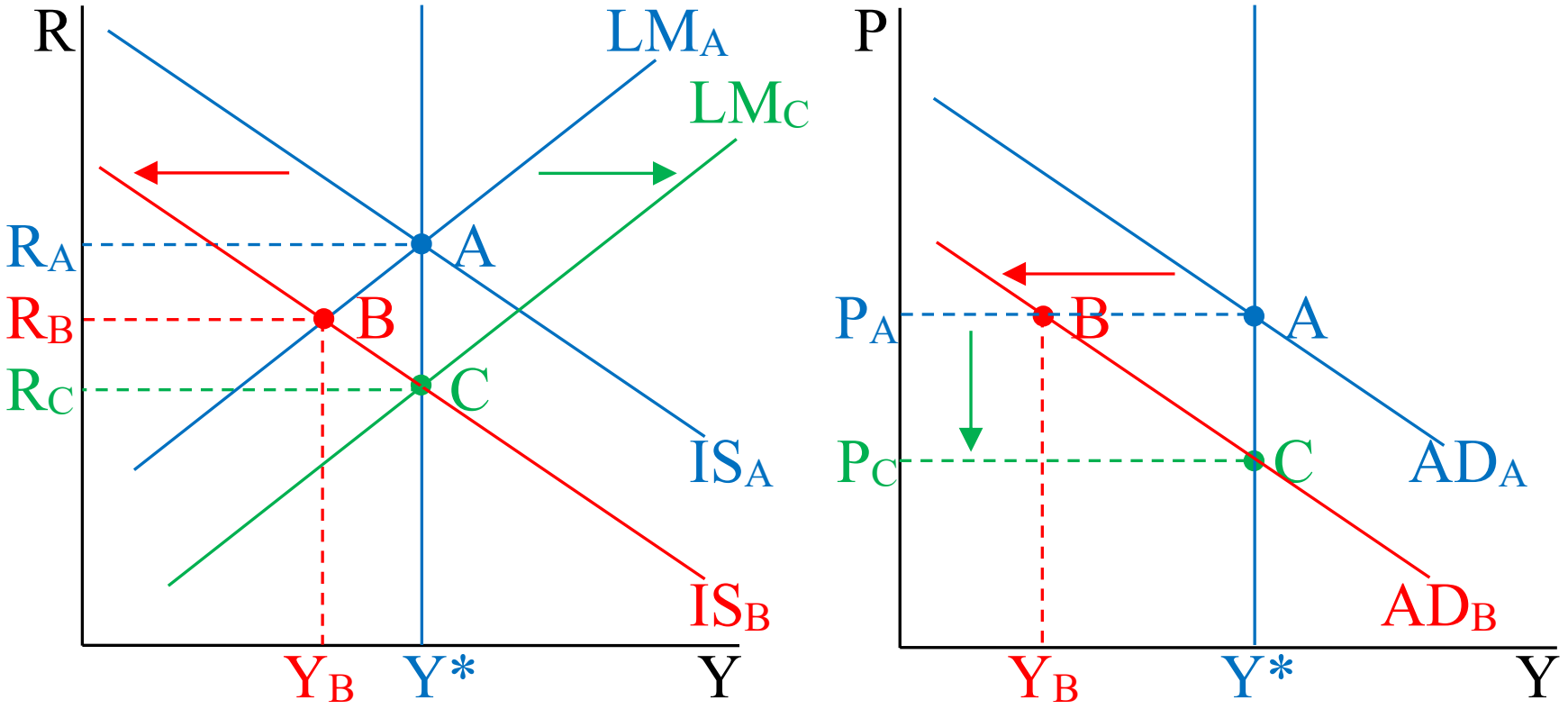


Initial: Point A; Short-run: Point B; Long-run: Point C

10. *A Change in Government Spending*: *Suppose output is initially at its potential. Government spending then decreases.*

