University of Warsaw
Faculty of Economic Sciences

The Balance of Payments II: Output, Exchange Rates, and Macroeconomic Policies in the Short Run

Łukasz Matuszczak, Phd

Introduction

- Our goal is to build a model that explains the relationships between the major macroeconomic variables in an open economy in the short run.
- One key lesson we learn is that the feasibility and effectiveness of macroeconomic policies depend on the type of exchange rate regime in operation.

Preliminaries and Assumptions

For our purposes, the foreign economy can be thought of as "the rest of the world" (ROW). The key assumptions we make are as follows:

- Because we are examining the short run, we assume that home and foreign price levels, $\bar{P}$ and $\bar{P}^*$, are fixed due to price stickiness. As a result expected inflation is fixed at zero, $\bar{\pi}^e = 0$, and all quantities can be viewed as both real and nominal quantities because there is no inflation.
- We assume that government spending $\bar{G}$ and taxes $\bar{T}$ are fixed, but subject to policy change.

Preliminaries and Assumptions

- We assume that foreign output $\bar{Y}^*$ and the foreign interest rate i^* are fixed. Our main interest is in the equilibrium and fluctuations in the home economy.

- We assume that income Y is equivalent to output; that is, gross domestic product (GDP) equals gross national disposable income (GNDI).

- We assume that net factor income from abroad (NFIA) and net unilateral transfers (NUT) are zero, which implies that the current account (CA) equals the trade balance (TB).

Consumption

- The simplest model of aggregate private consumption relates household **consumption** *C* to **disposable income** Y^d.

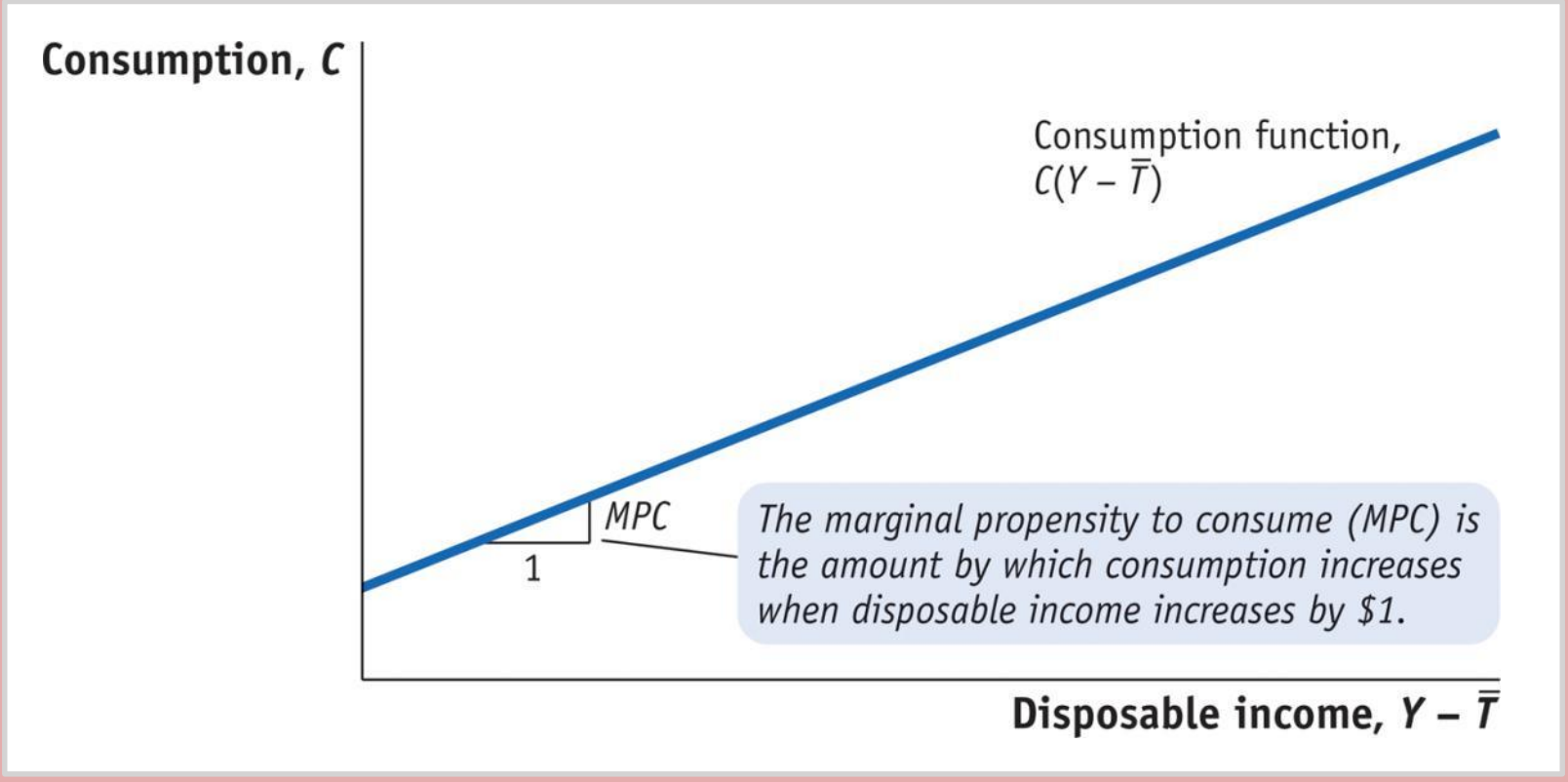
$$Consumption = C = C(Y - \overline{T})$$

- This equation is known as the *Keynesian consumption function.*

Marginal Effects The slope of the consumption function is called the **marginal propensity to consume** (*MPC*). We can also define the *marginal propensity to save* (*MPS*) as 1 – *MPC.*

Consumption

FIGURE 7-1



The Consumption Function The consumption function relates private consumption, *C,* to disposable income, Y – $\overline{T}$. The slope of the function is the marginal propensity to consume, *MPC.*

Investment

- The firm's borrowing cost is the **expected real interest rate** r^e, which equals the nominal interest rate i minus the expected rate of inflation π^e:

$$r^e = i - \pi^e.$$

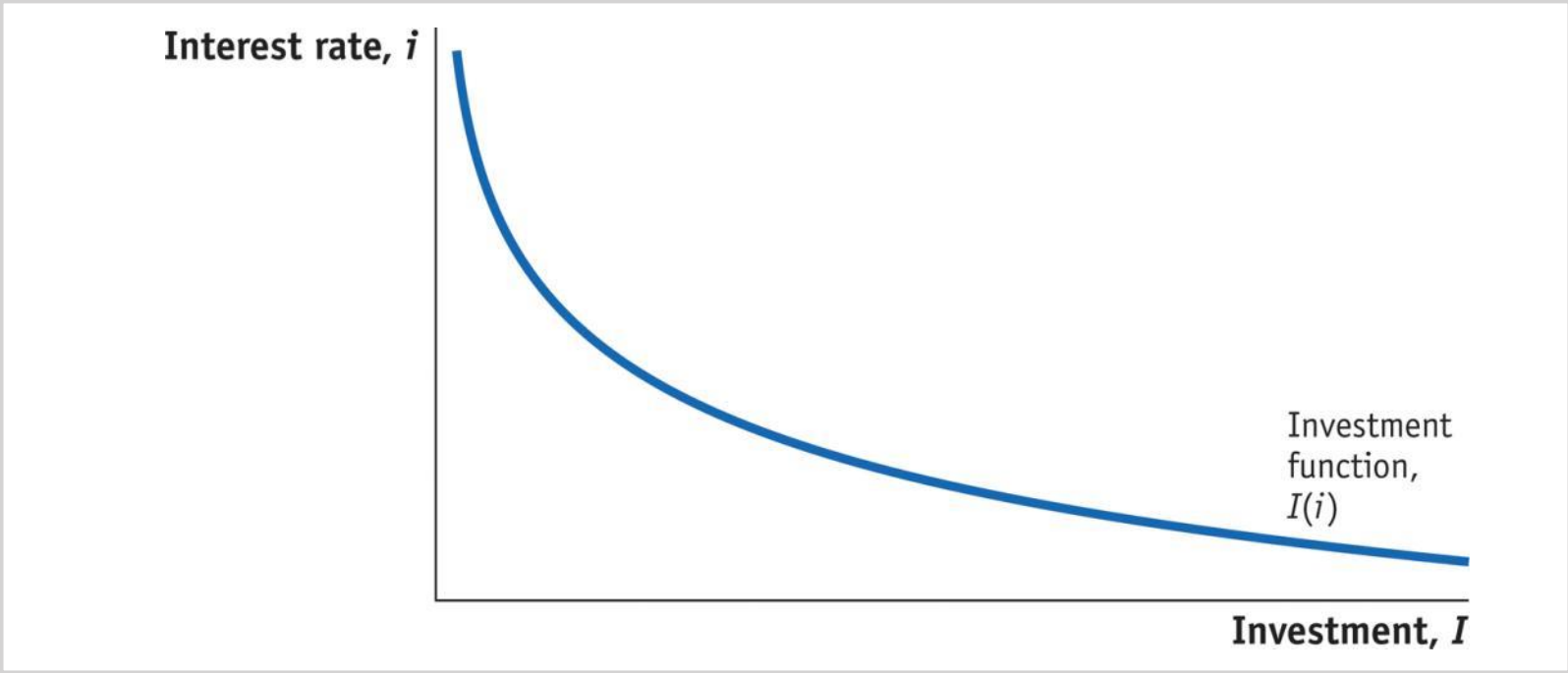
- Since expected inflation is zero, the expected real interest rate equals the nominal interest rate, $r^e = i$.

- Investment I is a decreasing function of the real interest rate. So investment $I(r)$ falls as the real interest rate rises.

- But expected inflation is zero, so the real interest rate equals the nominal interest rate. We can then write $I(i)$.

Investment

FIGURE 7-2



The Investment Function The investment function relates the quantity of investment, I, to the level of the expected real interest rate, which equals the nominal interest rate, i, when (as assumed in this chapter) the expected rate of inflation, π^e, is zero. The investment function slopes downward: as the real cost of borrowing falls, more investment projects are profitable.

The Government

- Assume that the government collects an amount $\bar{T}$ of **taxes** from households and spends an amount $\bar{G}$ on **government consumption**.
- We will ignore government **transfer programs**, such as social security, medical care, or unemployment benefit systems.
- In the unlikely event that $\bar{G} = \bar{T}$ exactly, we say that the government has a *balanced budget.*
- If $\bar{T} > \bar{G}$, the government is said to be running a *budget surplus* (of size $\bar{T} - \bar{G}$).
- If $\bar{G} > \bar{T}$, there is a *budget deficit* (of size $\bar{G} - \bar{T}$ or, equivalently, a negative surplus of $\bar{T} - \bar{G}$).

The Trade Balance

The Role of the Real Exchange Rate

- When aggregate spending patterns change due to changes in the real exchange rate, this is **expenditure switching** from foreign purchases to domestic purchases.
- If home's exchange rate is *E,* and home and foreign price levels are $\bar{P}$ and $\bar{P}^*$ (both fixed in the short run), the real exchange rate *q* of Home is defined as $q = E\,\bar{P}^* / \bar{P}$.
  - *We expect the trade balance of the home country to be an increasing function of the home country's real exchange rate. As the home country's real exchange rate rises, it will export more and import less, and the trade balance rises.*

The Trade Balance

The Role of Income Levels

- *We expect an increase in home income to be associated with an increase in home imports and a fall in the home country's trade balance.*
- *We expect an increase in rest of the world income to be associated with an increase in home exports and a rise in the home country's trade balance.*

- The trade balance is, therefore, a function of three variables: the real exchange rate, home disposable income, and rest of world disposable income.

$$TB = TB\left(\underbrace{E\overline{P}^{*}/\overline{P}}_{\text{Increasing function}},\ \underbrace{Y-\overline{T}}_{\text{Decreasing function}},\ \underbrace{Y^{*}-\overline{T}^{*}}_{\text{Increasing function}}\right)$$

HEADLINES

Oh! What a Lovely Currency War

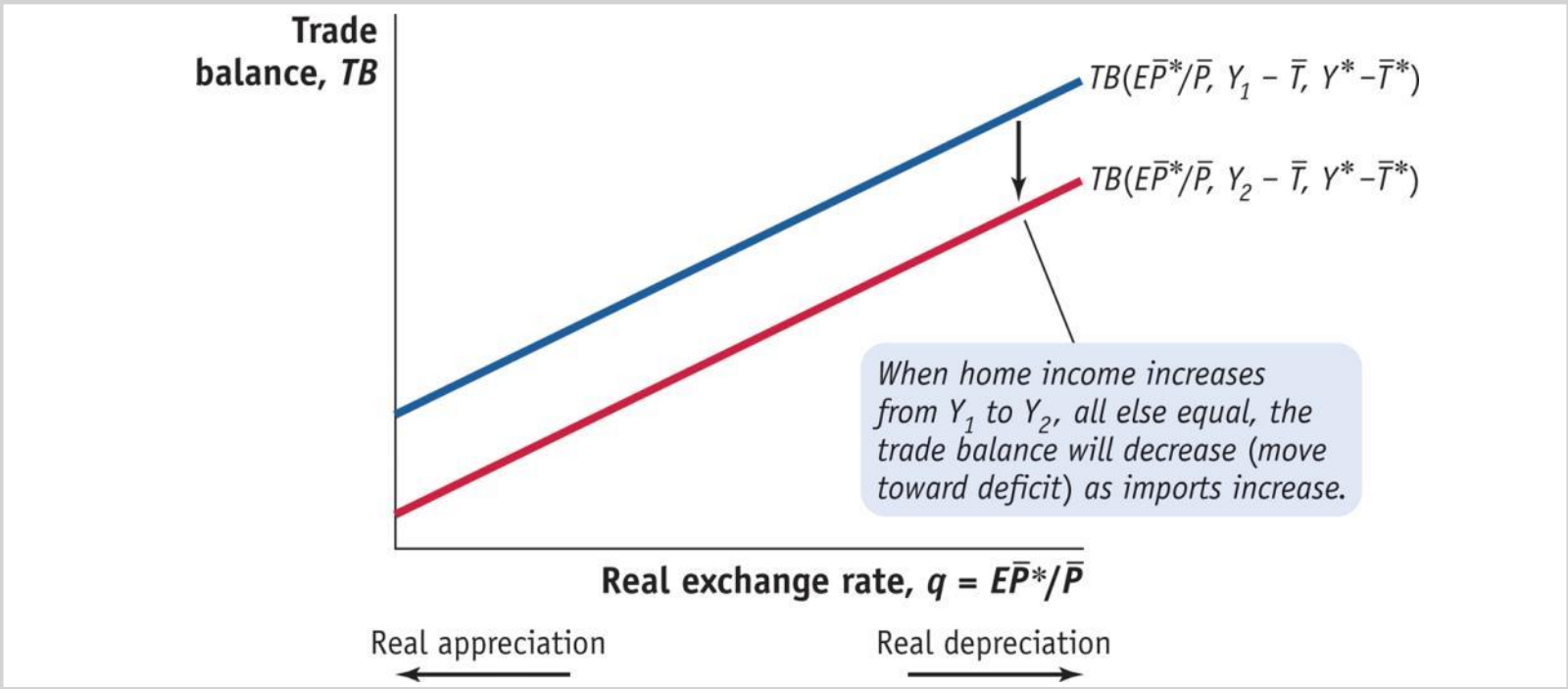
In September 2010, the finance minister of Brazil accused other countries of starting a "currency war" by pursuing policies that made Brazil's currency, the real, strengthen against its trading partners, thus harming the competitiveness of his country's exports and pushing Brazil's trade balance toward deficit. By 2013, fears about such policies were being expressed by more and more policy makers around the globe.

The Curry Trade

In 2009, a dramatic weakening of the pound against the euro sparked an unlikely boom in cross-Channel grocery deliveries. Many Britons living in France used the Internet to order groceries from British supermarkets, including everything from bagels to baguettes.

