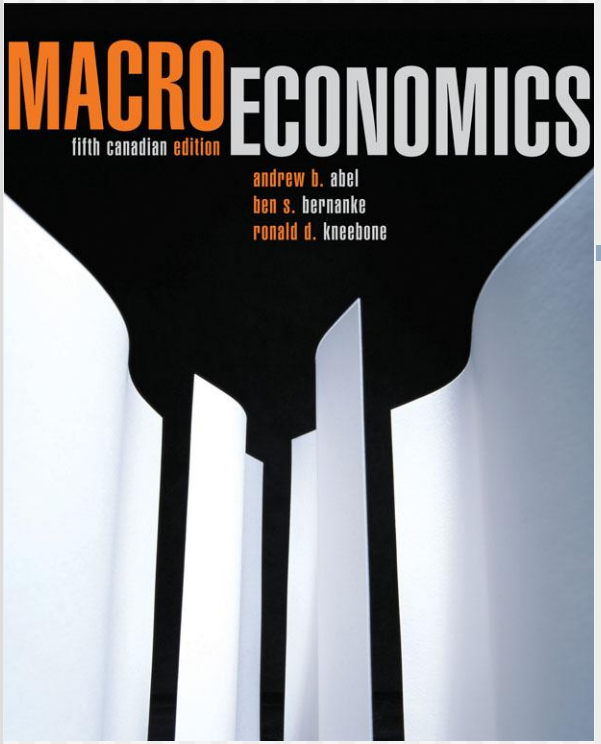

Chapter 10

Exchange Rates, Business Cycles, and Macroeconomic Policy in the Open Economy Part 1

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The Open Economy

- We want to build an open-economy version of the IS-LM model.
- Two aspects of the interdependence of the world economies:
  - international trade in goods and services;
  - worldwide integration of financial markets.
- These are the links to the rest of the world.

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Nominal Exchange Rates

- If someone in one country wants to buy goods, services, or assets from someone in another country, normally she will first have to exchange her currency for that of her trading partner's country.
- The nominal exchange rate, or exchange rate, between two currencies, e_{nom}, is the number of units of foreign currency which can be purchased with a unit of the domestic currency.
- For example, looking at euros, with a Canadian dollar in late March 2010 one could get about 74 euro cents.

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Exchange Rate Systems

- In a flexible-exchange-rate, or floating-exchange-rate system, exchange rates are not officially fixed, but are determined by conditions of supply and demand in the foreign exchange market.
- Under this system exchange rates adjust continuously in response to market developments.
- In a fixed-exchange-rate system exchange rates are set at officially determined levels.
- The official rates are maintained by the commitment of nations' central banks to buy and sell their own currencies at the fixed exchange rate.
- Canada had such a system in the 1960s.

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Real Exchange Rate

- The real exchange rate is the number of foreign goods someone gets in exchange for one domestic good.
- Real exchange rates are based on price indexes of "baskets" of goods. We assume that each country produces a single good.
- The real exchange rate is what matters for real economic activity.

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Real Exchange Rate (continued)

$$e = \frac{e_{nom} P}{P_{For}}$$

e_{nom} is the nominal exchange rate;

P_{For} is the price of foreign goods, measured in the foreign currency;

P is the price of domestic goods, measured in nominal currency.

- This is an important relationship for what follows.

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Appreciation and Depreciation

- Under a nominal depreciation the nominal exchange rate, e_{nom}, falls, a dollar buys less units of foreign currency, it becomes "weaker".
- Under a nominal appreciation the nominal exchange rate, e_{nom} rises, a Canadian dollar buys more units of foreign currency, it becomes "stronger".
- The terms "depreciation" and "appreciation" are associated with flexible exchange rates.
- The fixed-exchange rate system equivalents are devaluation and revaluation.

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Appreciation and Depreciation (continued)

- A real appreciation is an increase in the real exchange rate, "*e*".
- With real appreciation the same quantity of domestic goods can be traded for more foreign goods.
- A real depreciation is a drop in the real exchange rate.

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Purchasing Power Parity

- How are nominal and real exchange rates related?
- Purchasing Power Parity (PPP) says similar foreign and domestic goods, or baskets of goods, should have the same price in terms of the same currency ($e = 1$).

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Purchasing Power Parity (continued)

- PPP implies that:

$$e_{nom} = \frac{P_{For}}{P}$$

- This says that the nominal exchange rate changes quickly to reflect relative price movements.
- PPP holds only in the very long-run, if then.
- To find a relationship that holds more generally we can use the definition of the real exchange rate and derive a relative PPP measure.

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Purchasing Power Parity (continued)

$$\frac{\Delta e}{e} = \frac{\Delta e_{nom}}{e_{nom}} + \frac{\Delta P}{P} - \frac{\Delta P_{For}}{P_{For}}$$

After re-arranging $$\frac{\Delta e_{nom}}{e_{nom}} = \frac{\Delta e}{e} + \pi_{For} - \pi$$

So, relative PPP is $$\frac{\Delta e_{nom}}{e_{nom}} = \pi_{For} - \pi$$

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The Real Exchange Rate and Net Exports

- Why are we worried about the real exchange rate?
- The real exchange rate:
  - represents the rate at which domestic goods can be traded for foreign goods;
  - affects a country's net export.
- The higher the real exchange rate, the lower is a country's net exports.
- In this way real economic activity is affected.

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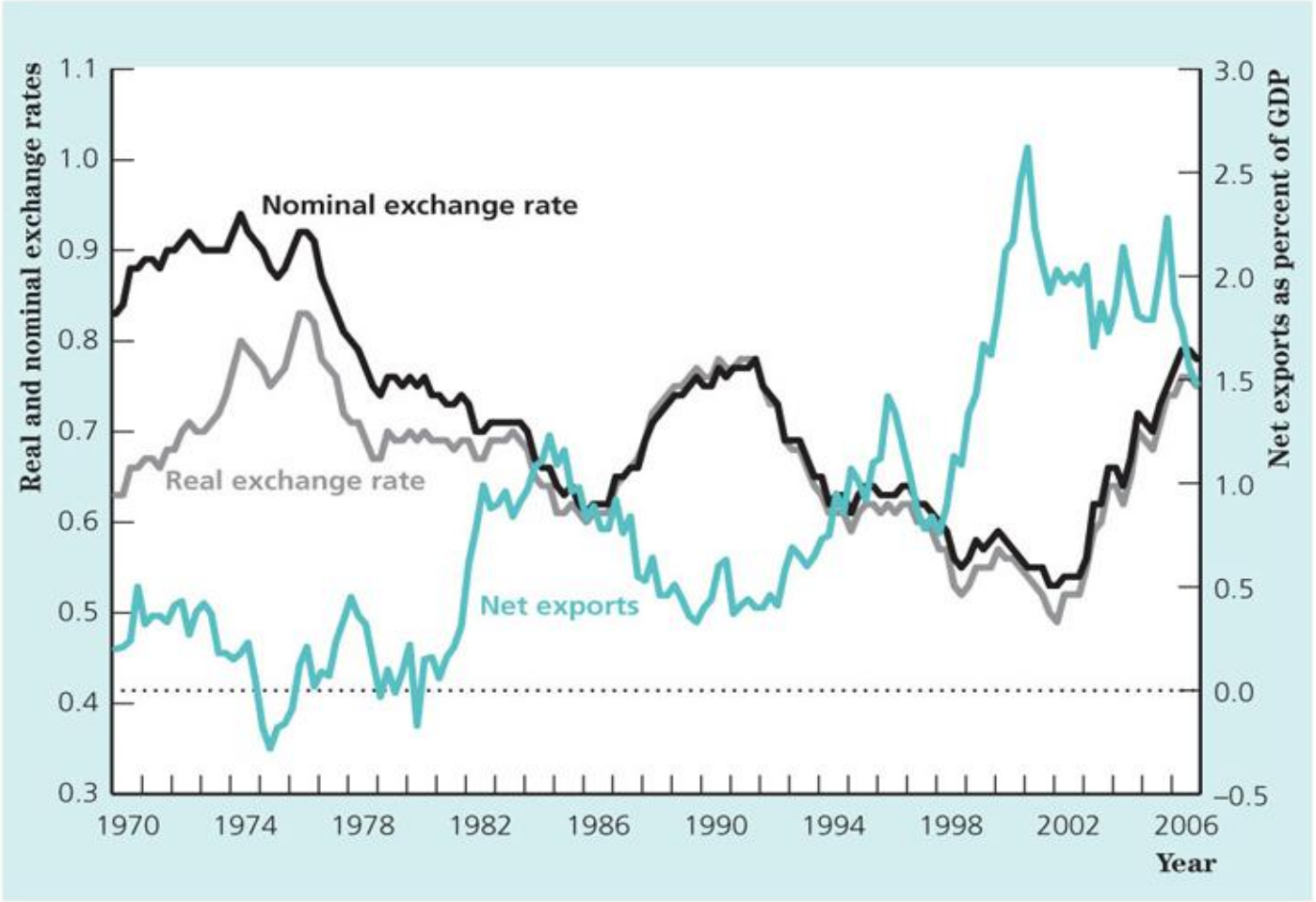
FIGURE 10.1