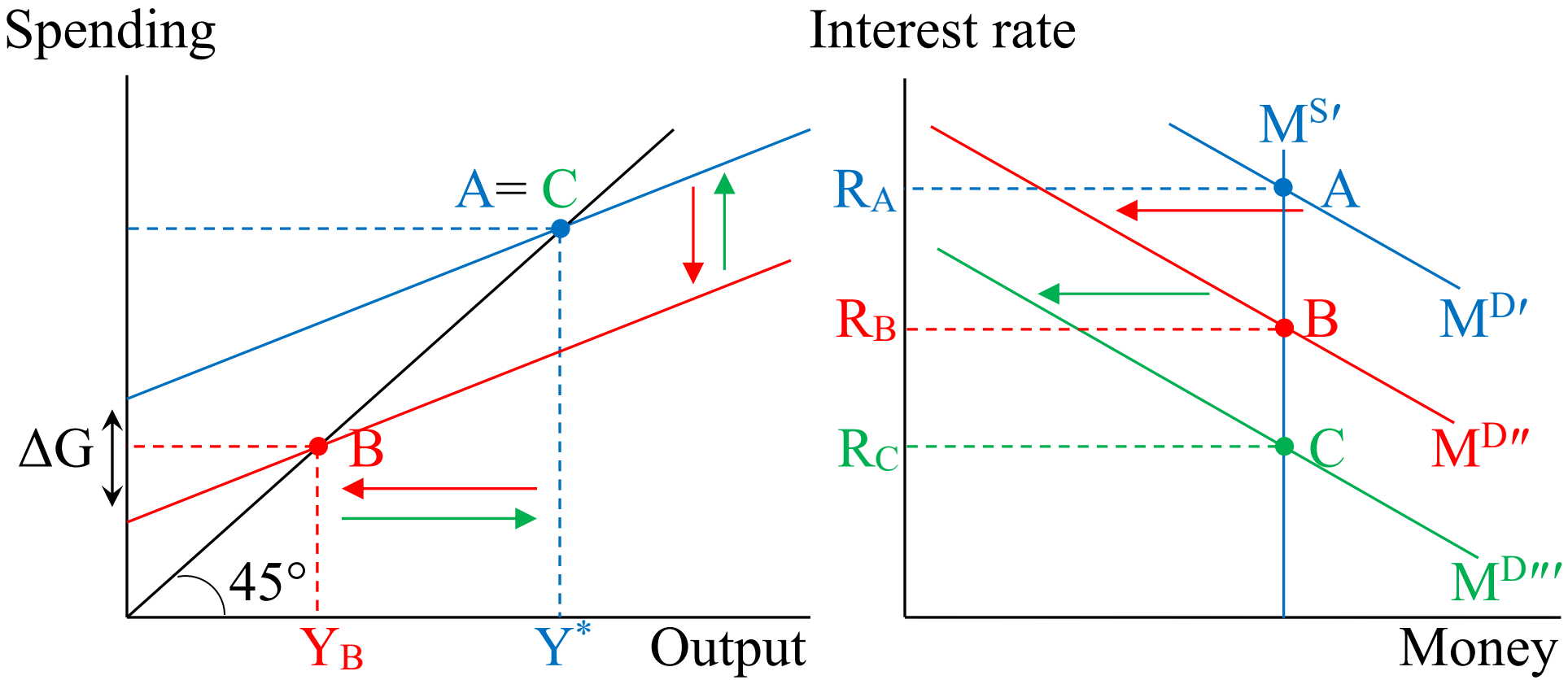
    a. *Use an IS-LM graph and an aggregate demand graph to show the short-run and long-run effects of that decrease on output, the interest rate, and the price level. Include a brief explanation in your answer and be sure to properly label your graphs.*

Short run: [G↓ → Y↓ → M^D↓ → R↓]
Long run: [Y<Y* → P↓ → M^D↓ → R↓ → I↑ & (X–IM)↑ → Y↑]



Short run: Y↓, R↓, and P is unchanged
Long run: Y=Y*, R↓, and P↓

b. *Use an income/spending graph and a money market graph to show the short-run and long-run effects of that decrease on output and the interest rate. Be sure to properly label your graphs.*