The Trade Balance

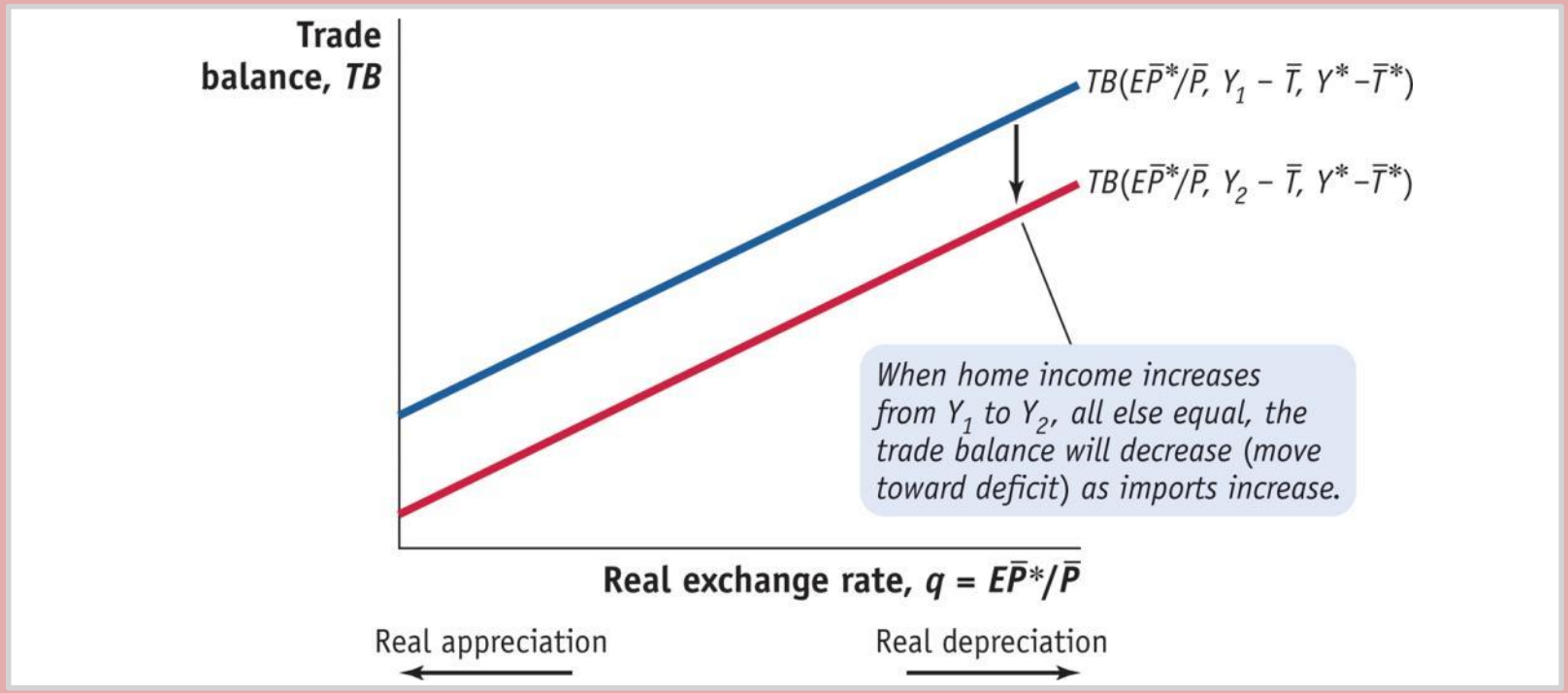
FIGURE 7-3 (1 of 2) The Trade Balance and the Real Exchange Rate



The trade balance is an increasing function of the real exchange rate, EP^*/P. When there is a real depreciation (a rise in q), foreign goods become more expensive relative to home goods, and we expect the trade balance to increase as exports rise and imports fall (a rise in TB) This is a movement *along* this line.

The Trade Balance

FIGURE 7-3 (2 of 2) The Trade Balance and the Real Exchange Rate (continued)



The trade balance may also depend on income. If home income rises, then some of the increase in income may be spent on the consumption of imports. For example, if home income rises from Y_1 to Y_2, then the trade balance will decrease, whatever the level of the real exchange rate, and the trade balance function will shift down.

The Trade Balance

Marginal Effects Once More

We refer to MPC_F as the *marginal propensity to consume foreign imports.*

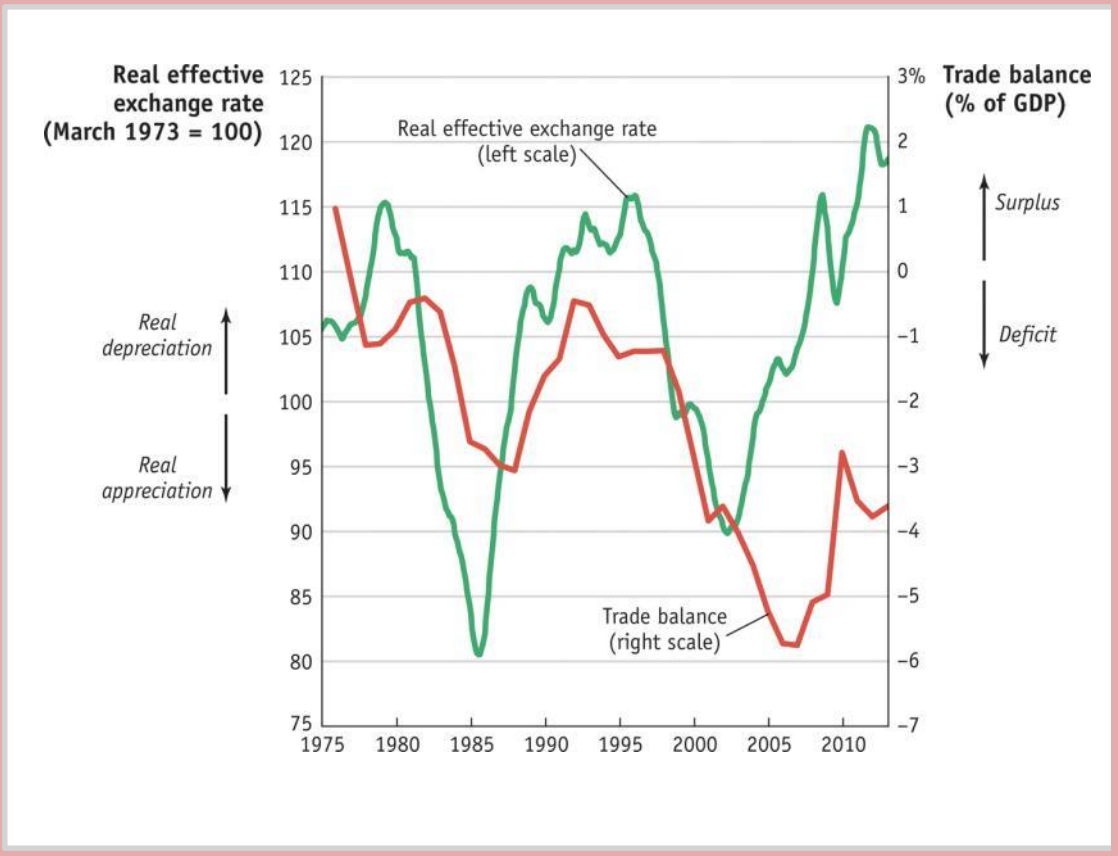
- Let $MPC_H > 0$ be the *marginal propensity to consume home goods.* By assumption, $MPC = MPC_H + MPC_F$.

- For example, if we have $MPC_F = 0.10$ and $MPC_H = 0.65$, then $MPC = 0.75$; for every extra \$1 of disposable income, home consumers spend 75 cents—10 cents on imported foreign goods and 65 cents on home goods (and they save 25 cents).

Application

The Trade Balance and the Real Exchange Rate

FIGURE 7-4



The Real Exchange Rate and the Trade Balance: United States, 1975–2012 Does the real exchange rate affect the trade balance in the way we have assumed? The data show that the U.S. trade balance is correlated with the U.S. real effective exchange rate index. Because the trade balance also depends on changes in the United States and rest of the world, disposable income (and other factors), it may respond with a lag to changes in the real exchange rate, so the correlation is not perfect (as seen in the years 2002–2007).

The Trade Balance and the Real Exchange Rate

- A composite or weighted-average measure of the price of goods in all foreign countries relative to the price of U.S. goods is constructed using *multilateral* measures of real exchange rate movement.

- Applying a trade weight to each bilateral real exchange rate's percentage change, we obtain the percentage change in home's multilateral real exchange rate or real effective exchange rate:

$$\underbrace{\frac{\Delta q_{\text{effective}}}{q_{\text{effective}}}}_{\substack{\text{Real effective}\\ \text{exchange rate}\\ \text{change (in \%)}}} = \underbrace{\left(\frac{\text{Trade}_1}{\text{Trade}}\frac{\Delta q_1}{q_1}\right) + \left(\frac{\text{Trade}_2}{\text{Trade}}\frac{\Delta q_2}{q_2}\right) + \cdots + \left(\frac{\text{Trade}_N}{\text{Trade}}\frac{\Delta q_N}{q_N}\right)}_{\substack{\text{Trade-weighted average of}\\ \text{bilateral real exchange rate}\\ \text{changes (in \%)}}}$$

SIDE BAR

Barriers to Expenditure Switching: Pass-Through and the J Curve

Trade Dollarization, Distribution, and Pass-Through

$$\left.\begin{array}{c}\text{Price of foreign goods}\\ \text{relative to dollar priced}\\ \text{home goods}\end{array}\right\} = \frac{E \times \overline{P}^*}{E \times \overline{P}_1} = \frac{\overline{P}^*}{\overline{P}_1} \qquad \left.\begin{array}{c}\text{Price of foreign goods}\\ \text{relative to local currency priced}\\ \text{home goods}\end{array}\right\} = \frac{E \times \overline{P}^*}{E \times \overline{P}_2}$$

The price of all foreign-produced goods relative to all home-produced goods is the weighted sum of the relative prices of the two parts of the basket. Hence,

$$\text{Home real exchange rate} = d\frac{\overline{P}^*}{\overline{P}_1} + (1-d)\frac{E\overline{P}^*}{\overline{P}_2}$$

When *d* is 0, all home goods are priced in local currency and we have our basic model. A 1% rise in *E* causes a 1% rise in *q*. There is full **pass-through** from changes in the nominal exchange rate to changes in the real exchange rate. As *d* rises, pass-through falls.

Barriers to Expenditure Switching: Pass-Through and the J Curve

Trade Dollarization, Distribution, and Pass-Through

TABLE 7-1 (1 of 2) Trade Dollarization

The table shows the extent to which the dollar and the euro were used in the invoicing of payments for exports and imports of different countries in the 2002–2004 period. In the United States, for example, 100% of exports are invoiced and paid in U.S. dollars but so, too, are 93% of imports. In Asia, U.S. dollar invoicing is very common, accounting for 48% of Japanese exports and more than 75% of exports and imports in Korea, Malaysia, and Thailand.

	Exports Denominated in		Imports Denominated in	
	U.S. Dollar	Euro	U.S. Dollar	Euro
United States	100%	—	93%	—
United Kingdom	26	21%	37	27%
Australia	70	1	50	9

	Exports Denominated in		Imports Denominated in	
	U.S. Dollar	Euro	U.S. Dollar	Euro
Asia				
Japan	48	10	9	5
Korea	83	7	80	5
Malaysia	90	—	90	—
Thailand	85	3	76	4

Barriers to Expenditure Switching: Pass-Through and the J Curve

Trade Dollarization, Distribution, and Pass-Through

TABLE 7-1 (2 of 2) Trade Dollarization (continued)

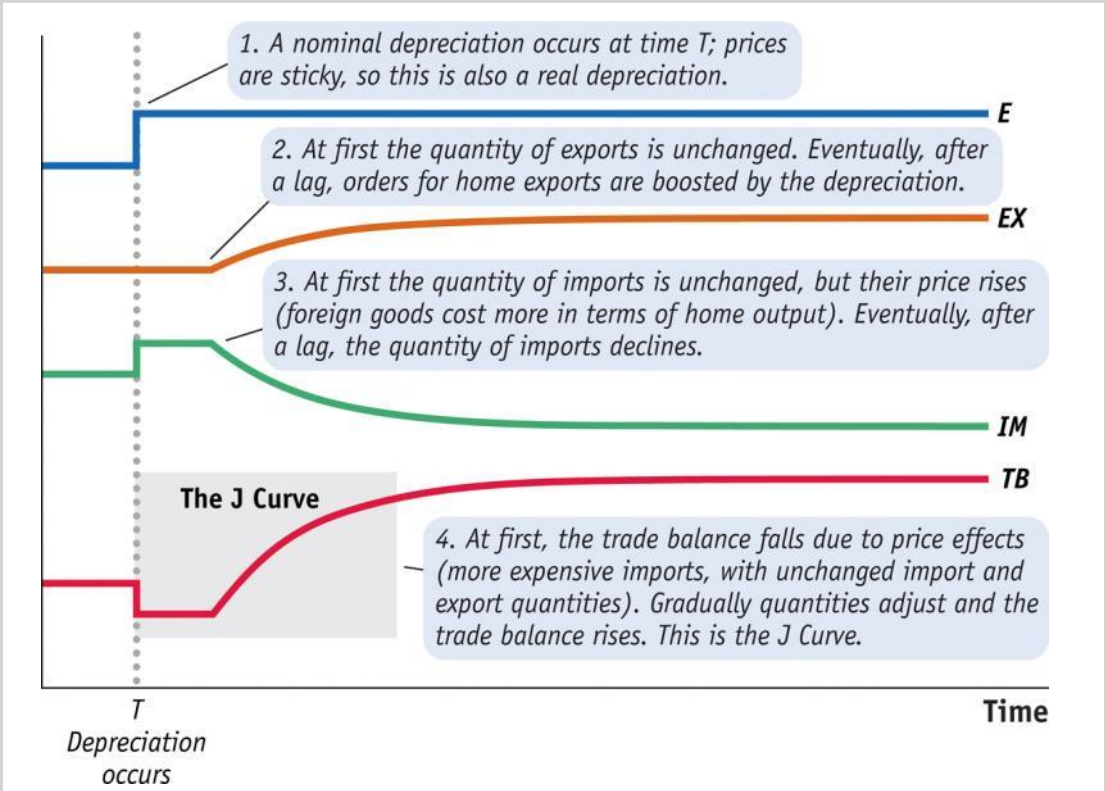
The table shows the extent to which the dollar and the euro were used in the invoicing of payments for exports and imports of different countries in the 2002–2004 period. In Europe the euro figures more prominently as the currency used for trade, but the U.S. dollar is still used in a sizable share of transactions.

	Exports Denominated in		Imports Denominated in	
	U.S. Dollar	Euro	U.S. Dollar	Euro
Eurozone				
France	34	52	47	45
Germany	24	63	34	55
Italy	18	75	25	70
Greece	46	47	55	40
Spain	30	61	36	60

	Exports Denominated in		Imports Denominated in	
	U.S. Dollar	Euro	U.S. Dollar	Euro
EU New Accession Countries				
Czech Republic	13	70	18	66
Hungary	12	83	19	73
Latvia	27	57	—	49
Slovakia	12	74	21	60

Barriers to Expenditure Switching: Pass-Through and the J Curve

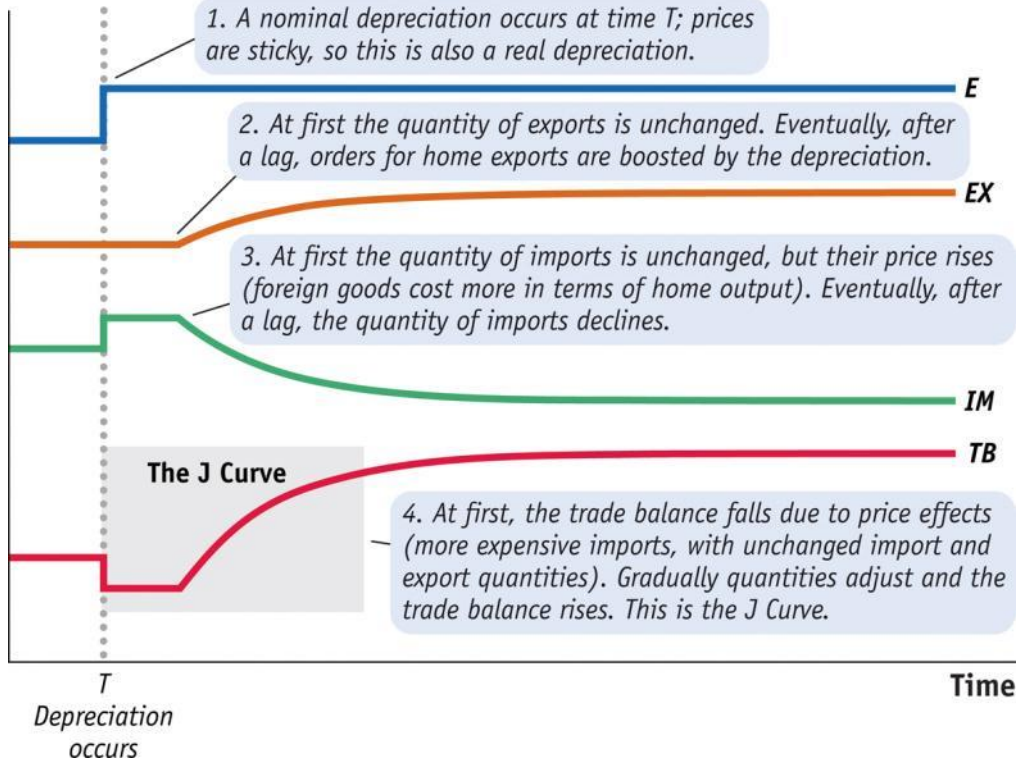
FIGURE 7-5 (1 of 2) The J Curve



When prices are sticky and there is a nominal and real depreciation of the home currency, it may take time for the trade balance to move toward surplus. In fact, the initial impact may be toward deficit. If firms and households place orders in advance, then import and export quantities may react sluggishly to changes in the relative price of home and foreign goods. Hence, just after the depreciation, the value of home exports, *EX,* will be unchanged.