CANADA–US REAL AND NOMINAL EXCHANGE RATES AND NET EXPORTS, 1970–2006

Canadian net exports to the United States are measured on the right vertical axis and the Canada–US real and nominal exchange rates are measured on the left vertical axis. Note that the nominal and real exchange rates tend to move together. Note also that net exports rise when the real exchange rate falls.

Source: Adapted from the following: Net exports to the United States in millions of dollars, seasonally adjusted, quarterly: CANSIM II series v114387. Canadian GDP in millions of dollars, seasonally adjusted, quarterly: CANSIM II series v498086. Nominal Canada–US exchange rate, monthly: CANSIM II series v37426. Real Canada–US exchange rate calculated using Canadian GDP implicit price deflator (CANSIM II series v498086/v1992067) and US GDP implicit price deflator (CANSIM II series v122054/v21581591).



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How Exchange Rates are Determined

- For now we hold prices constant and focus on the nominal exchange rate.
- The nominal exchange rate e_{nom} is the value of a currency, say the Canadian dollar (C$), expressed in terms of the value of another currency – that is, it tells us how many units of another currency can be purchased with a C$.
- The value of the dollar is determined by supply and demand in the foreign exchange markets, which is the relevant market.

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Demand for Canadian Dollars

- Reasons to demand Canadian dollars:
  - to be able to buy Canadian goods;
  - to be able to buy Canadian real and financial assets;
  - these demands correspond to the two components of the balance of payments – current and capital accounts
- The demand curve is downward sloping.

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Supply of Canadian Dollars

- Reasons to supply dollars (national currency):
  - to be able to buy foreign goods;
  - to be able to buy real and financial assets in foreign countries.
- The supply curve is upward sloping.

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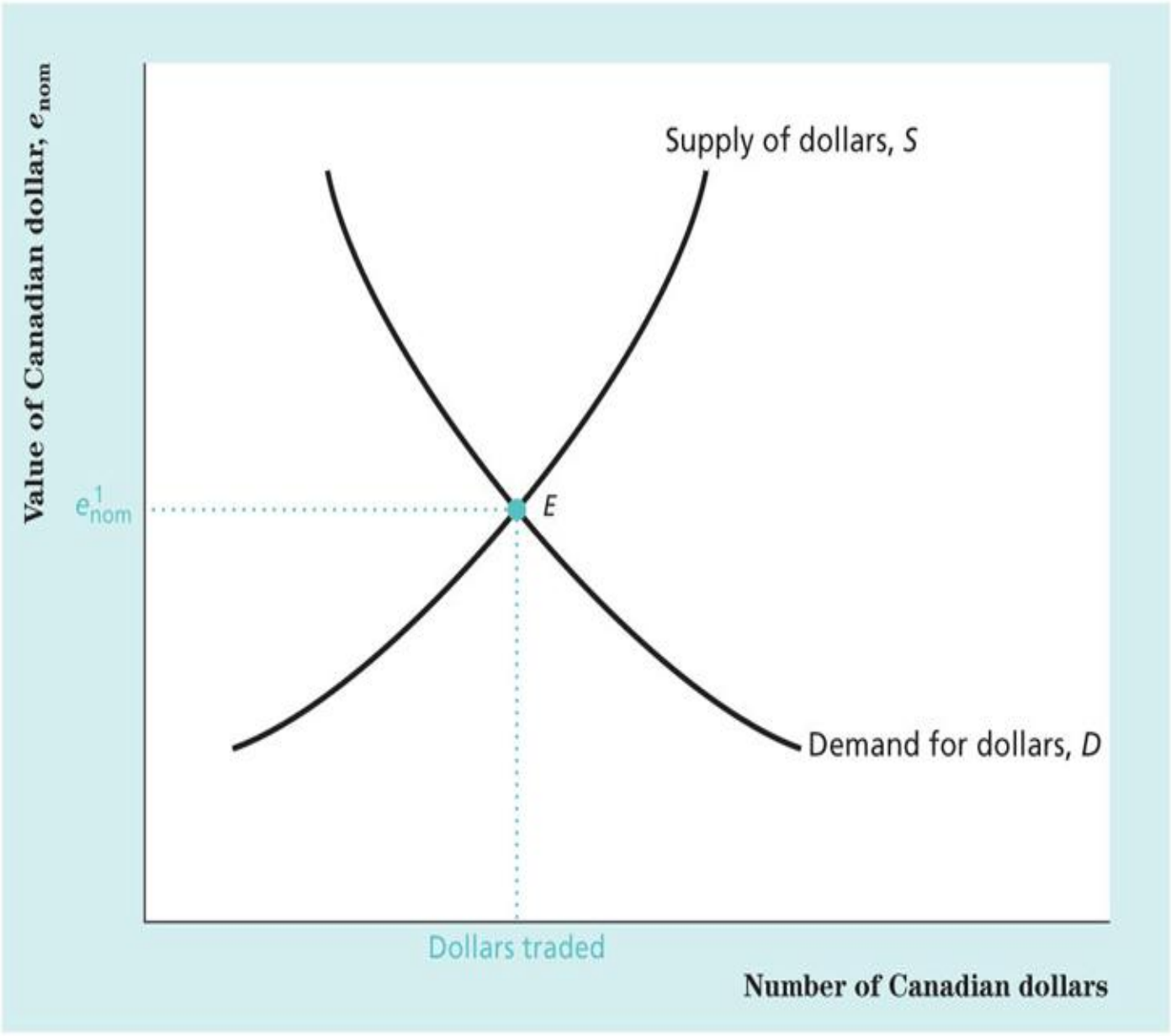
FIGURE 10.2

THE SUPPLY OF AND DEMAND FOR THE CANADIAN DOLLAR

The figure shows the determination of the value of the dollar in the foreign exchange market. The supply curve for dollars, *S*, indicates the number of dollars that people are willing to sell in the foreign exchange market at each value of the Canadian nominal exchange rate e_{nom}. The demand curve for dollars, *D*, shows the number of dollars that people want to buy at each nominal exchange rate. At equilibrium, point *E*, the value of the dollar, e^1_{nom}, is the nominal exchange rate at which the quantity of dollars supplied equals the quantity of dollars demanded.