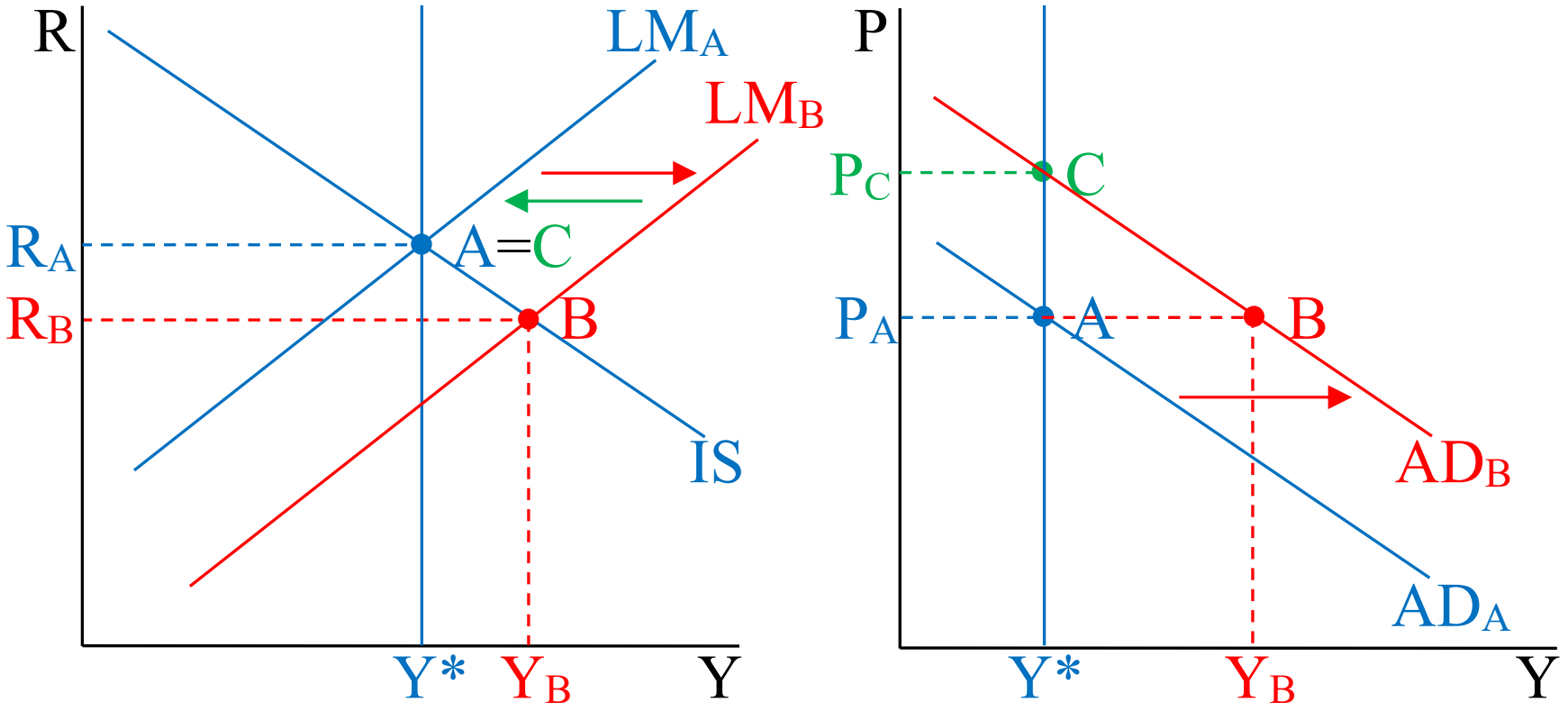
Initial: Point A; Short-run: Point B; Long-run: Point C

11. *A Change in the Money Supply: Suppose output is initially at its potential. The money supply then increases.*

    a. *Use an IS-LM graph and an aggregate demand graph to show the short-run and long-run effects of that increase on output, the interest rate, and the price level. Include a brief explanation in your answer and be sure to properly label your graphs.*

Short run: [$M^S\uparrow \rightarrow R\downarrow \rightarrow I\uparrow$ & $(X–IM)\uparrow \rightarrow Y\uparrow$]