Barriers to Expenditure Switching: Pass-Through and the J Curve

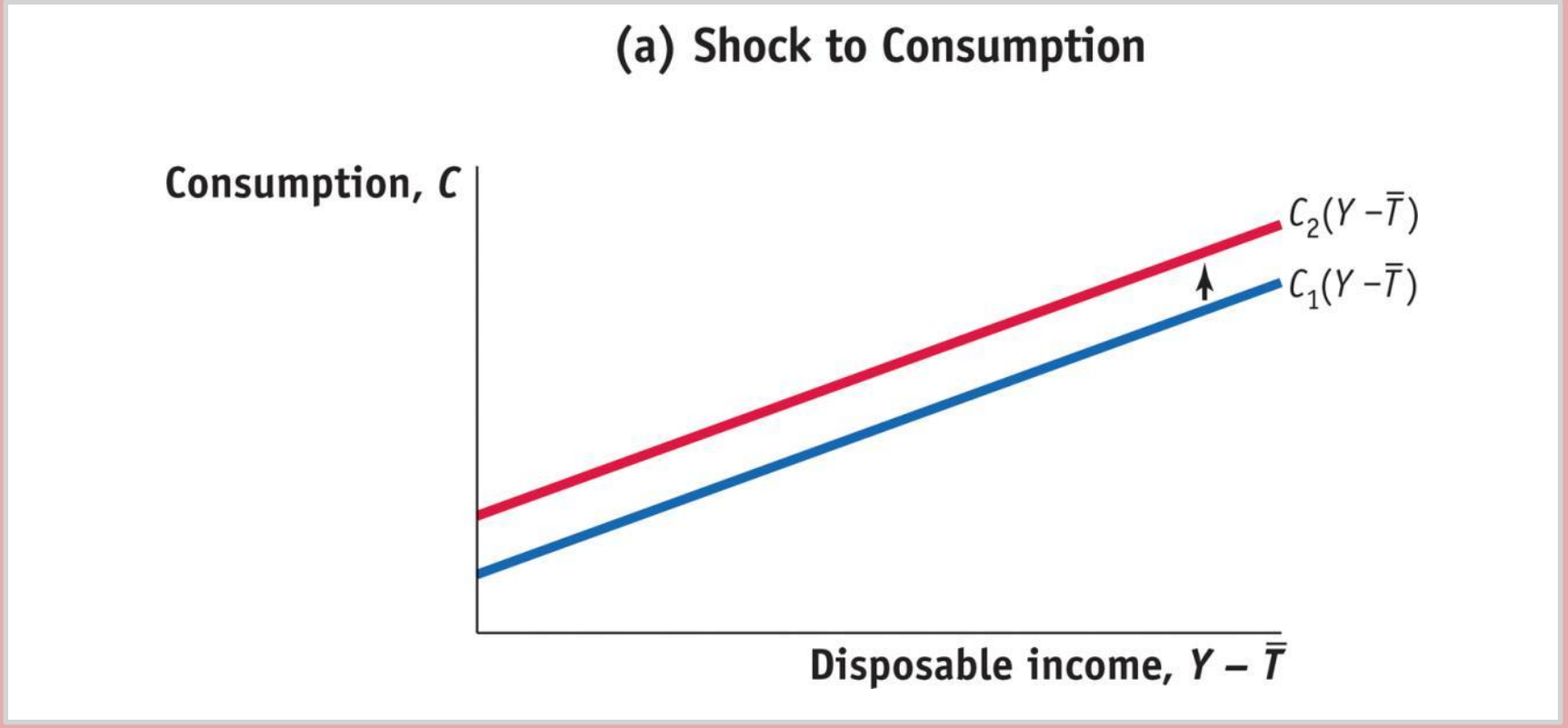
FIGURE 7-5 (2 of 2) The J Curve (continued)



However, home imports now cost more due to the depreciation. Thus, the value of imports, *IM*, would actually *rise* after a depreciation, causing the trade balance $TB = EX - IM$ to fall. Only after some time would exports rise and imports fall, allowing the trade balance to rise relative to its pre-depreciation level. The path traced by the trade balance during this process looks vaguely like a letter *J*.

Exogenous Changes in Demand

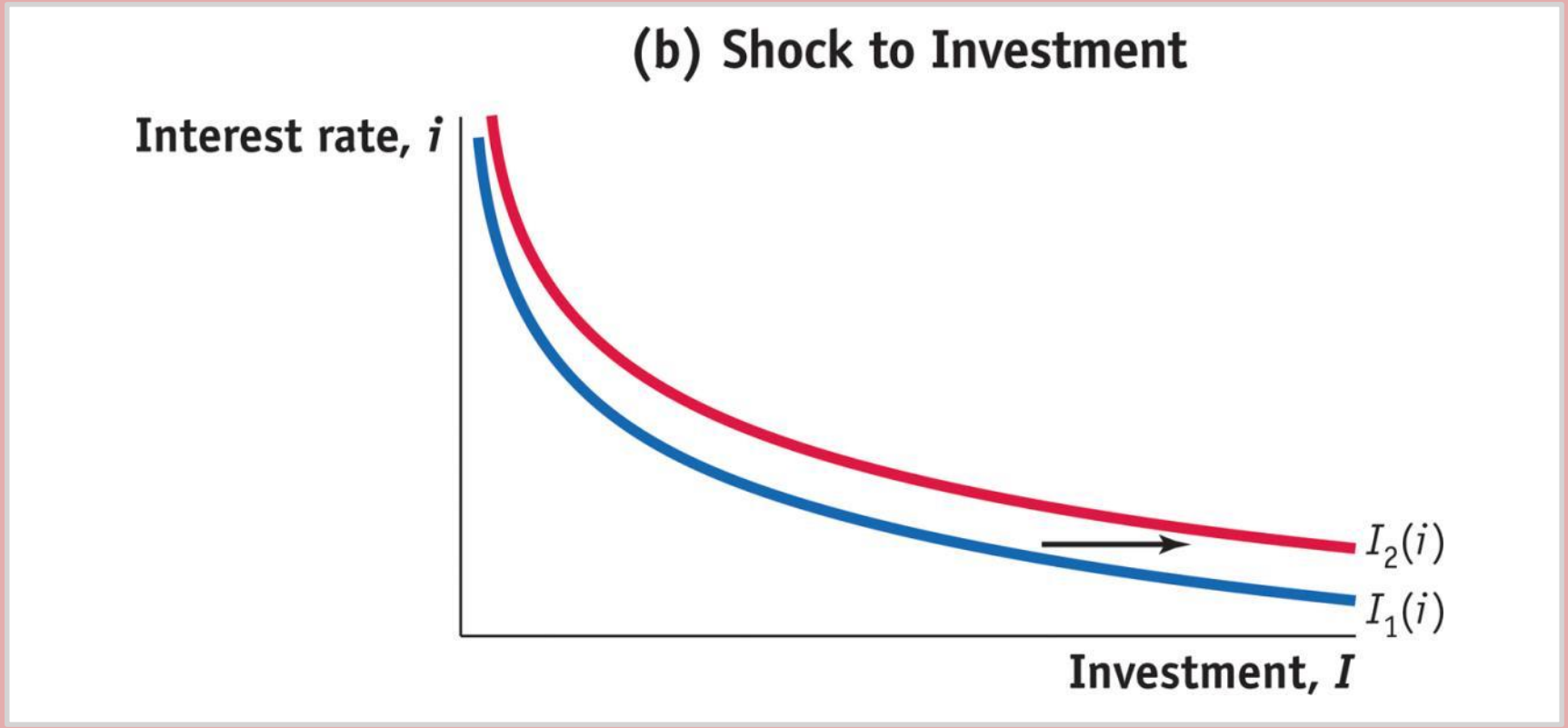
FIGURE 7-6 (1 of 3) Exogenous Shocks to Consumption, Investment, and the Trade Balance



When households decide to consume more at any given level of disposable income, the consumption function shifts up.

Exogenous Changes in Demand

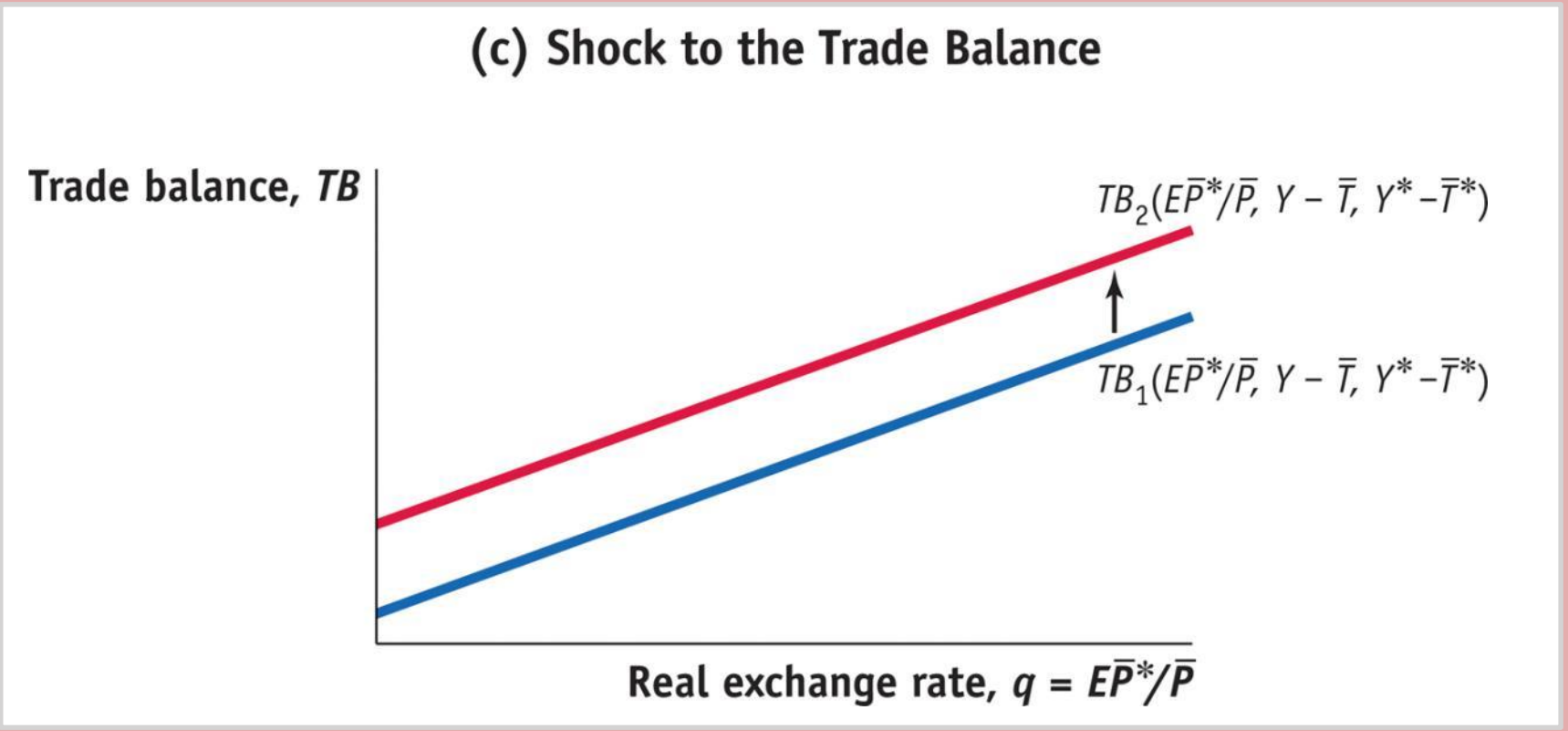
FIGURE 7-6 (2 of 3) Exogenous Shocks to Consumption, Investment, and the Trade Balance (continued)



When firms decide to invest more at any given level of the interest rate, the investment function shifts right.

Exogenous Changes in Demand

FIGURE 7-6 (3 of 3) Exogenous Shocks to Consumption, Investment, and the Trade Balance (continued)



When the trade balance increases at any given level of the real exchange rate, the trade balance function shifts up.

Supply and Demand

Given our assumption that the current account equals the trade balance, gross national income Y equals GDP:

$$\text{Supply} = GDP = Y$$

Aggregate demand, or just "demand," consists of all the possible sources of demand for this supply of output.

$$\text{Demand} = D = C + I + G + TB$$

Substituting, we have

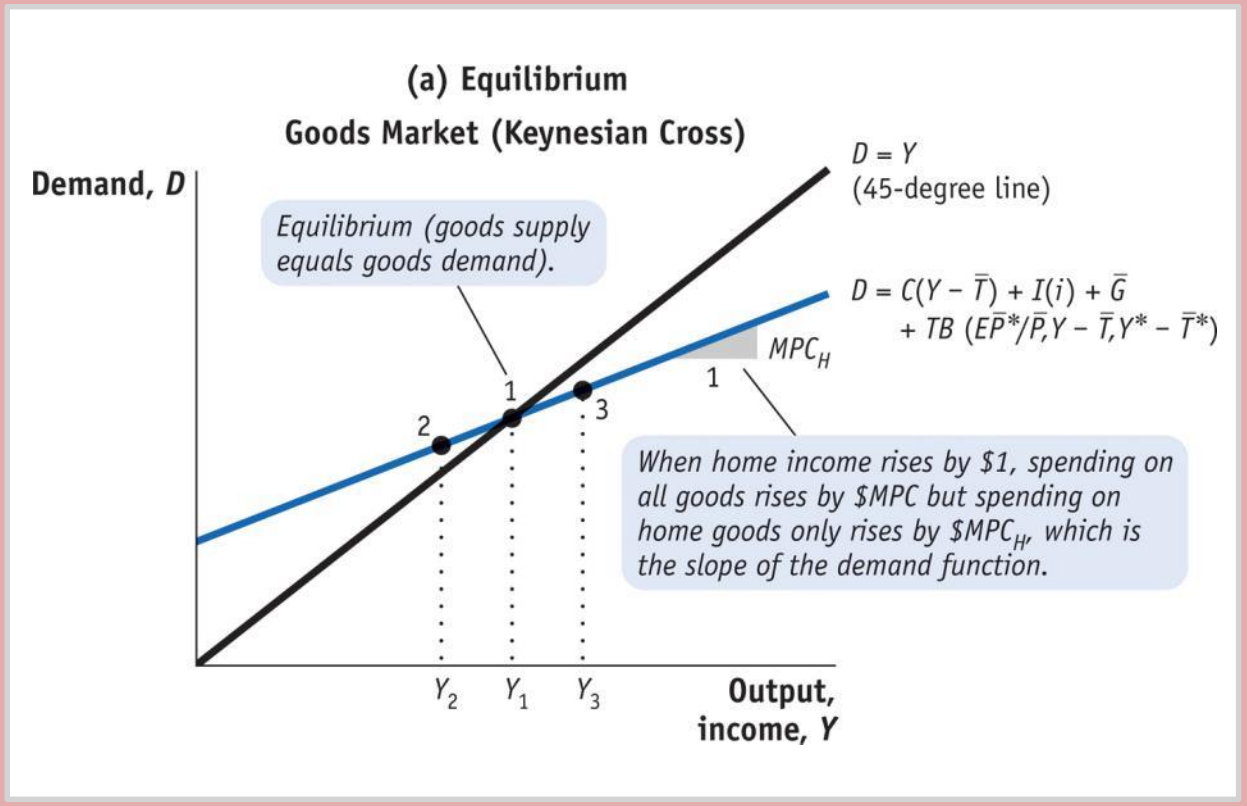
$$D = C\left(Y - \overline{T}\right) + I(i) + \overline{G} + TB\left(E\overline{P}^{*} / \overline{P}, Y - \overline{T}, Y^{*} - \overline{T}^{*}\right)$$