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Effects of Changes in Output (Income)

- Here we are anticipating the open-economy version of the *IS-LM* model by focusing on output and interest rates.
- When domestic output (income) rises the demand for imports increases and net exports must fall.
- Domestic residents must supply more dollars to the F/X market.
- There is a tendency for the domestic currency to depreciate and the exchange rate falls.

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Effects of Changes in Output (continued)

- When foreign output (income) rises exports increase and net exports must rise.
- The domestic currency tends to appreciate and the exchange rate rises.
- The example in Figure 10.3 shows the effect of an improvement in the quality of Canadian goods.

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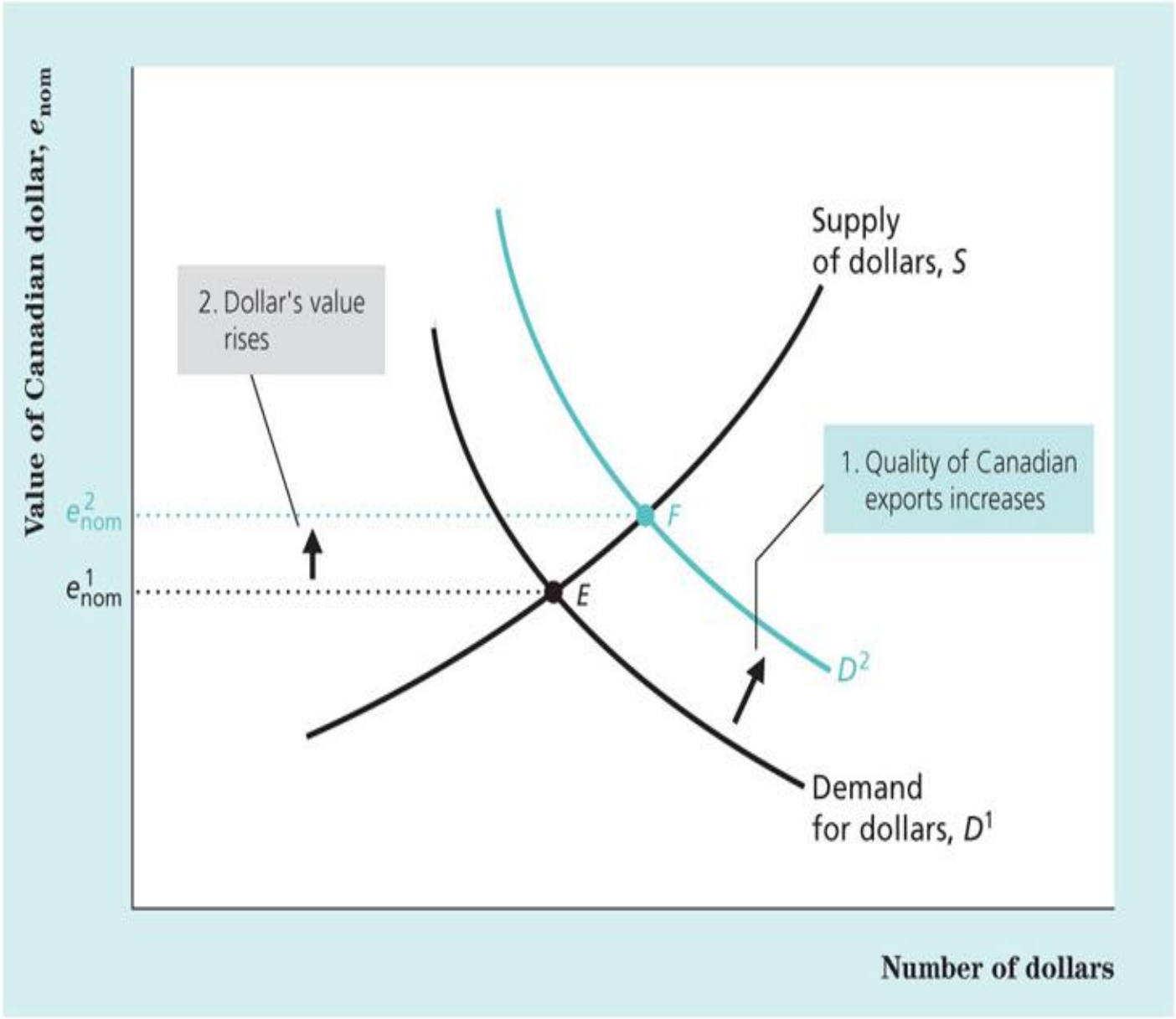
FIGURE 10.3

THE EFFECT OF INCREASED EXPORT QUALITY ON THE VALUE OF THE DOLLAR

An increase in the quality of Canadian exports raises foreigners' demands for Canadian goods and, hence, their demand for Canadian dollars, which are needed to buy Canadian goods. The demand curve for dollars shifts, from D^1 to D^2, raising the value of the dollar (the nominal exchange rate) from e^1_{nom} to e^2_{nom}.



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Effects of Changes in Real Interest Rate

- If the domestic country's real interest rate rises, other factors held constant, the country's real and financial assets are more attractive for investment.
- The demand for the domestic currency increases and the exchange rate appreciates (e_{nom} rises).

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Effects of Changes in Real Interest Rate (continued)

- After the domestic real interest rate rises, the exchange rate appreciation reduces net exports

.

- If the foreign country's real interest rate rises, the supply of domestic currency increases, the exchange rate depreciates, and the domestic country's net exports rise.

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Returns on Domestic and Foreign Assets

- In an open economy, savers have an opportunity to buy financial assets sold by foreign borrowers as well as those sold by domestic borrowers.
- Investment decisions depend on:
  - nominal interest rates in foreign countries relative to those in the domestic economy;
  - expected changes to the exchange rate.

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TABLE 10.1

Calculating the Gross Nominal Rate of Return for a Foreign Asset

Example

Today: $e_{nom} = 0.7$ euros/dollar $\quad i_{For} = 0.06$ $\quad$ Future: $e^f_{nom} = 0.679$ euros/dollar

Step 1		**Step 2**		**Step 3**
Convert home currency to foreign currency		Earn interest on foreign bond		Convert foreign currency to home currency
\$10 000	→ 7000 euros		→ 7420 euros	→ \$10 928

General Case

Today $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ Future

Step 1		**Step 2**		**Step 3**
Convert home currency to foreign currency		Earn interest on foreign bond		Convert foreign currency to home currency
1 unit of home currency	→ e_{nom} units of foreign currency		→ $(1 + i_{For})e_{nom}$ units of foreign currency	→ $[(1 + i_{For})e_{nom}]/e^f_{nom}$ units of home currency

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Returns on Domestic and Foreign Assets (continued)

- The gross nominal rate of return on a foreign bond

$$\textbf{expected gross nominal rate} = (1 + i_{For}) \frac{e_{nom}}{e^{f}_{nom}} \qquad (10.4)$$

e^{f}_{nom} is the expected future value of e_{nom}.

- There is a simple approximation given by:

$$approximation = 1 + i_{For} - \Delta e_{nom}/e_{nom}$$

- It permits easy calculation of the gross returns and makes clear the sources for holding foreign assets.
- It also suggests that:

$$i - i_{For} = -\Delta e_{nom}/e_{nom}$$

a positive interest differential implies an expected depreciation of the currency. If the currency is not expected to change then:

$$i = i_{For}$$

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Interest Rate Parity

- The difference in returns cannot persist for long.
- The nominal interest rates equalize these returns as investors move to take advantage of the differences.

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Interest Rate Parity (continued)

- The equilibrium for the international asset market or nominal interest rate parity condition:

$$\frac{e_{nom}}{e^{f}_{nom}}(1+i_{For}) = 1+i \qquad (10.6)$$

- For this to hold exactly a number of conditions must be met like similar liquidity, default risk, transactions costs, taxes, etc.