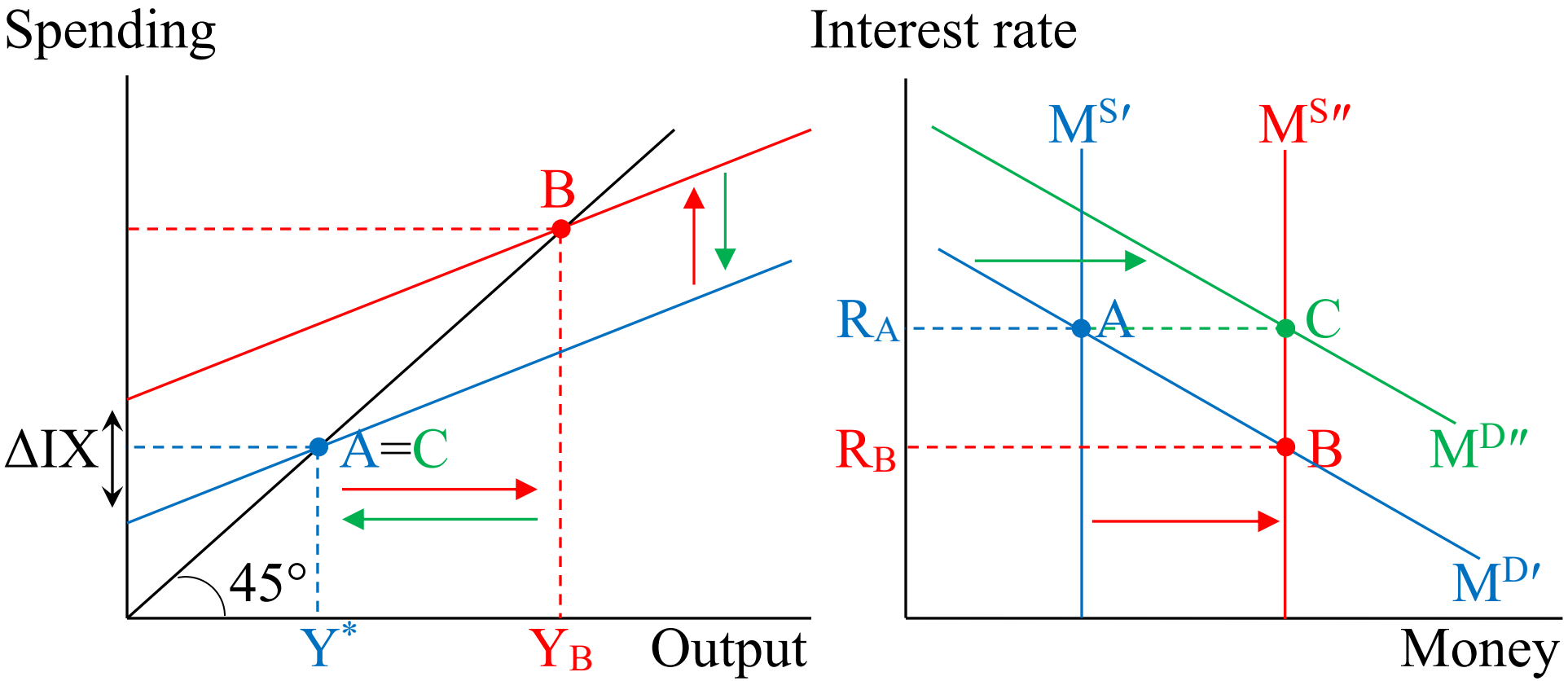
Long run: [$Y>Y^* \rightarrow P\uparrow \rightarrow M^D\uparrow \rightarrow R\uparrow \rightarrow I\downarrow$ & $(X–IM)\downarrow \rightarrow Y\downarrow$]



Short run: Y↑, R↓, and P is unchanged

Long run: Y=Y*, R is unchanged, and P↑

b. *Use an income/spending graph and a money market graph to show the short-run and long-run effects of that increase on the money supply on output and the interest rate. Be sure to properly label your graphs.*