The goods market equilibrium condition is

$$Y = \underbrace{C\left(Y - \overline{T}\right) + I(i) + \overline{G} + TB\left(E\overline{P}^{*} / \overline{P}, Y - \overline{T}, Y^{*} - \overline{T}^{*}\right)}_{D} \quad (7\text{-}1)$$

Determinants of Demand

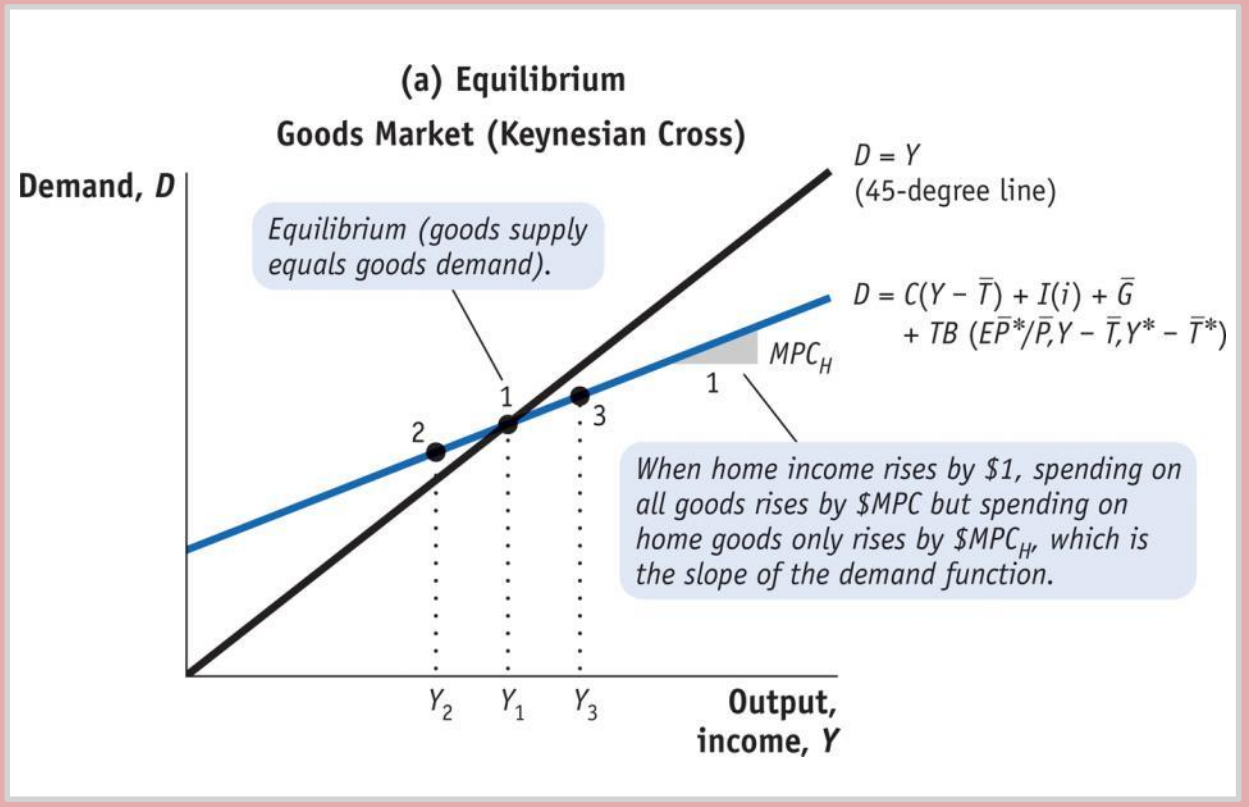
FIGURE 7-7 (a) (1 of 2) The Goods Market Equilibrium and the Keynesian Cross



Equilibrium is where demand, D, equals real output or income, Y. In this diagram, equilibrium is at point 1, at an income or output level of Y_1. The goods market will adjust toward this equilibrium.

Determinants of Demand

FIGURE 7-7 (a) (2 of 2) The Goods Market Equilibrium and the Keynesian Cross (continued)

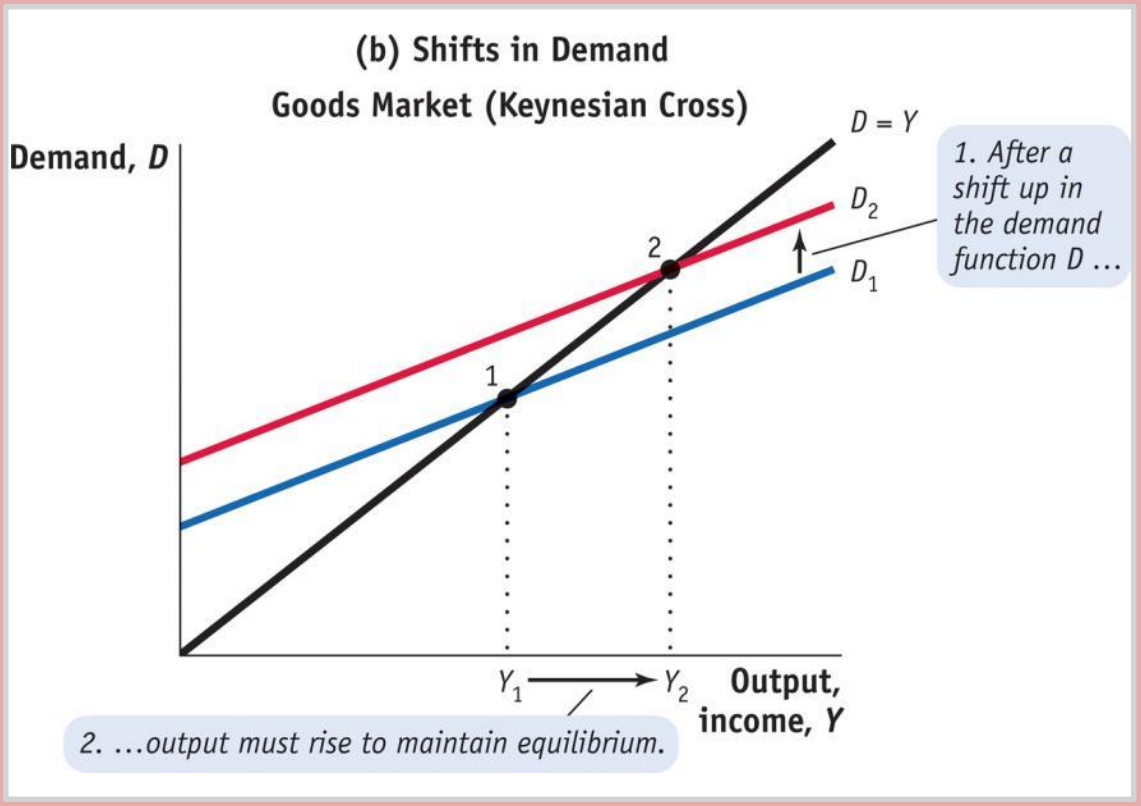


At point 2, the output level is Y_2 and demand, D, exceeds supply, Y; as inventories fall, firms expand production and output rises toward Y_1.

At point 3, the output level is Y_3 and supply Y exceeds demand; as inventories rise, firms cut production and output falls toward Y_1.

Determinants of Demand

FIGURE 7-7 (b) Shifts in Demand



The goods market is initially in equilibrium at point 1, at which point demand and supply both equal Y_1.

An increase in demand, *D,* at all levels of real output, *Y,* shifts the demand curve up from D_1 to D_2.

Equilibrium shifts to point 2, where demand and supply are higher and both equal Y_2. Such an increase in demand could result from changes in one or more of the components of demand: *C, I, G,* or *TB*.

Summary

Rise in government spending G
Fall in taxes T
Fall in the home interest rate i
Rise in the nominal exchange rate E
Rise in foreign prices P*
Fall in home prices P
Any shift up in the consumption function C
Any shift up in the investment function I
Any shift up in the trade balance function TB

$\Rightarrow$ Demand curve D shifts up

Increasing demand D at a given level of output Y

The opposite changes lead to a decrease in demand and shift the demand curve in.

Equilibrium in Two Markets

- A general equilibrium requires equilibrium in all markets—that is, equilibrium in the goods market, the money market, and the forex market.
- *The* **IS curve** *shows combinations of output Y and the interest rate i for which the goods and forex markets are in equilibrium.*

Forex Market Recap

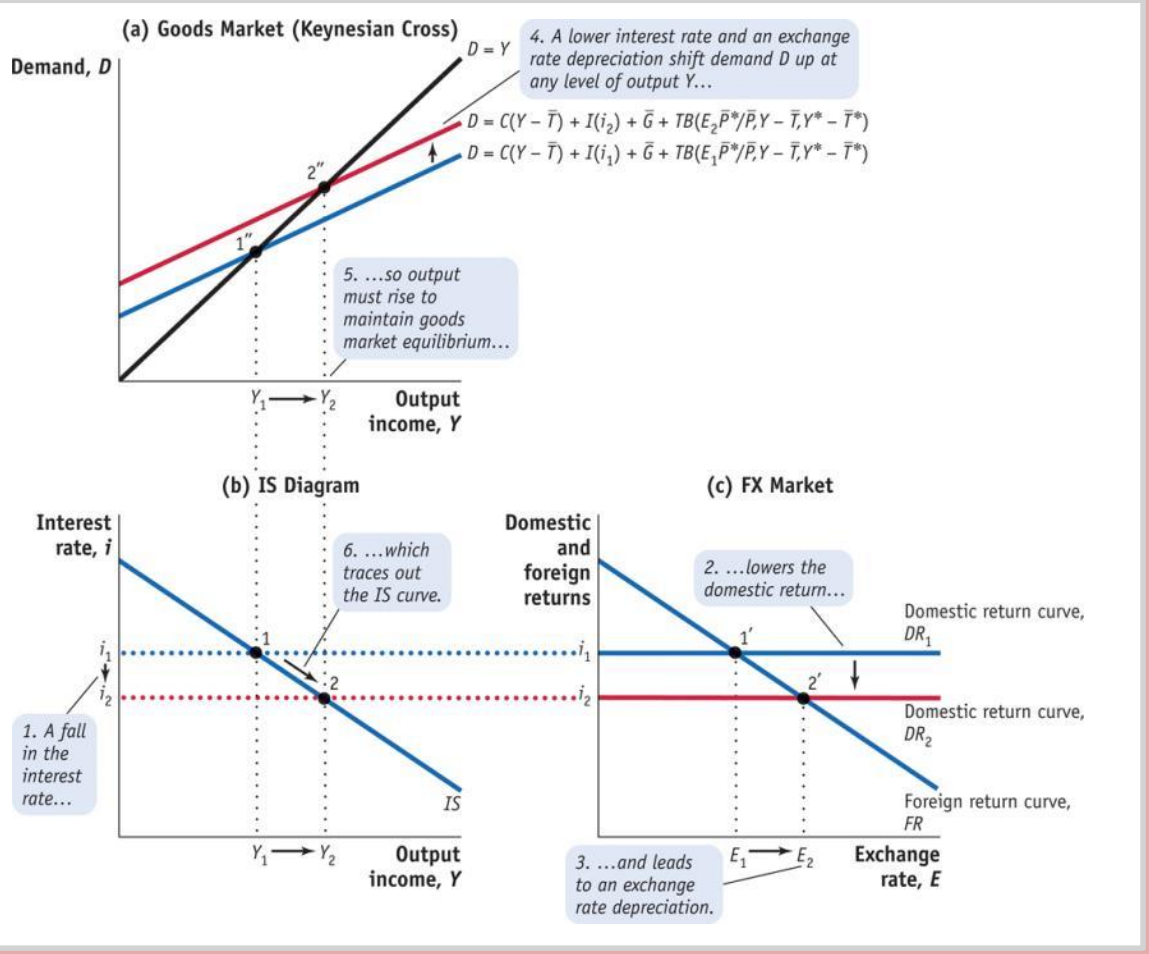
Uncovered interest parity (UIP) Equation (10-3):

$$\underbrace{i}_{\text{Domestic intrest rate}} = \underbrace{\underbrace{i^*}_{\text{Foreign interest rate}} + \underbrace{\left(\frac{E^e}{E} - 1\right)}_{\text{Expected rate of depreciation of the domestic currency}}}_{\text{Expected foreign return}}$$

$$\underbrace{\qquad\qquad}_{\text{Domestic return}}$$

Equilibrium in Two Markets

FIGURE 7-8 (1 of 3) Deriving the IS Curve



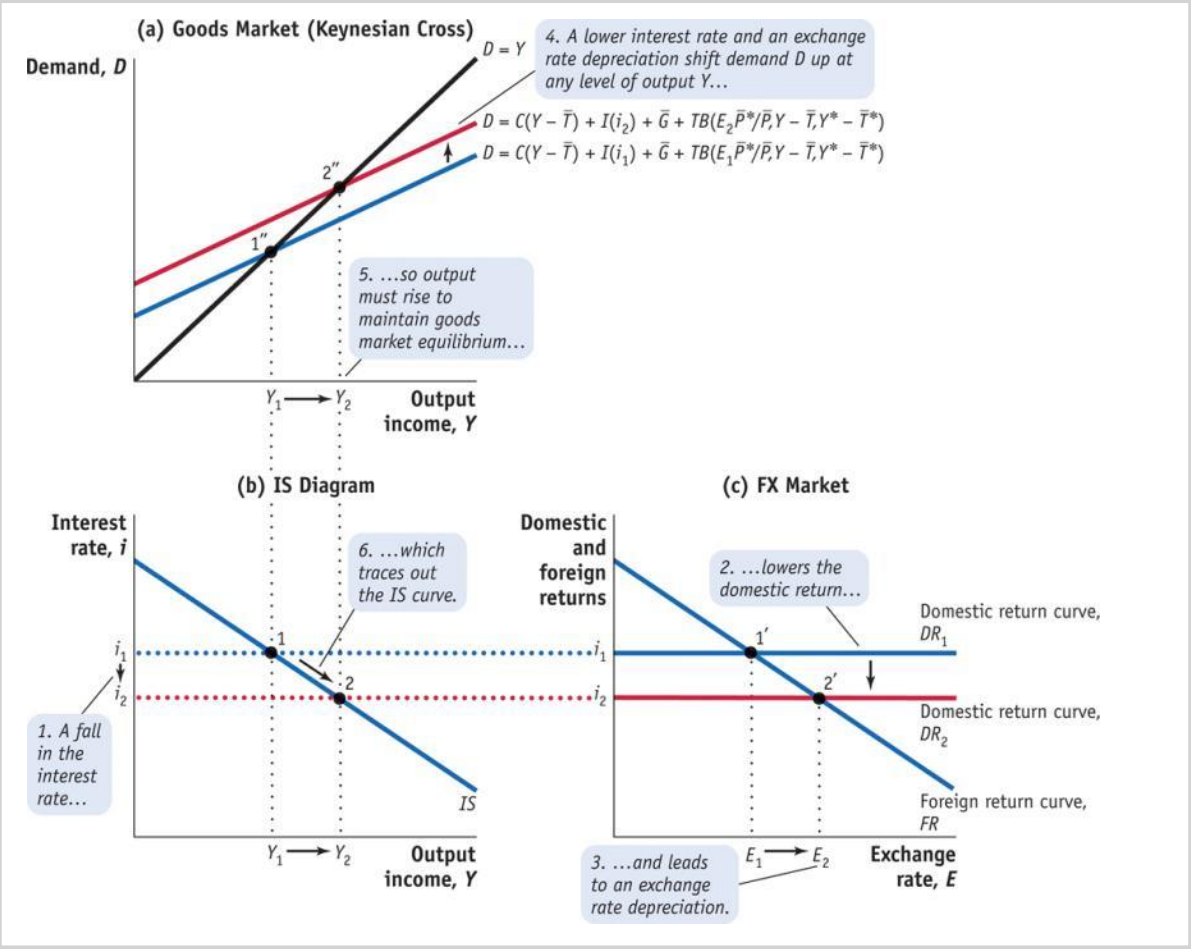
The **Keynesian cross** is in panel (a), the IS curve is in panel (b), and the forex (FX) market is in panel (c).