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Interest Rate Parity (continued)

- If and only if the nominal exchange rate is expected to remain the same as its current value the nominal interest rate parity condition reduces to:

$$i = i_{For}$$

- We have already seen this in an earlier slide.

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Interest Rate Parity (continued)

- The real interest rate parity condition is:

$$\frac{e}{e^{f}}(1+r_{For})=1+r$$

- For $e = e^{f}$ the condition is $r = r_{For}$ which is the assumption we make in what follows next.

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The *IS-LM* Model for an Open Economy

- We are now ready to look at how trade and exchange rates affect the economy.
- Here we will use the *IS=LM* version of the model as we want to focus on interest rate among other things.
- Assume that the expected (trend) rates of growth in domestic prices and money supply are given.
- Assume that the expected (trend) rate of growth in foreign prices P_{For} is given.
- Then changes in *e* (the real exchange rate) are equal to changes in e_{nom} – this seems to be in line with what has typically happened (see Figure 10.1, slide 13).

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The *IS-LM* Model for an Open Economy (continued)

- Nothing discussed so far indicates that the *LM* or *FE* curves are affected – and they are not.
- For what follows we will use the closed economy versions of these markets.
- The effect of opening up the economy to trade will come through the *IS* curve.
- As before we will proceed by doing some thought experiments, holding money and the exchange rate constant but allowing output and the real interest rate to change.

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The Open-Economy *IS* Curve

- In the open economy version, net exports have to be incorporated into the *IS* curve, since *S* no longer equals *I*, but:
  - *IS* is still downward sloping.
  - All factors shifting the *IS* curve in the closed economy shift the *IS* curve in the open economy.
  - All factors that change net exports also shift the *IS* curve.

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The Open-Economy *IS* Curve (continued)

- The goods market equilibrium condition for an open economy is:

$$S^d - I^d = NX$$

- This condition says that, for goods market equilibrium, desired foreign lending must equal desired foreign borrowing.
- The $S - I$ curve is upward sloping; it increases when r rises, analogous to the saving curve in Chapters 5 and 10.
- The NX curve is downward sloping; it decreases when r rises through the effect of r on the real exchange rate, e.

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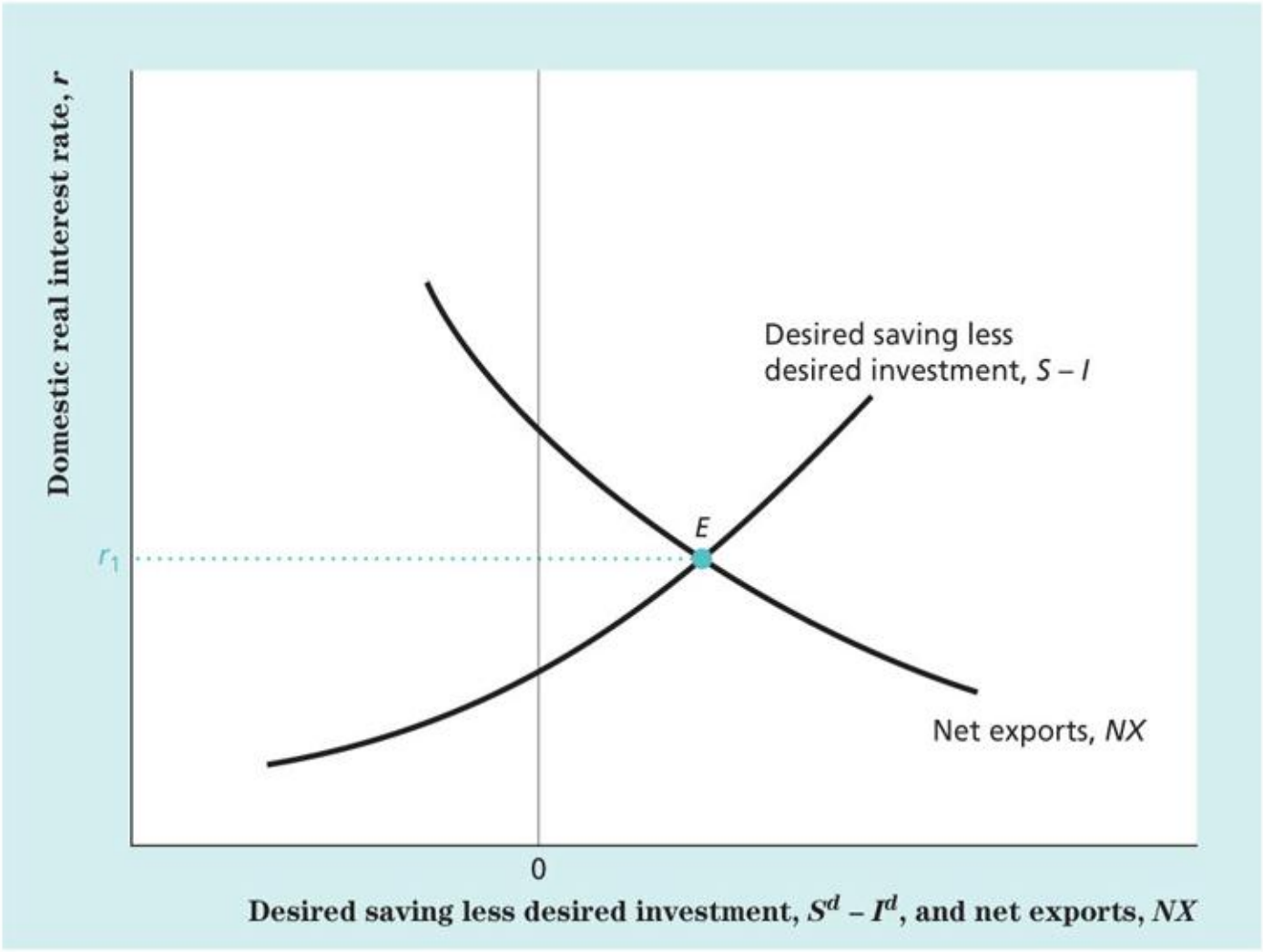
FIGURE 10.4

GOODS MARKET EQUILIBRIUM IN AN OPEN ECONOMY

The upward-sloping curve shows desired saving S^d less desired investment I^d. This curve slopes upward because a higher domestic real interest rate increases the excess of desired saving over desired investment. The *NX* curve relates net exports to the domestic real interest rate. This curve slopes downward because a higher domestic real interest rate causes the real exchange rate to rise, reducing net exports. Goods market equilibrium occurs at point *E*, where the excess of desired saving over desired investment equals net exports (equivalently, where desired lending abroad equals desired borrowing by foreigners). The real interest rate that clears the goods market is r_1.



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The Open-Economy *IS* Curve (continued)

- To derive the open economy version of the *IS* curve we need to know what happens to real interest rates when output rises.
- Suppose that output rises:
  - S^d increases but not I^d so $S^d > I^d$, the *S* minus *I* curve shifts to the right;
  - import rises, *NX* falls and the *NX* curve shifts to the left;
  - the equilibrium is restored with lower *r*;
  - the *IS* curve slopes downward (see next slide).

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The Open-Economy *IS* Curve (continued)

- To see these points more formally, suppose we had, as before, the following simplified model of the economy:

$$C^d = c_0 + c_y(1-\tau)Y - c_r r$$

$$I^d = \lambda_0 - \lambda_r r$$

- For an open economy we need an equation for net exports, NX.

$$NX = x_0 - x_y Y - x_e e$$

- The symbols "c", "λ" *and* "x" are coefficients and "τ" is the income tax rate.