Initial: Point A; Short-run: Point B; Long-run: Point C

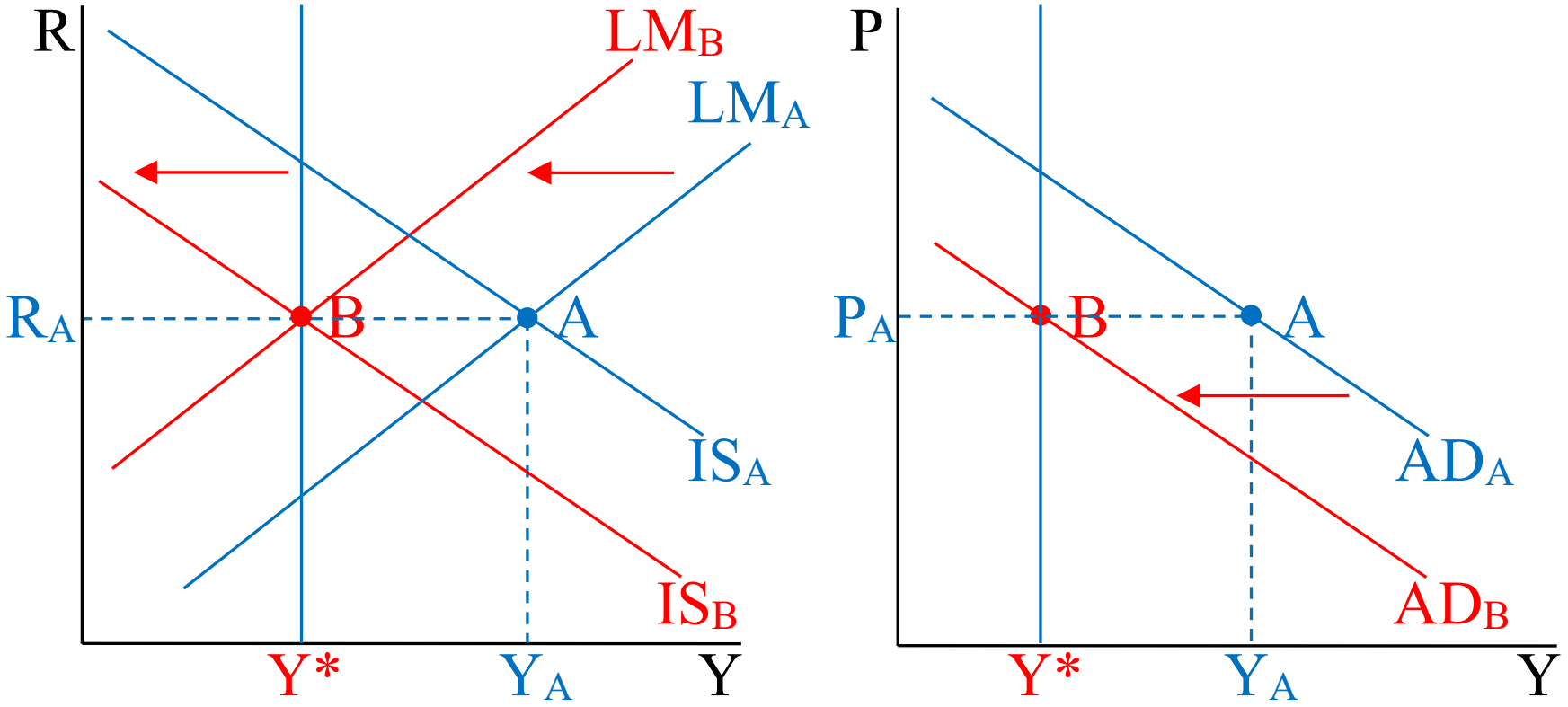
Note: $\Delta IX = \Delta I + \Delta(X - IM)$

12. *Stabilization Policy: Suppose actual output is initially above potential output. If policymakers prefer price stability and do not desire higher interest rates, what type of stabilization policy should it use and then briefly explain how that policy will impact the economy? Use an IS/LM graph and an aggregate demand graph to support your answer.*

Fiscal Policy: G↓ [G↓ → Y↓ → M^D↓ → R↓] or

Taxes↑ [Taxes↑ → Y^D↓ → C↓ → Y↓ → M^D↓ → R↓]

Monetary Policy: M^S↓ [M^S↓ → R↑ → I↓ & (X–IM)↓ → Y↓]