The economy starts in equilibrium with output, Y_1; interest rate, i_1; and exchange rate, E_1.

Consider the effect of a decrease in the interest rate from i_1 to i_2, all else equal. In panel (c), a lower interest rate causes a depreciation; equilibrium moves from 1′ to 2′.

Equilibrium in Two Markets

FIGURE 7-8 (2 of 3) Deriving the IS Curve (continued)

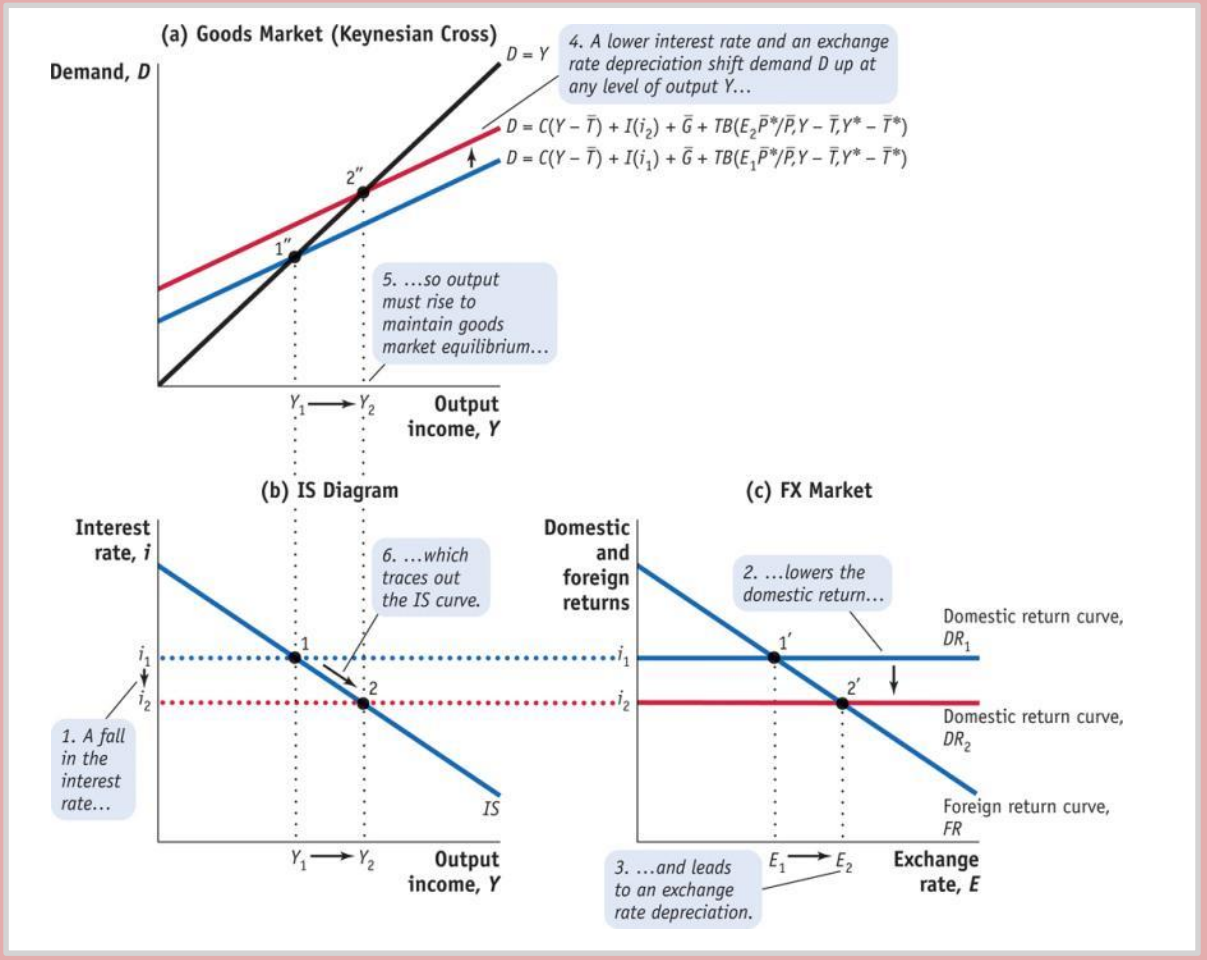


A lower interest rate boosts investment and a depreciation boosts the trade balance.

In panel (a), demand shifts up from D_1 to D_2, equilibrium from 1″ to 2″, and output from Y_1 to Y_2.

Equilibrium in Two Markets

FIGURE 7-8 (3 of 3) Deriving the IS Curve (continued)



In panel (b), we go from point 1 to point 2. The IS curve is thus traced out, a downward-sloping relationship between the interest rate and output.

When the interest rate falls from i_1 to i_2, output rises from Y_1 to Y_2.

The IS curve describes all combinations of i and Y consistent with goods and FX market equilibria in panels (a) and (c).

Deriving the IS Curve

Two important observations are in order:

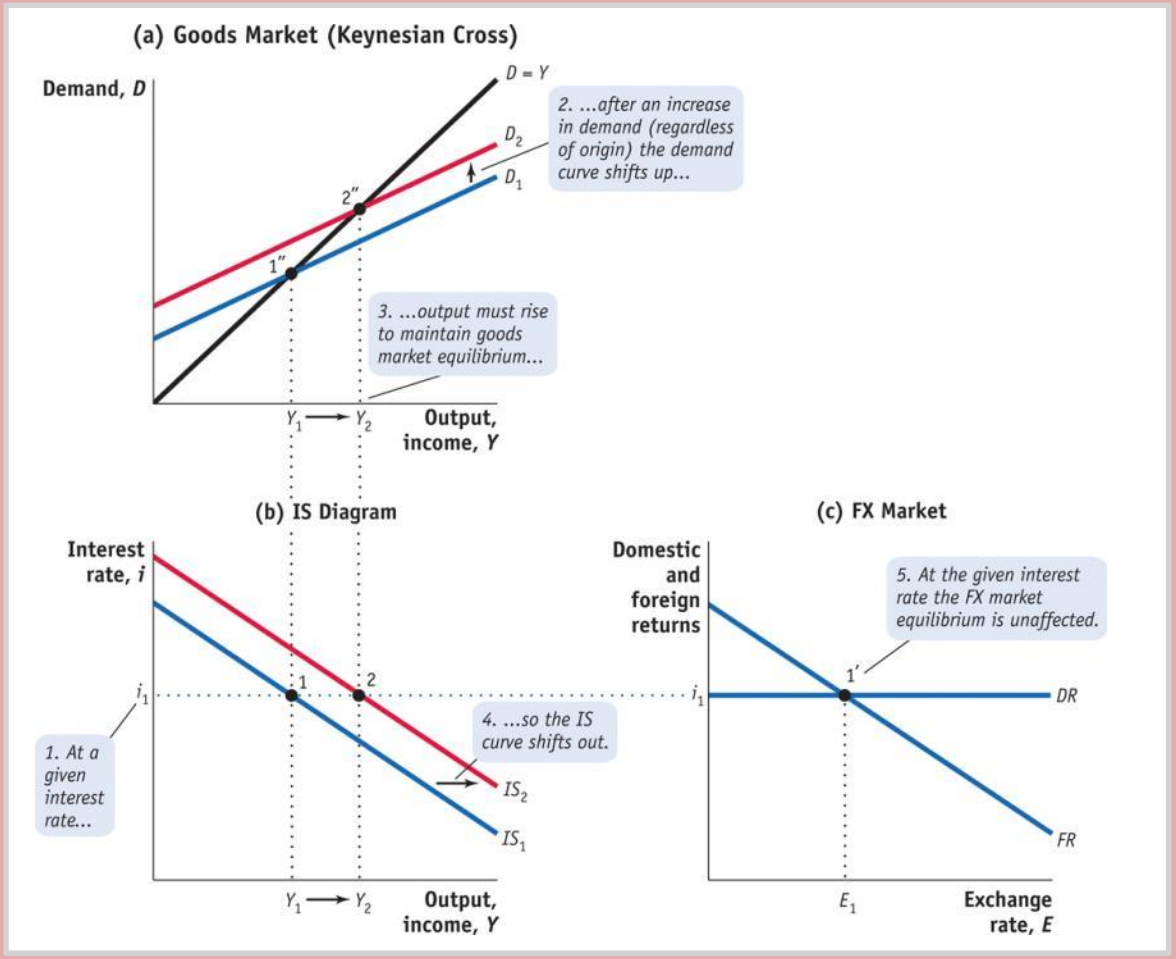
- In an open economy, lower interest rates stimulate demand through the traditional closed-economy investment channel and through the trade balance.
- The trade balance effect occurs because lower interest rates cause a nominal depreciation (a real depreciation in the short run), which stimulates external demand.

We have now derived the shape of the IS curve, which describes goods and forex market equilibrium:

- *The IS curve is downward-sloping. It illustrates the negative relationship between the interest rate i and output Y.*

Factors That Shift the IS Curve

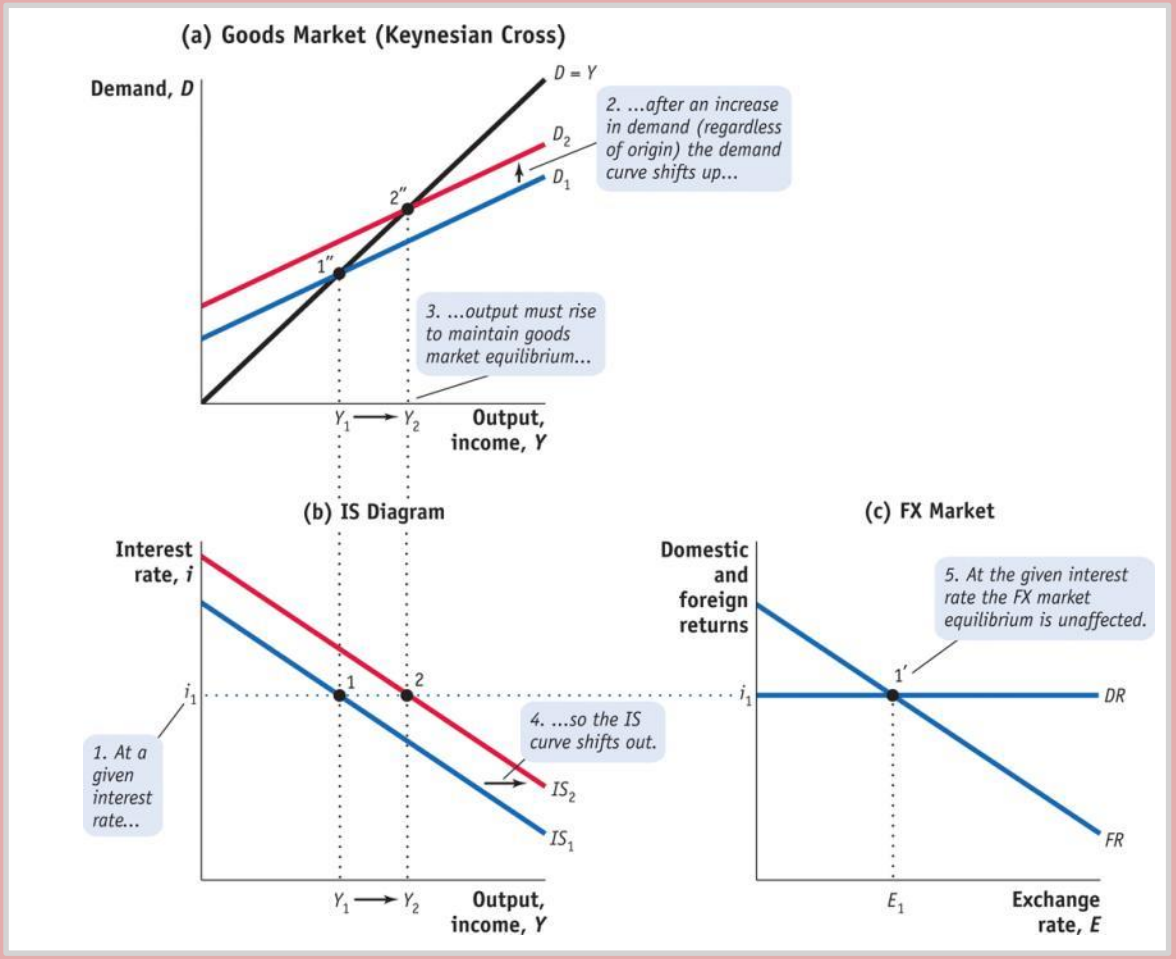
FIGURE 7-9 (1 of 2) Exogenous Shifts in Demand Cause the IS Curve to Shift



In the Keynesian cross in panel (a), when the interest rate is held constant at i_1, an exogenous increase in demand (due to other factors) causes the demand curve to shift up from D_1 to D_2 as shown, all else equal. This moves the equilibrium from 1'' to 2'', raising output from Y_1 to Y_2.

Factors That Shift the IS Curve

FIGURE 7-9 (2 of 2) Exogenous Shifts in Demand Cause the IS Curve to Shift (continued)



In the IS diagram in panel (b), output has risen, with no change in the interest rate.

The IS curve has therefore shifted right from IS_1 to IS_2.

The nominal interest rate and hence the exchange rate are unchanged in this example, as seen in panel (c).

Summing Up the IS Curve

$$IS = IS(G, T, i^*, E^e, P^*, P)$$

Factors That Shift the IS Curve

Rise in government spending G
Fall in taxes T
Rise in foreign interest rate i^*
Rise in future nominal exchange rate E^e
Rise in foreign prices P*
Fall in home prices P
Any shift up in the consumption function C
Any shift up in the investment function I
Any shift up in the trade balance function TB

$\Rightarrow$ Demand curve D shifts up (Increasing demand D at a given level of output Y and a given home interest rate i) $\Rightarrow$ IS curve shifts right (Increase in equilibrium output Y at a given home interest rate i)

These changes are for a given level of i.

The opposite changes lead to a decrease in demand and shift the demand curve down and the IS curve to the left.

4 Money Market Equilibrium: Deriving the LM Curve

In this section, we derive a set of combinations of *Y* and *i* that ensures equilibrium in the money market, a concept that can be represented graphically as the **LM curve**.