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The Open-Economy *IS* Curve (continued)

- Equilibrium condition in an open economy is given by:

$$S^d - I^d = NX$$

- First we need to derive desired saving:

$$S^d = Y - C^d - G$$

$$S^d = Y - c_0 - c_y(1-\tau)Y + c_r r - G = G - c_0 - (1 - c_y(1-\tau))Y + c_r r$$

- Substituting this equation, along with those for I^d and NX into the equilibrium condition yields, and after collecting up like terms:

$$r = \{(c_0 + \lambda_0 + x_0 + G) - [(1 - c_y(1-\tau)) + x_y]Y - x_e e\}/(c_r + \lambda_r) \qquad (IS)$$

- The IS curve now takes account of the effect of NX. This has changed the constant term, the slope coefficient and has added a new channel of adjustment through the exchange rate.
- The LM curve is the same as in a closed economy:

$$r = (l_0/l_r) + (l_y/l_r)Y - (1/l_r)(M/P) - \pi^e \qquad (LM)$$

The Open-Economy *IS* Curve (continued)

- As we did in Chapter 9, let's simplify the notation for the IS and LM curves as follows:
- *IS curve* $r = \alpha'_{IS} - \beta'_{IS} Y - \gamma_{IS} e$
- *LM curve* $r = \alpha_{LM} + \beta_{LM} Y - (1/l_r)(M/P)$

  where: $\alpha'_{IS} = (c_0 + \lambda_0 + x_0 + G)/(c_r + \lambda_r)$

  $\alpha_{LM} = (l_0/l_r) - \pi^e$

  $\beta'_{IS} = (1 - (1-\tau)c_y + x_y)/(c_r + \lambda_r)$

  $\gamma_{IS} = x_e/(c_r + \lambda_r)$

  $\beta_{LM} = (l_y/l_r)$
- Note that in the IS curve the constant term has changed, there is an extra term to show the effect of the real exchange rate and the slope coefficient has the added effect Y on NX; e.g. "x_y".

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The Open-Economy *IS* Curve (continued)

- **Note** that when the consumption function is:

$$C^d = c_0 + c_y(Y - T) - c_r r$$

- Then the IS curve becomes:

$$r = \{(c_0 + \lambda_0 + x_0 + G - c_y T) - [(1 - c_y) + x_y] - x_e e\}/(c_r + \lambda_r)$$

- And

$$\alpha'_{IS} = (c_0 + \lambda_0 + x_0 + G - c_y T)/(c_r + \lambda_r)$$

$$\beta'_{IS} = (1 - c_y + x_y)/(c_r + \lambda_r)$$

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The Open-Economy *IS* Curve (continued)

- As in the closed economy case, to get the AD relationship we find the point we the LM and IS curves cross, which means setting one equal to the other so as to eliminate r:

$$\alpha_{LM} + \beta_{LM}Y - (1/l_r)(M/P) = \alpha'_{IS} - \beta'_{IS}Y - \gamma_{IS}e$$

- Re-arranging terms we get:

$$Y = \{(\alpha'_{IS} - \alpha_{LM}) + 1/l_r(M/P_0) - \gamma_{IS}\}/(\beta'_{IS} + \beta_{LM})$$

- The AD curve is key to solving for the short-run value of Y following a shock or a policy change on the assumption that M/P and e are constant.

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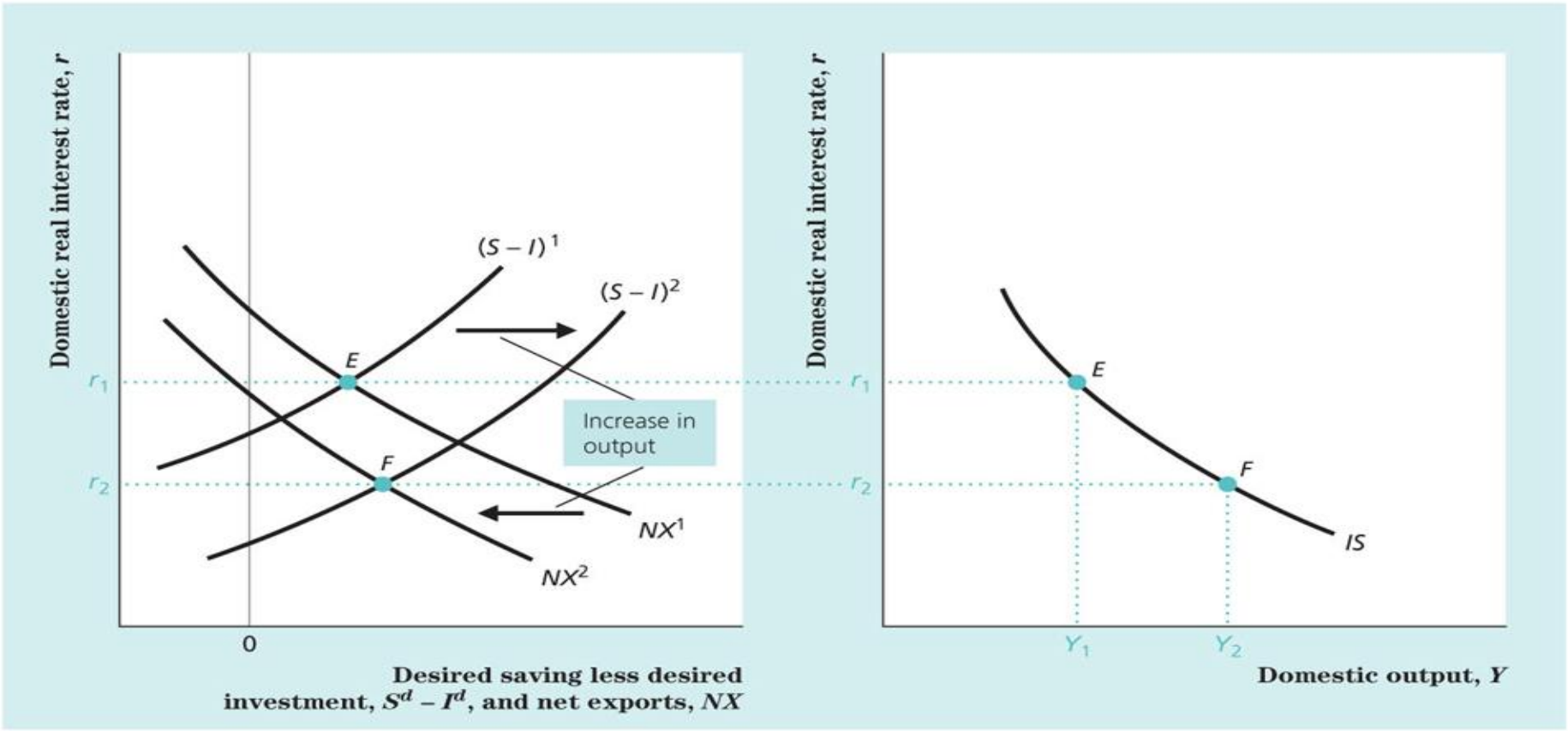

(a) Goods market equilibrium

(b) Open-economy *IS* curve

FIGURE 10.5

DERIVATION OF THE *IS* CURVE IN AN OPEN ECONOMY

The initial equilibrium in the goods market is represented by point E in both (a) and (b).

(a) At point E, domestic output is Y_1 and the domestic real interest rate is r_1. An increase in domestic output from Y_1 to Y_2 raises desired national saving at each real interest rate and does not affect desired investment. Therefore, the $S - I$ curve shifts to the right, from $(S - I)^1$ to $(S - I)^2$. The increase in output also raises domestic spending on imports, reducing net exports and causing the NX curve to shift to the left, from NX^1 to NX^2. At the new equilibrium point, F, the real interest rate is r_2.