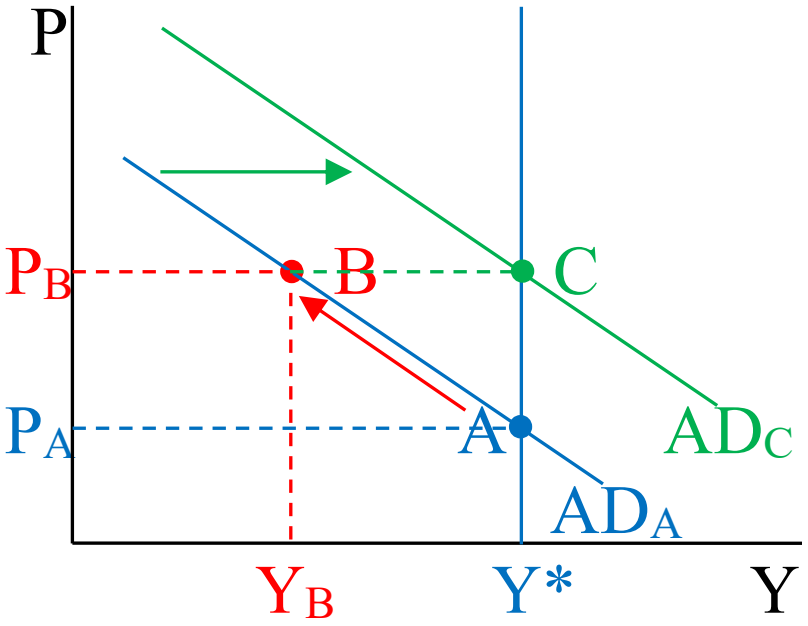


G↓ and/or Taxes↑ shift(s) the IS curve left.

M^S↓ shifts the LM curve left.

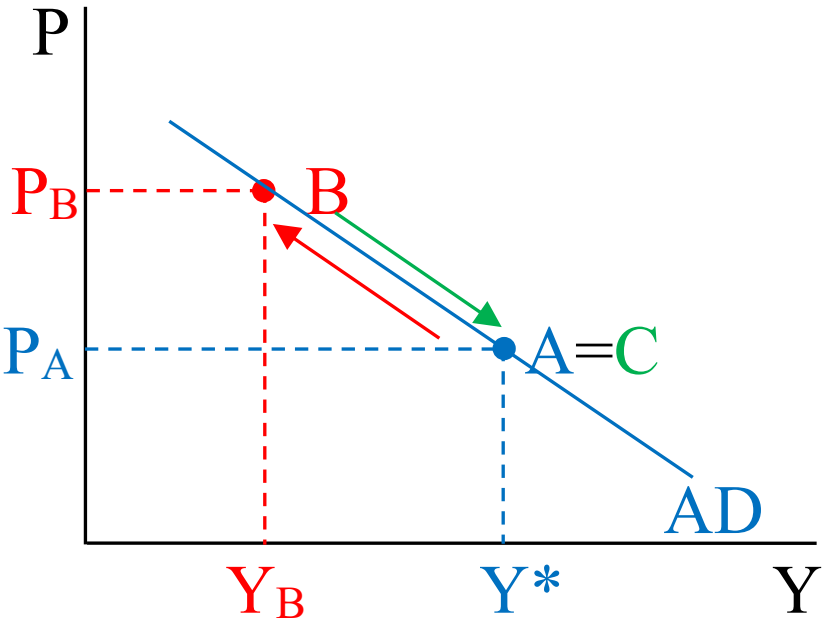
13. *Accommodative vs. Nonaccommodative Monetary Policy*: *Suppose the economy is initially at potential output. A rapid increase in energy prices then pushes up the price level. What are the advantages and disadvantages of using accommodative and nonaccommodative monetary policy? In your answer, state the short- and long-run impacts of each policy on the price level and output. Use an aggregate demand graph for each policy option to support your answer.*

Accom. Monetary Policy
Money Supply Increases



Adv: Y = Y* in short run
Disadv: P↑ in long run

Nonaccom. Monetary Policy
No Change in Money Supply



Adv: P is unchanged in long run
Disadv: Y < Y* in short run

14. *The Phillip's Curve*: *Use Okun's law and the Phillips curve to derive a relationship between inflation and unemployment. Is inflation related to the current period unemployment or last period's unemployment?*

Phillips curve: $\pi = \pi^e + f[(Y_{-1} - Y^*)/Y^*]$
Okun's law: $(Y - Y^*)/Y^* = -2\times(U - U^*)$

Back date Okun's law by one period

$$(Y_{-1} - Y^*)/Y^* = -2\times(U_{-1} - U^*)$$

And then substitute it into the Taylor rule to get

$$\pi = \pi^e - f[(2\times(U_{-1} - U^*)].$$

Thus, inflation (π) is related to last period's unemployment rate (U_{-1}).