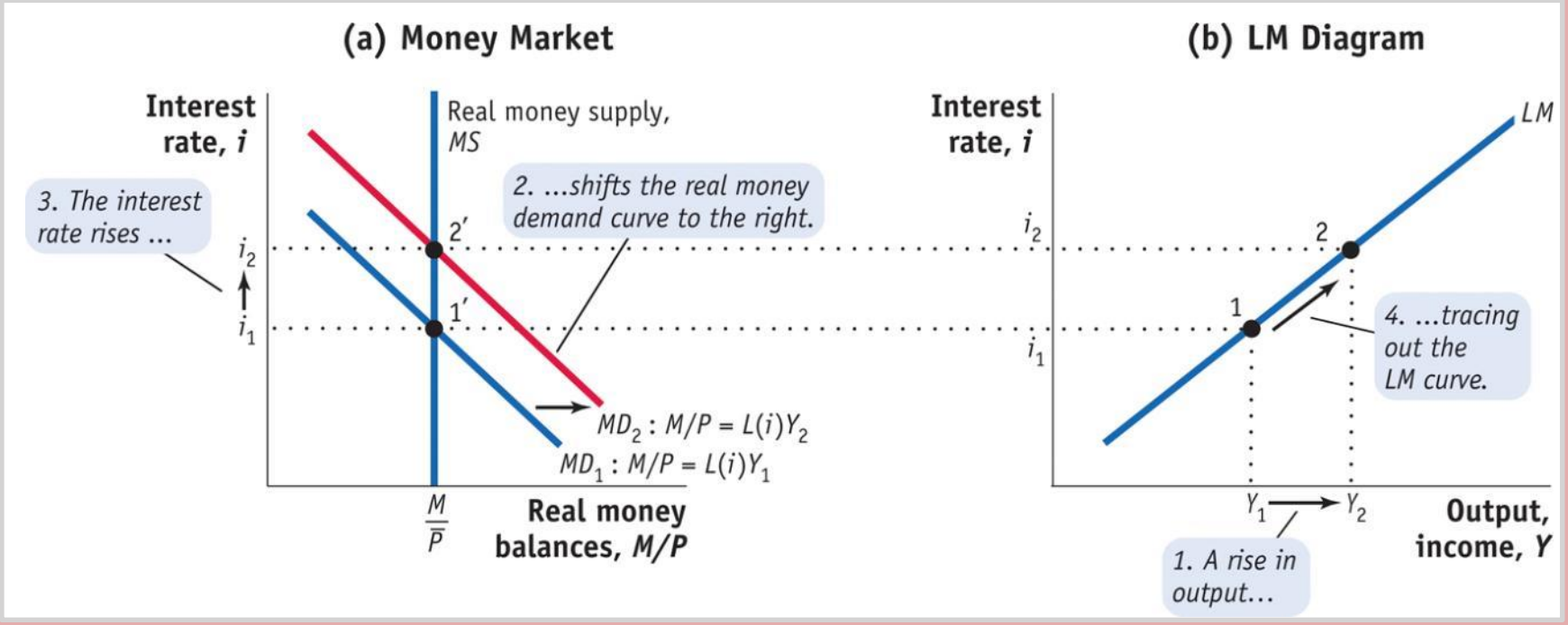
Money Market Recap

- In the short run, the price level is assumed to be sticky at a level $\bar{P}$, and the money market is in equilibrium when the demand for real money balances $L(i)Y$ equals the real money supply $M/\bar{P}$:

$$\underbrace{\frac{M}{\bar{P}}}_{\substack{\text{Real money supply}}} = \underbrace{L(i)\,Y}_{\substack{\text{Real money demand}}} \qquad (7\text{-}2)$$

Deriving the LM Curve

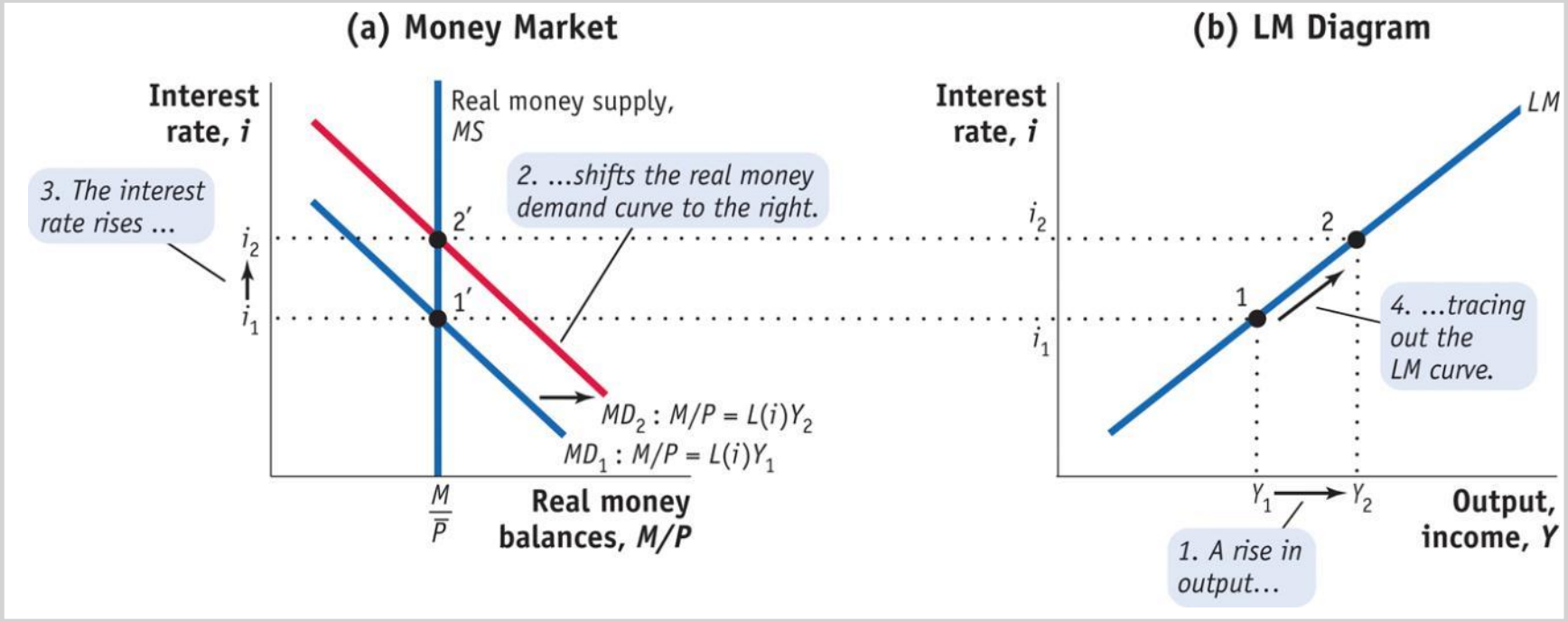
FIGURE 7-10 (1 of 2) Deriving the LM Curve



If there is an increase in real income or output from Y_1 to Y_2 in panel (b), the effect in the money market in panel (a) is to shift the demand for real money balances to the right, all else equal. If the real supply of money, *MS,* is held fixed at $M/\bar{P}$, then the interest rate rises from i_1 to i_2 and money market equilibrium moves from point 1′ to point 2′.

Deriving the LM Curve

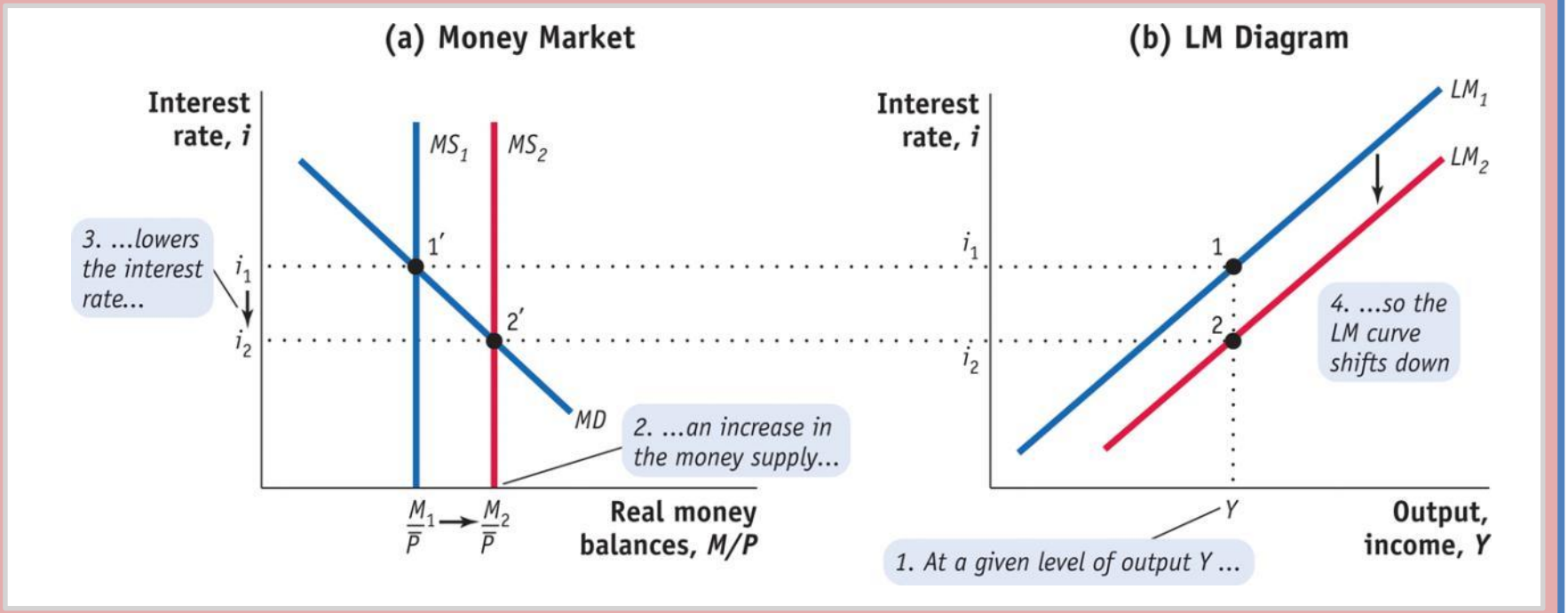
FIGURE 7-10 (2 of 2) Deriving the LM Curve (continued)



The relationship between the interest rate and income is known as the LM curve and is depicted in panel (b). The LM curve is upward-sloping: When the output level rises from Y_1 to Y_2, the interest rate rises from i_1 to i_2. The LM curve describes all combinations of i and Y that are consistent with money market equilibrium in panel (a).

Factors That Shift the LM Curve

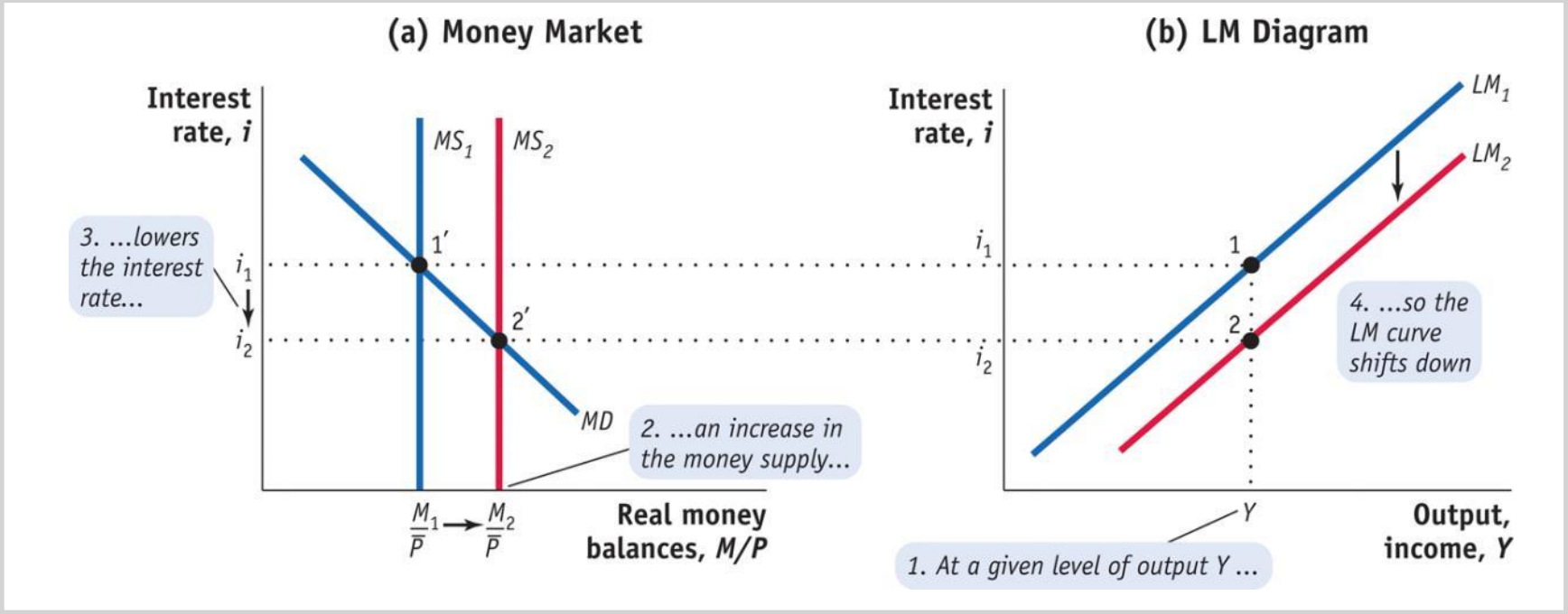
FIGURE 7-11 (1 of 2) Change in the Money Supply Shifts the LM Curve



In the money market, shown in panel (a), we hold fixed the level of real income or output, Y, and hence real money demand, MD. All else equal, we show the effect of an increase in money supply from M_1 to M_2. The real money supply curve moves out from MS_1 to MS_2. This moves the equilibrium from 1′ to 2′, lowering the interest rate from i_1 to i_2.

Factors That Shift the LM Curve

FIGURE 7-11 (2 of 2) Change in the Money Supply Shifts the LM Curve (continued)



In the LM diagram, shown in panel (b), the interest rate has fallen, with no change in the level of income or output, so the economy moves from point 1 to point 2.

The LM curve has therefore shifted down from LM_1 to LM_2.