(b) Because an increase in output from Y_1 to Y_2 lowers the real interest rate that clears the goods market from r_1 to r_2, the IS curve slopes downward.

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The Open-Economy *IS* Curve Shifters

- As in a closed economy, any factor that changes the real interest rate that clears the goods market at a constant level of output shifts the *IS* curve.
- The figure shows that an increase in *G* has the same effect as it did in a closed economy.

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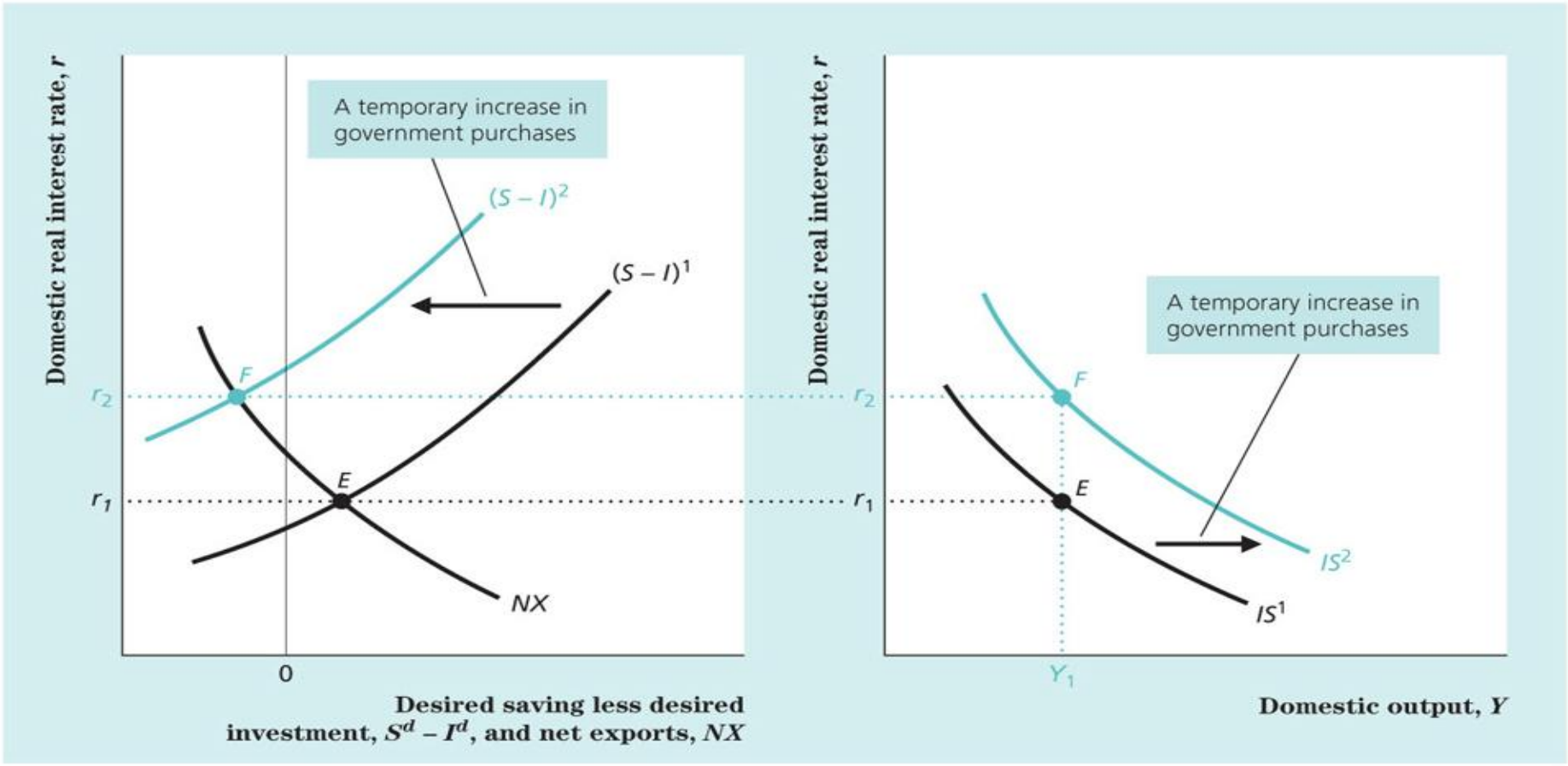

(a) Goods market equilibrium

(b) Open-economy *IS* curve

FIGURE 10.6

EFFECT OF AN INCREASE IN GOVERNMENT PURCHASES ON THE OPEN-ECONOMY *IS* CURVE

Initial equilibrium is at point *E*, where output is Y_1 and the real interest rate is r_1, in both (a) and (b).

(a) A temporary increase in government purchases lowers desired national saving at every level of output and raises the real interest rate. Thus, the $S - I$ curve shifts to the left, from $(S - I)^1$ to $(S - I)^2$.

(b) For output Y_1, the real interest rate that clears the goods market is now r_2, at point *F* in both (a) and (b). Because the real interest rate that clears the goods market has risen, the *IS* curve shifts up and to the right, from IS^1 to IS^2.

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The Open-Economy *IS* Curve Shifters (continued)

- For an open economy, there are additional factors that shift the *IS* curve.
- Any factor that changes *NX*, given *Y*, will shift the open-economy *IS* curve.
- Factors that could cause *NX* to rise include:
  - an increase in foreign output;
  - an increase in foreign interest rates; and/or
  - an improvement in the quality of domestic goods and services.

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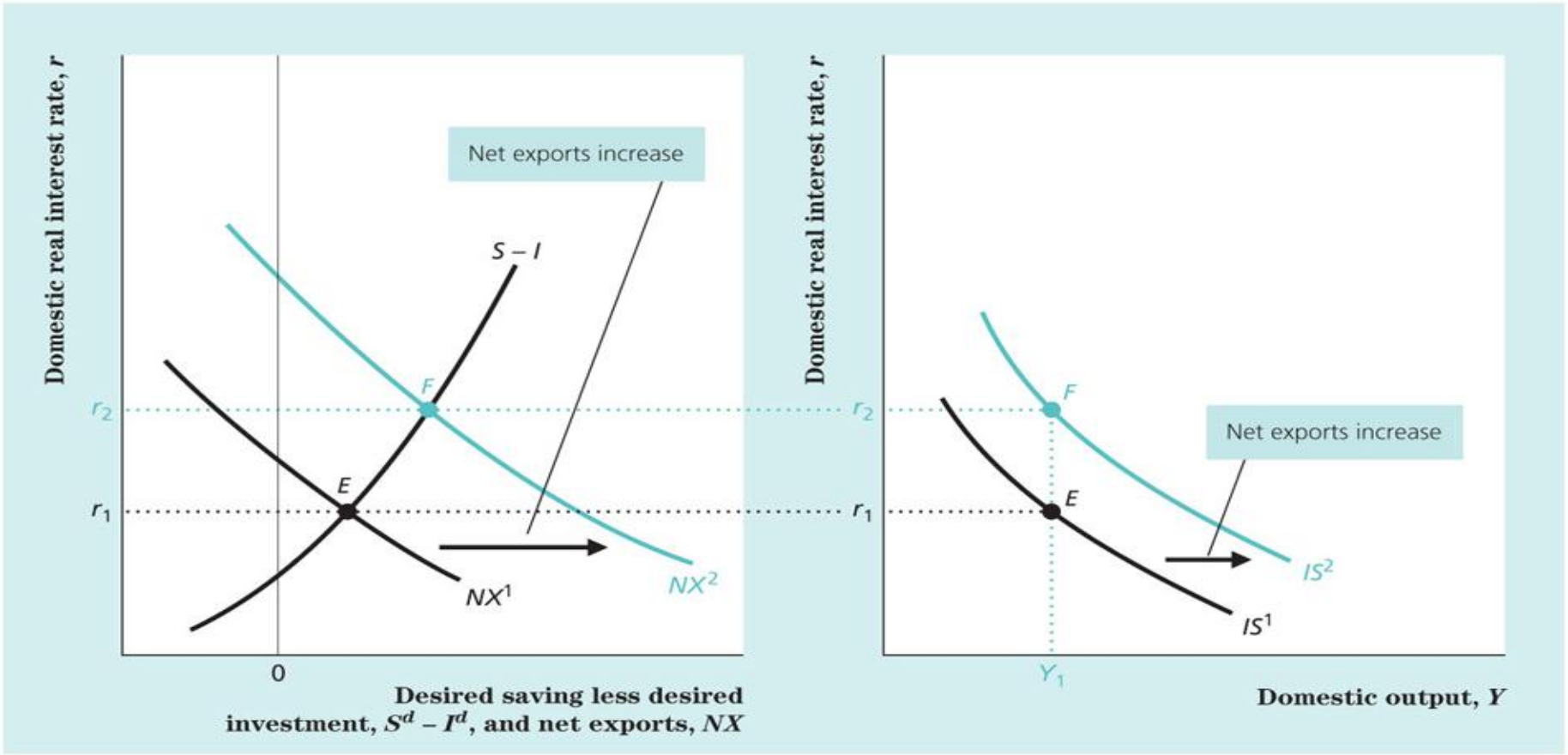