Summing Up the LM Curve

$$LM = LM\left(M/\overline{P}\right)$$

Factors That Shift the LM Curve

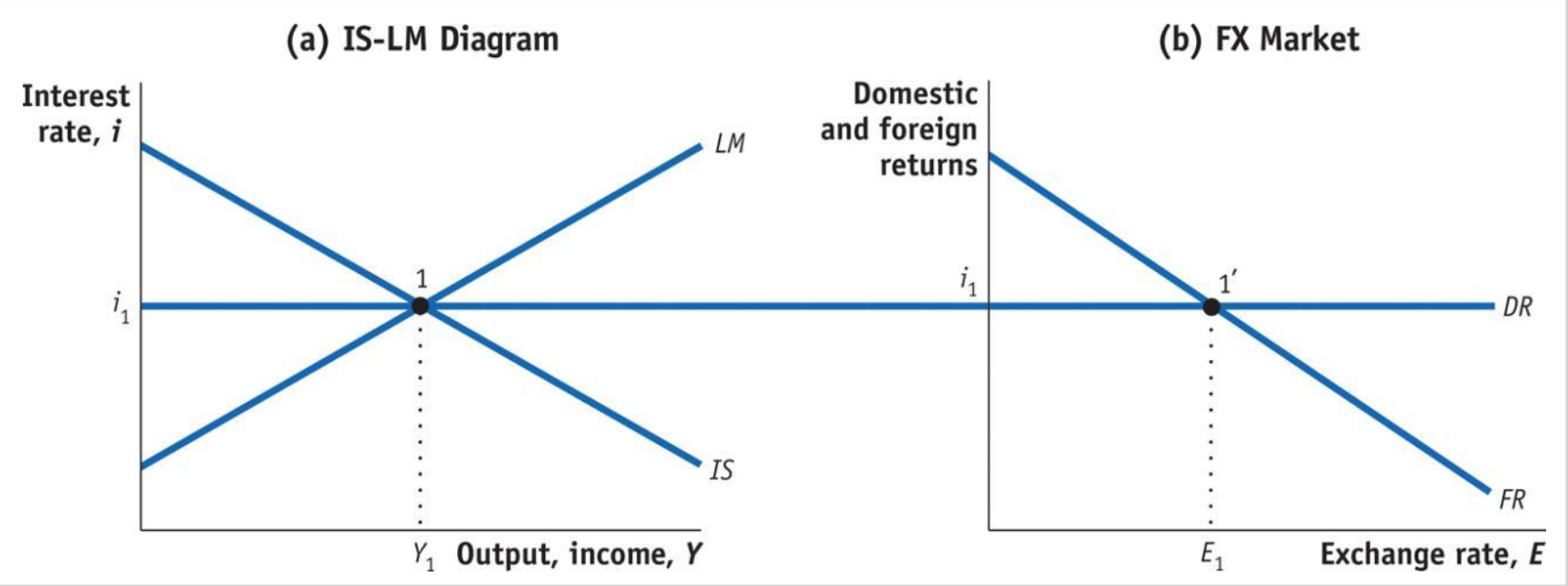
Rise in (nominal) money supply *M*

Any shift left in the money demand function *L*

$\Rightarrow$ LM curve shifts down or right

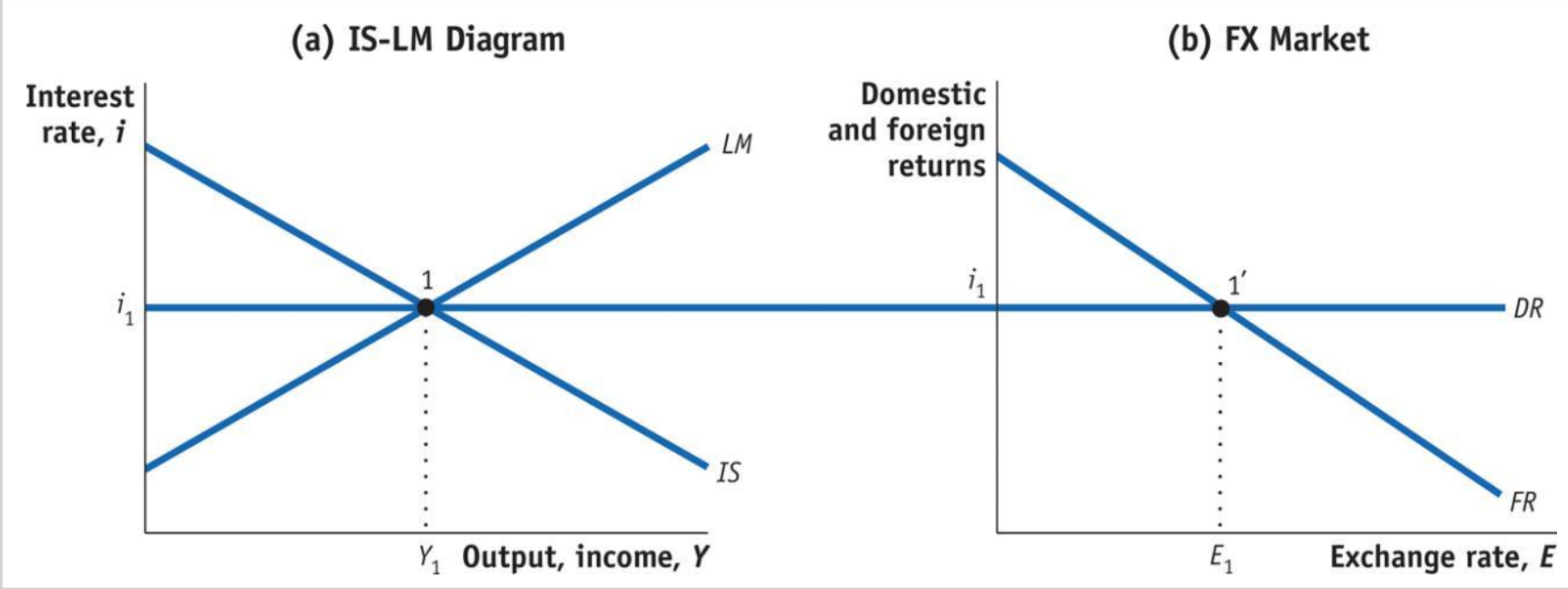
Decrease in equilibrium home interest rate i at given level of output Y

FIGURE 7-12 (1 of 2) Equilibrium in the IS–LM–FX Model



In panel (a), the IS and LM curves are both drawn. The goods and forex markets are in equilibrium when the economy is on the IS curve. The money market is in equilibrium when the economy is on the LM curve. Both markets are in equilibrium if and only if the economy is at point 1, the unique point of intersection of IS and LM.

FIGURE 7-12 (2 of 2) Equilibrium in the IS–LM–FX Model (continued)



In panel (b), the forex (FX) market is shown. The domestic return, *DR,* in the forex market equals the money market interest rate.

Equilibrium is at point 1′ where the foreign return *FR* equals domestic return, *i*.

Macroeconomic Policies in the Short Run

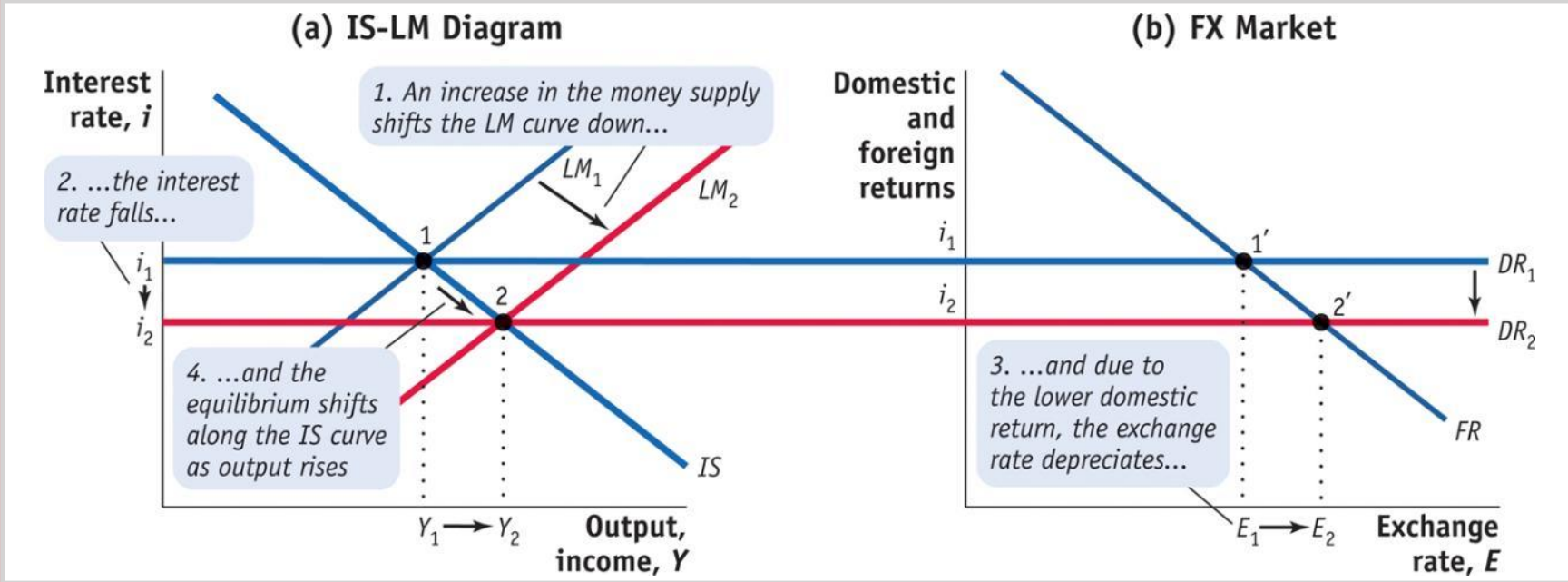
We focus on the two main policy actions: changes in **monetary policy**, via changes in the money supply, and changes in **fiscal policy**, via changes in government spending or taxes.

The key assumptions of this section are as follows:

- The economy starts in long-run equilibrium. We then consider policy changes in the home economy, assuming that conditions in the foreign economy are unchanged.
- The home economy is subject to the usual short-run assumption of a sticky price level at home *and* abroad.
- Furthermore, we assume that the forex market operates freely and is unrestricted by capital controls and that the exchange rate is determined by market forces.

Monetary Policy Under Floating Exchange Rates

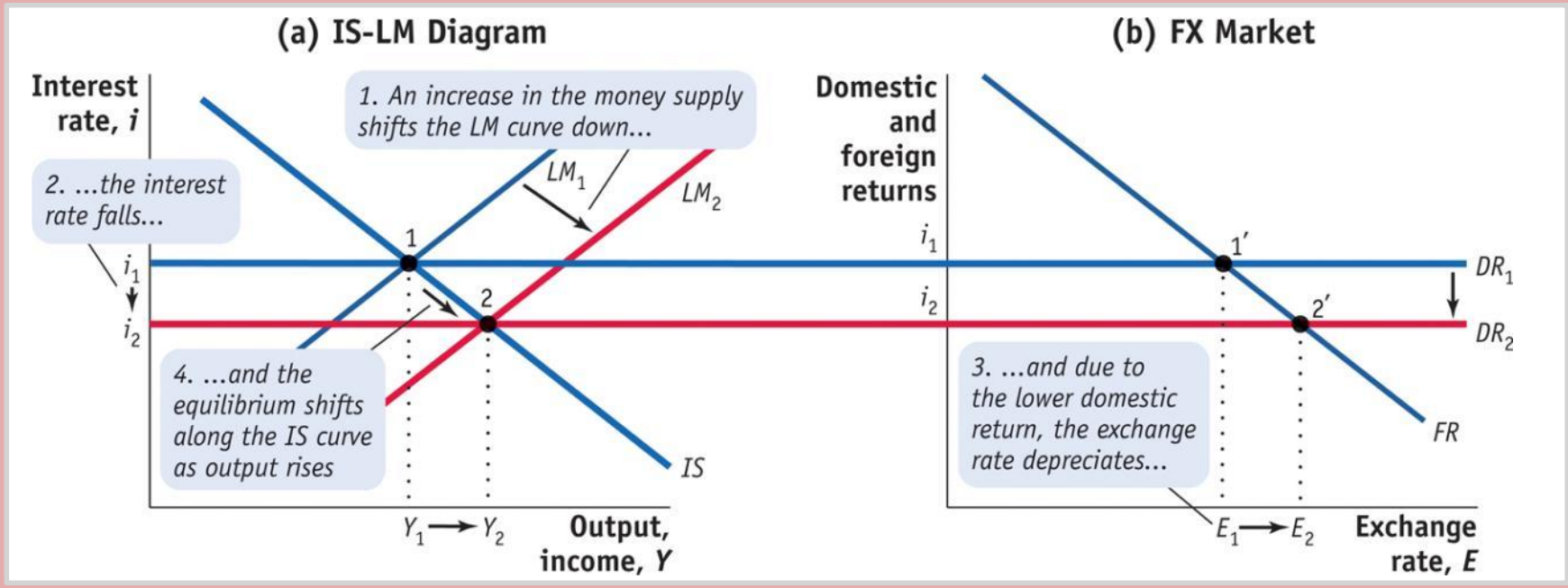
FIGURE 7-13 (1 of 2) Monetary Policy Under Floating Exchange Rates



In panel (a) in the IS–LM diagram, the goods and money markets are initially in equilibrium at point 1. The interest rate in the money market is also the domestic return, DR_1, that prevails in the forex market. In panel (b), the forex market is initially in equilibrium at point 1′. A temporary monetary expansion that increases the money supply from M_1 to M_2 would shift the LM curve down in panel (a) from LM_1 to LM_2, causing the interest rate to fall from i_1 to i_2. DR falls from DR_1 to DR_2.

Monetary Policy Under Floating Exchange Rates

FIGURE 7-13 (2 of 2) Monetary Policy Under Floating Exchange Rates (continued)



In panel (b), the lower interest rate implies that the exchange rate must depreciate, rising from E_1 to E_2. As the interest rate falls (increasing investment, I) and the exchange rate depreciates (increasing the trade balance), demand increases, which corresponds to the move down the IS curve from point 1 to point 2. Output expands from Y_1 to Y_2. The new equilibrium corresponds to points 2 and 2′.

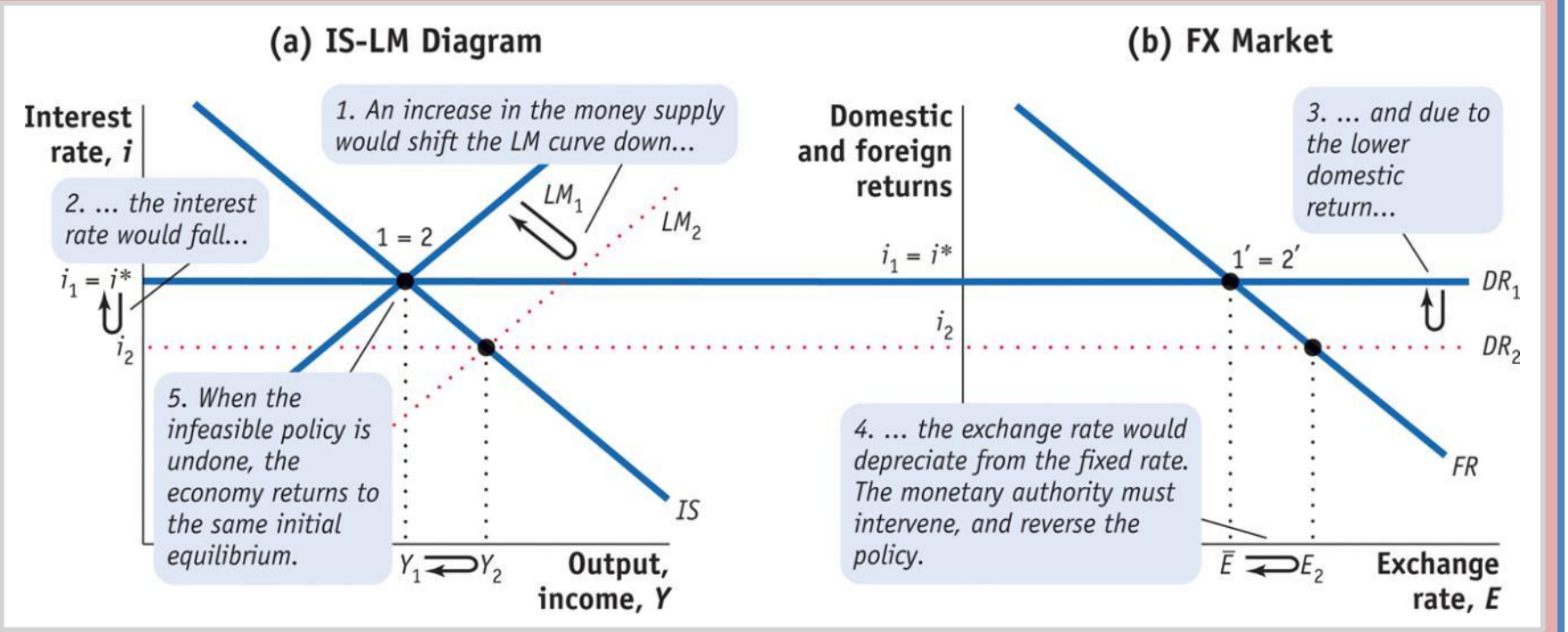
Monetary Policy Under Floating Exchange Rates

To sum up:

- A temporary monetary expansion under floating exchange rates is effective in combating economic downturns by boosting output.
- It raises output at home, lowers the interest rate, and causes a depreciation of the exchange rate. What happens to the trade balance cannot be predicted with certainty.

Monetary Policy Under Fixed Exchange Rates

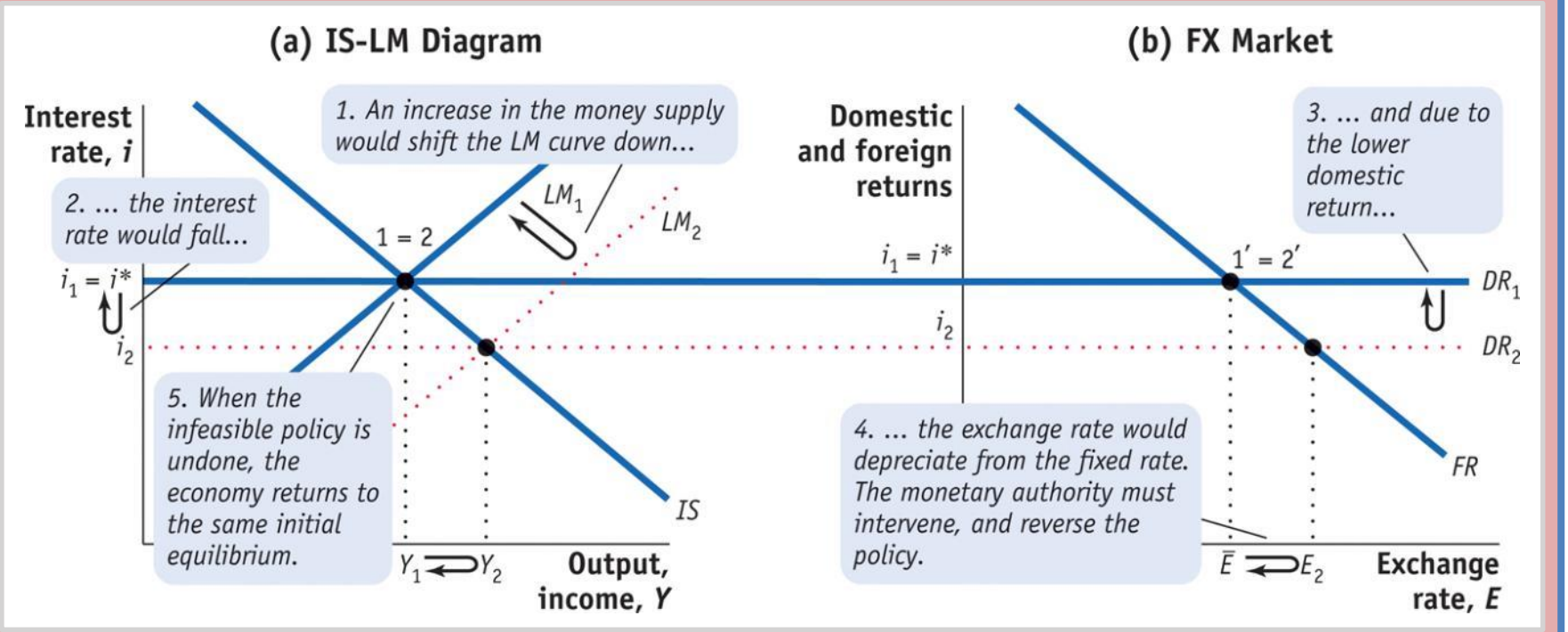
FIGURE 7-14 (1 of 2) Monetary Policy Under Fixed Exchange Rates



In panel (a) in the IS–LM diagram, the goods and money markets are initially in equilibrium at point 1. In panel (b), the forex market is initially in equilibrium at point 1′. A temporary monetary expansion that increases the money supply from M_1 to M_2 would shift the LM curve down in panel (a).