(a) Goods market equilibrium **(b) Open-economy *IS* curve**

FIGURE 10.7

EFFECT OF AN INCREASE IN NET EXPORTS ON THE OPEN-ECONOMY *IS* CURVE

In both (a) and (b), at the initial equilibrium point, *E*, output is Y_1 and the real interest rate that clears the goods market is r_1.

(a) If some change raises the country's net exports at any given domestic output and domestic real interest rate, the *NX* curve shifts to the right, from NX^1 to NX^2.

(b) For output Y_1, the real interest rate that clears the goods market has risen from r_1 to r_2, at point *F* in both (a) and (b). Thus, the *IS* curve shifts up and to the right, from IS^1 to IS^2.

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The Transmission of Business Cycles

- The impact of foreign economic conditions on the real exchange rate and net exports is one of the principal ways by which cycles are transmitted internationally.
- A decline in US output shifts the Canadian *IS* curve down.
- The cycle can also be transmitted through international asset markets.

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Macroeconomic Policy with Flexible Exchange Rates

- Let's assume a small open economy.
- The exchange rate is not expected to change, that is $r = r_{For}$, at least eventually.
- This will be an important assumption regarding how equilibrium is attained.
- This is known as Mundell-Fleming model.
- We look at the implications for fiscal and monetary policy under both flexible and fixed exchange rates.

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Fiscal Expansion and Flexible Exchange Rates

- An increase in *G* crowds out *NX* because it:
  - shifts the *IS* curve to the right;
  - *r* is above r_{For}, the demand for Canadian financial assets increases;
  - the real exchange rate, *e*, increases (due to a rise in e_{nom}) and the *NX* falls;
  - with no change in *Y* and *P*, the *IS* curve shifts to the left where $r=r_{For}$;
  - the nominal exchange rate does all the work and in the end it is higher, which means that the real exchange rate, *e*, is also higher;
  - the Keynesian and Classical all generate the same response – complete crowding out in the long run.

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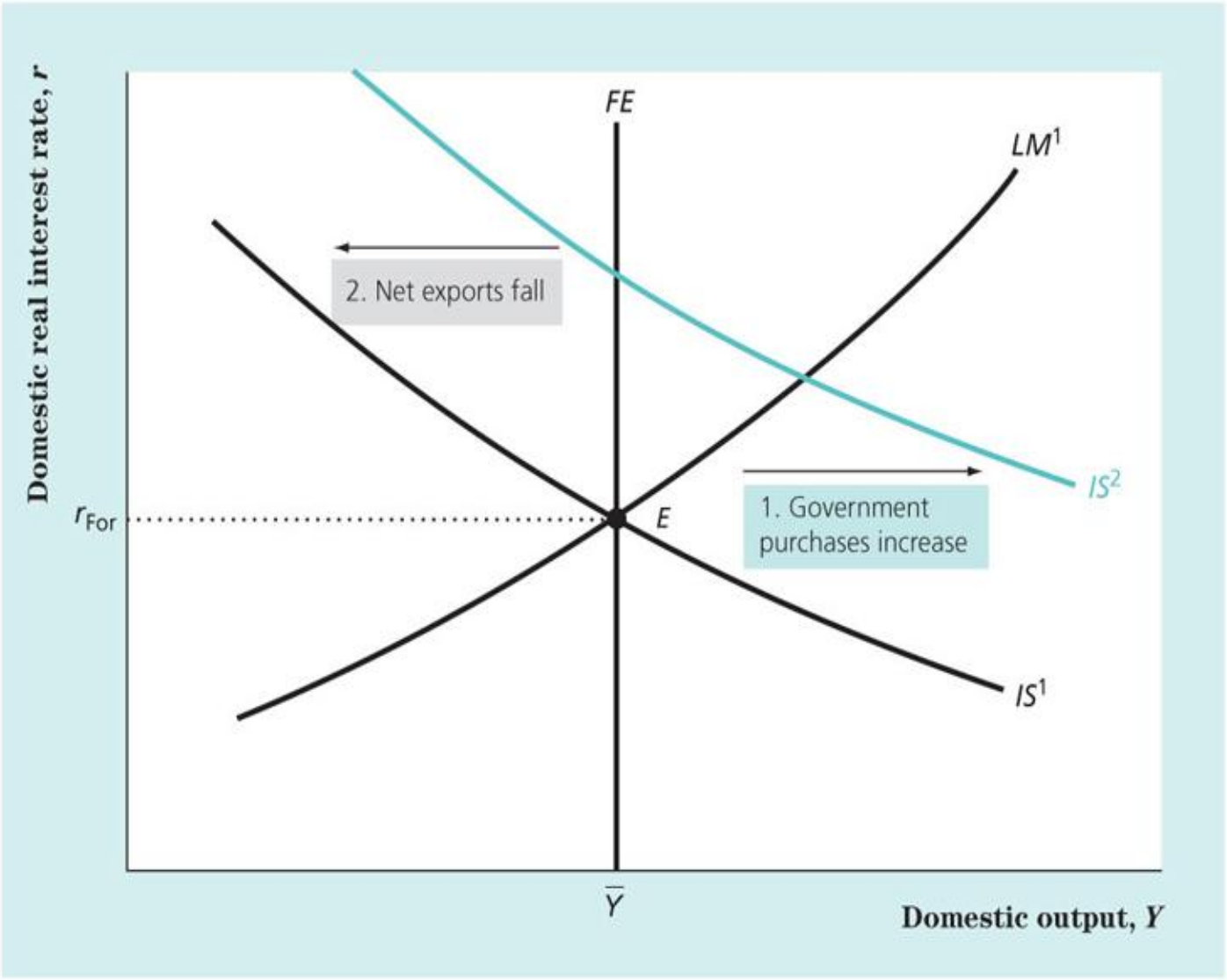
FIGURE 10.8

AN INCREASE IN GOVERNMENT PURCHASES IN A SMALL OPEN ECONOMY WITH FLEXIBLE EXCHANGE RATES

An increase in government purchases shifts the *IS* curve up and to the right, from IS^1 to IS^2. There results a temporary increase in the domestic interest rate above the foreign interest rate. As a consequence, the exchange rate appreciates, causing net exports to fall. IS^2 must return to IS^1 because only here does the exchange rate appreciation stop. There is no price level response unless the exchange rate is slow to respond to the temporary increase in the domestic interest rate. For this reason, the Keynesian short run, the Keynesian long run, and the classical model all generate the same result—general equilibrium remains at point *E*.



Monetary Expansion and Flexible Exchange Rates

- An increase in *M* is different:
  - shifts the *LM* curve to the right;
  - r is below r_{For}, the demand for Canadian financial assets decreases;
  - the *e* decreases (initially because e_{nom} falls) and the *NX* rises, shifting the *IS* curve;
  - the *IS* curve shifts to the right where $r=r_{For}$;
  - at this point, economy is in short-run equilibrium where *P* has not as yet changed.

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Monetary Expansion and Flexible Exchange Rates (continued)

- The Keynesian model predicts further adjustments in the long run:
  - since Y is higher than $\overline{Y}$, P increases;
  - the LM curve shifts to the left as the real money supply falls;
  - r is above r_{For}, the demand for Canadian financial assets increases;
  - the e increases and the NX falls;
  - the IS curve shifts to the left, where $r=r_{For}$.

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Monetary Expansion and Flexible Exchange Rates (continued)

- The Keynesian model predicts that in the long-run:
  - a monetary expansion will result in a higher price level;
  - no change in Y, r, NX, e;
  - but a decrease in e_{nom} *to offset higher P,*
  - thus, monetary neutrality holds.
- An important point is that now the nominal exchange rate is lower, given an unchanged real exchange rate and a higher price level – the opposite of a fiscal expansion.
- Neutrality holds immediately in the classical model.

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Flexible Exchange Rates: A Summary

- Fiscal expansion:
  - no effect, even in short run, as upward pressure on *e* offset expansionary of higher *G*;
  - in long run, *P* is fixed (as *M* hasn't changed) so e_{nom} does the adjusting – it rises and crowds out completely net exports;
  - the conclusion is that higher *G* then crowds out completely *NX* through the effect on *e*.

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Flexible Exchange Rates: A Summary (continued)

- Monetary expansion:
  - large short run effect as increased *M* lowers *e (*with *P* constant) and stimulates *NX*;
  - the higher *NX* shifts the IS curve to the right;
  - short-run equilibrium where *r* is unchanged but higher real *M* (with *P* unchanged) and *Y* (which can be determined from *LM* curve);
  - with *Y* greater than $\bar{Y}$, *P* now starts to rise shifting back the *LM* curve;
  - this cause *e* to rise and NX to fall, shifting back the *IS* curve.

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Flexible Exchange Rates: A Summary (continued)

- Monetary expansion (continued):
  - the shifting of the two curves continues until the economy is back at its long-run equilibrium;
  - the model predicts that in the long run money is neutral in the sense that it has no effect on *Y*, *r* or *e*;
  - it does have an effect on the nominal exchange rate;
  - given $e = e_{nom}(P/P_{For})$ and both e and P_{For} unchanged, e_{nom} must fall by the amount *P* rises.

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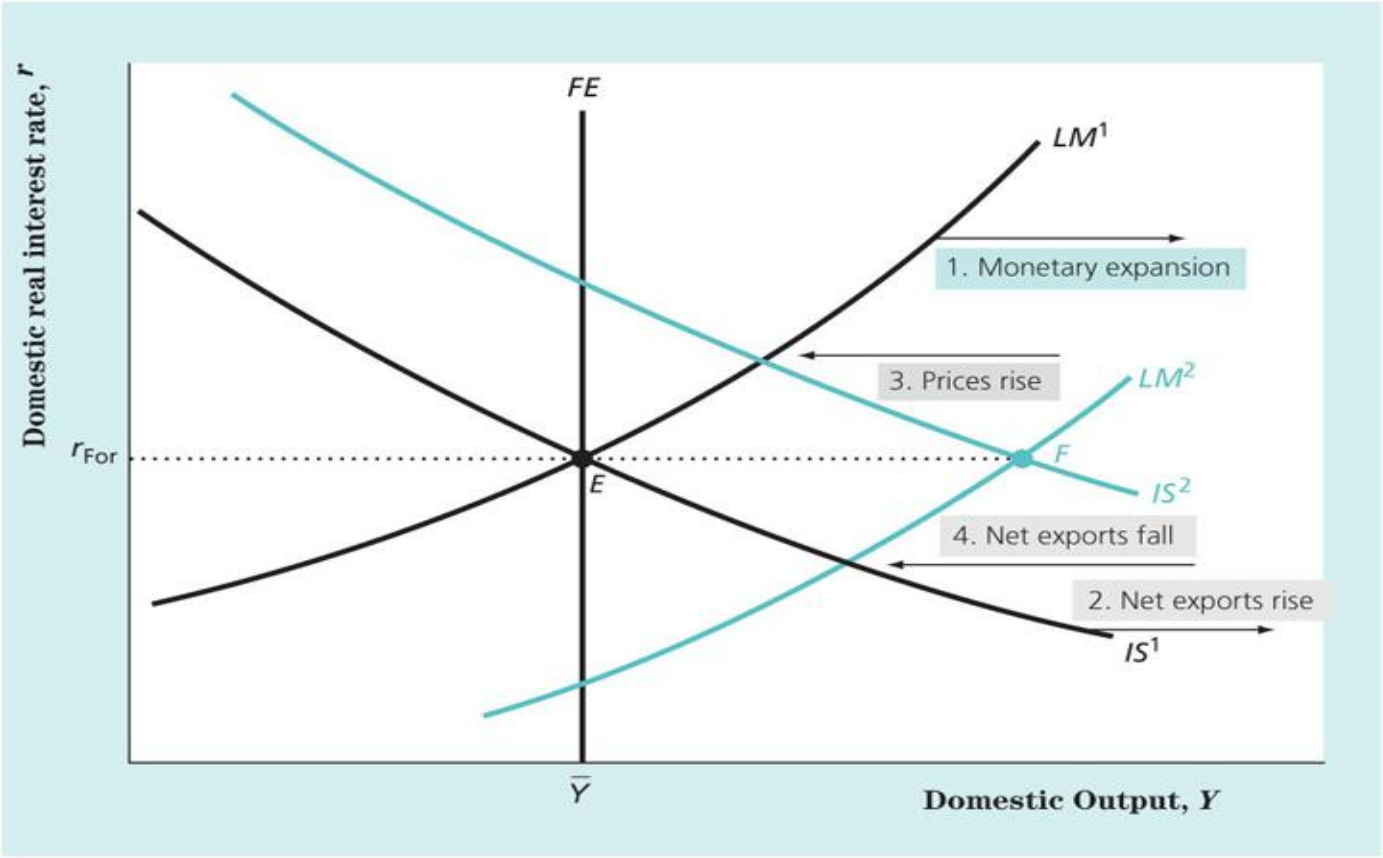
FIGURE 10.9

A MONETARY EXPANSION IN A SMALL OPEN ECONOMY WITH FLEXIBLE EXCHANGE RATES

A monetary expansion shifts the *LM* curve down and to the right, from LM^1 to LM^2. In the Keynesian short run, there results a temporary decrease in the domestic interest rate below the foreign interest rate. As a consequence, the exchange rate depreciates, causing net exports to increase and causing the *IS* curve to shift up and to the right from IS^1 to IS^2. The curves IS^2 and LM^2 must intersect at point *F*, where the domestic and foreign interest rates are equal. In the Keynesian long run, the domestic price level increases. This causes LM^2 to shift up and to the left and causes the domestic interest rate to increase temporarily above the foreign interest rate. The currency appreciates, causing a fall in net exports. Both IS^2 and LM^2 return to their original positions at point *E*. In the classical model, equilibrium remains at point *E* throughout because of the rapid adjustment of the price level.



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