Monetary Policy Under Fixed Exchange Rates

FIGURE 7-14 (2 of 2) Monetary Policy Under Fixed Exchange Rates (continued)



In panel (b), the lower interest rate implies that the exchange rate must depreciate, rising from $\bar{E}_1$ to $\bar{E}_2$. This depreciation is inconsistent with the pegged exchange rate, so the policy makers cannot move *LM* in this way, leaving the money supply equal to M_1. Implication: Under a fixed exchange rate, autonomous monetary policy is not an option.

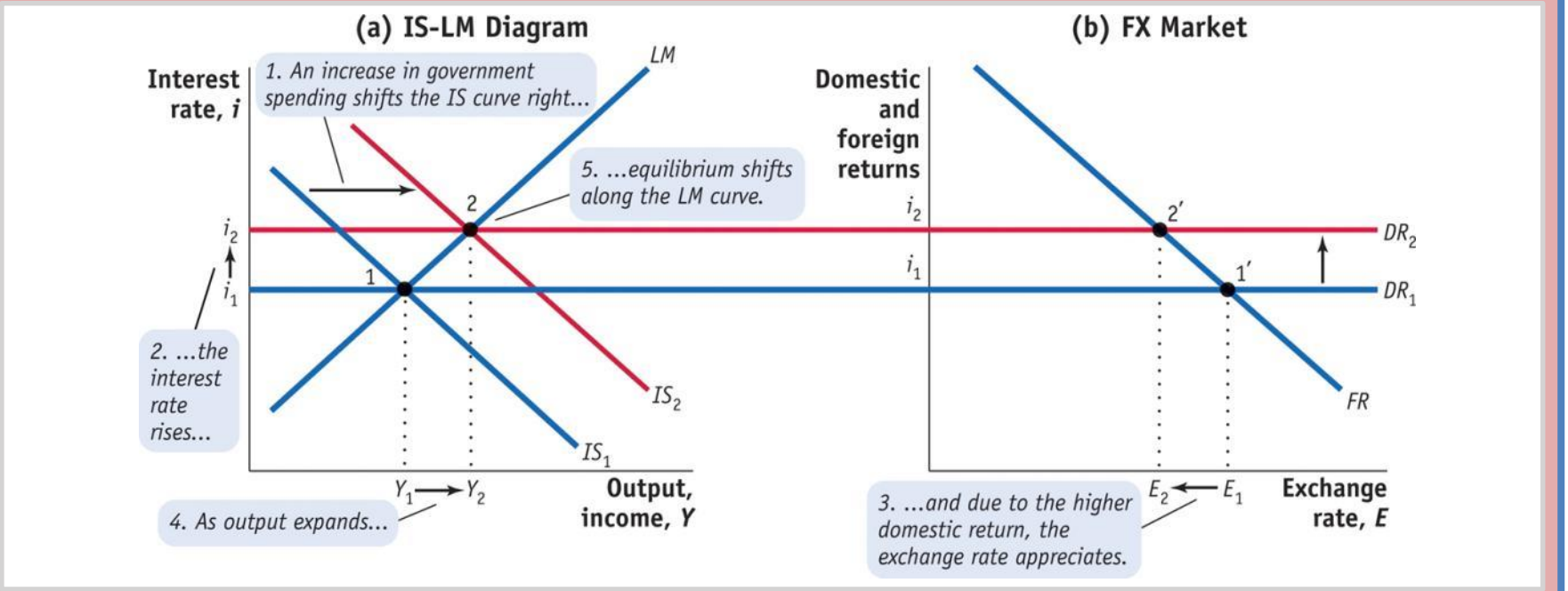
Monetary Policy Under Fixed Exchange Rates

To sum up:

- Monetary policy under fixed exchange rates is *impossible* to undertake. Fixing the exchange rate means giving up monetary policy autonomy.
- Countries cannot simultaneously allow capital mobility, maintain fixed exchange rates, and pursue an autonomous monetary policy. This is the *trilemma* faced by policy makers.

Fiscal Policy Under Floating Exchange Rates

FIGURE 7-15 (1 of 3) Fiscal Policy Under Floating Exchange Rates

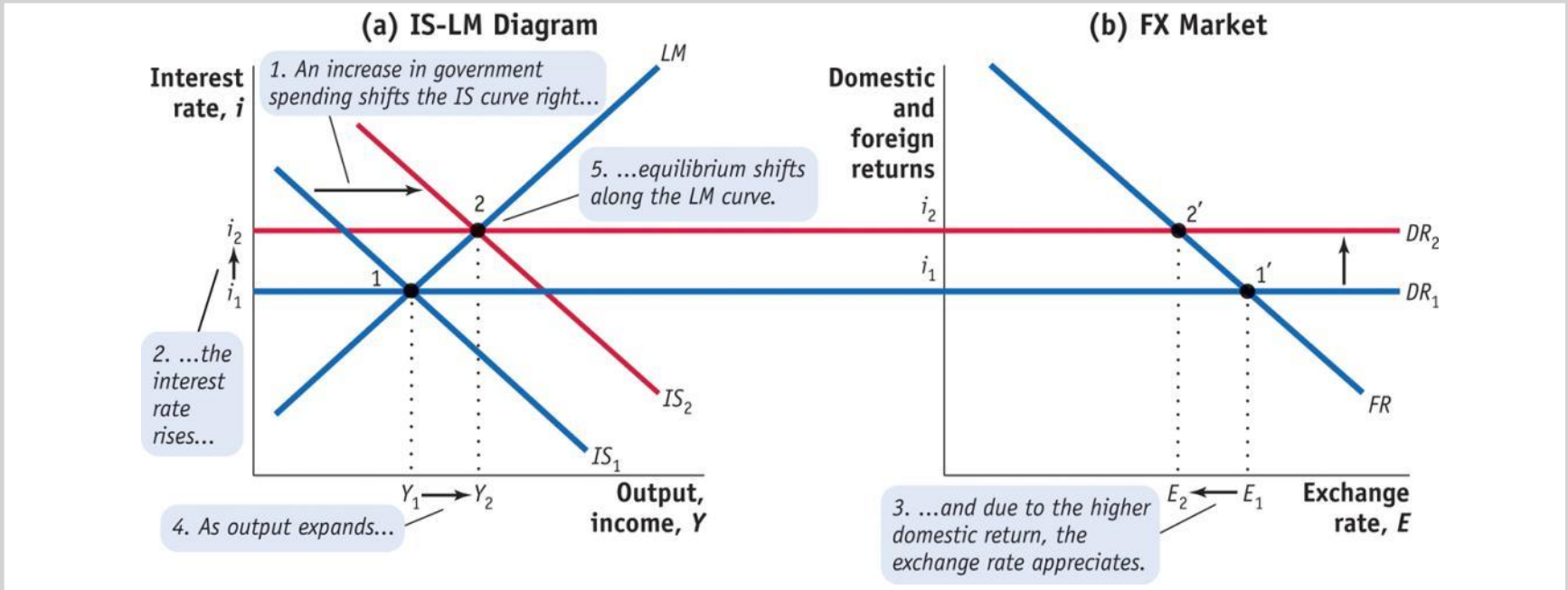


In panel (a) in the IS–LM diagram, the goods and money markets are initially in equilibrium at point 1.

The interest rate in the money market is also the domestic return, DR_1, that prevails in the forex market. In panel (b), the forex market is initially in equilibrium at point 1′.

Fiscal Policy Under Floating Exchange Rates

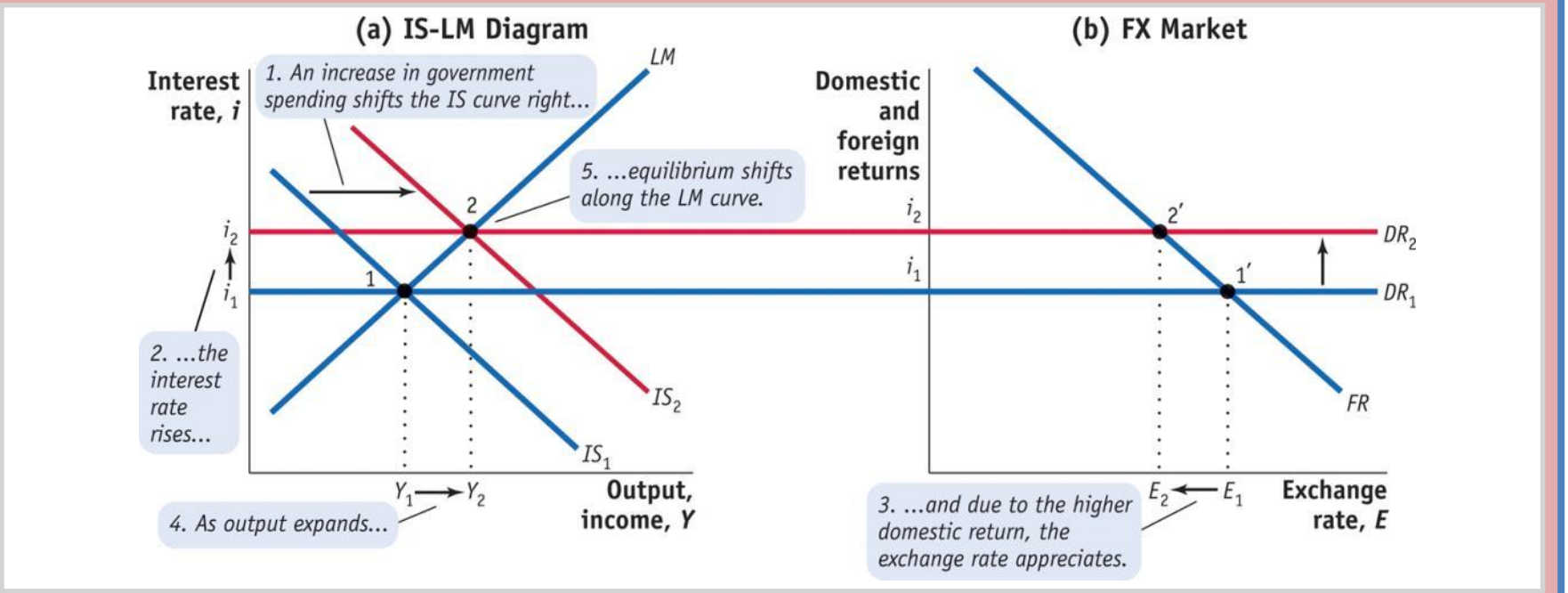
FIGURE 7-15 (2 of 3) Fiscal Policy Under Floating Exchange Rates (continued)



A temporary fiscal expansion that increases government spending from $\bar{G}_1$ to $\bar{G}_2$ would shift the IS curve to the right in panel (a) from IS_1 to IS_2, causing the interest rate to rise from i_1 to i_2. The domestic return shifts up from DR_1 to DR_2.

Fiscal Policy Under Floating Exchange Rates

FIGURE 7-15 (3 of 3) Fiscal Policy Under Floating Exchange Rates (continued)



In panel (b), the higher interest rate would imply that the exchange rate must appreciate, falling from E_1 to E_2. The initial shift in the IS curve and falling exchange rate corresponds in panel (a) to the movement along the LM curve from point 1 to point 2. Output expands Y_1 to Y_2. The new equilibrium corresponds to points 2 and 2′.

Fiscal Policy Under Floating Exchange Rates

- As the interest rate rises (decreasing investment, *I*) and the exchange rate appreciates (decreasing the trade balance), demand falls.
- This impact of fiscal expansion is often referred to as "crowding out" whereby the increase in government spending is offset by a decline in private spending.
- Note that, in an open economy, fiscal expansion crowds out investment (by raising the interest rate) and decreases net exports (by causing the exchange rate to appreciate).
- Over time, it limits the rise in output to *less than* the increase in government spending.

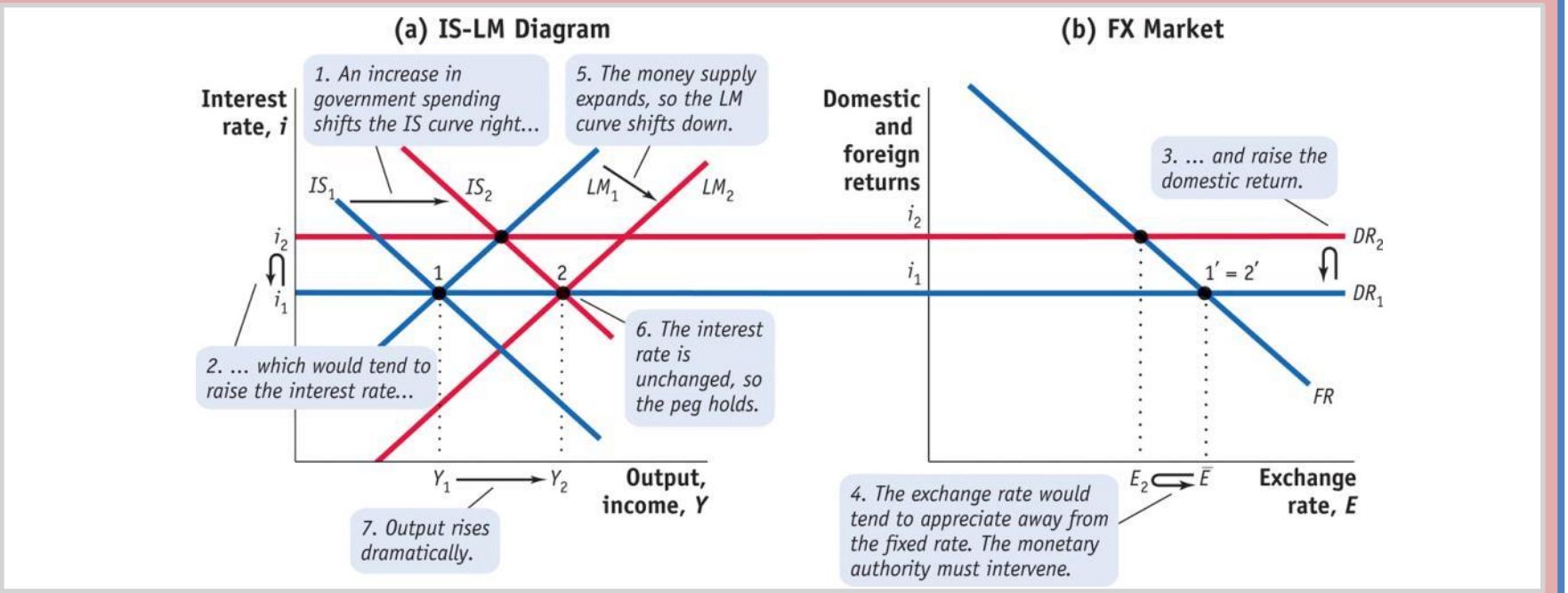
Fiscal Policy Under Floating Exchange Rates

To sum up:

- An expansion of fiscal policy under floating exchange rates might be temporarily effective.
- It raises output at home, raises the interest rate, causes an appreciation of the exchange rate, and decreases the trade balance.
- It indirectly leads to crowding out of investment and exports, and thus limits the rise in output to less than an increase in government spending.
- A temporary contraction of fiscal policy has opposite effects.

Fiscal Policy Under Fixed Exchange Rates

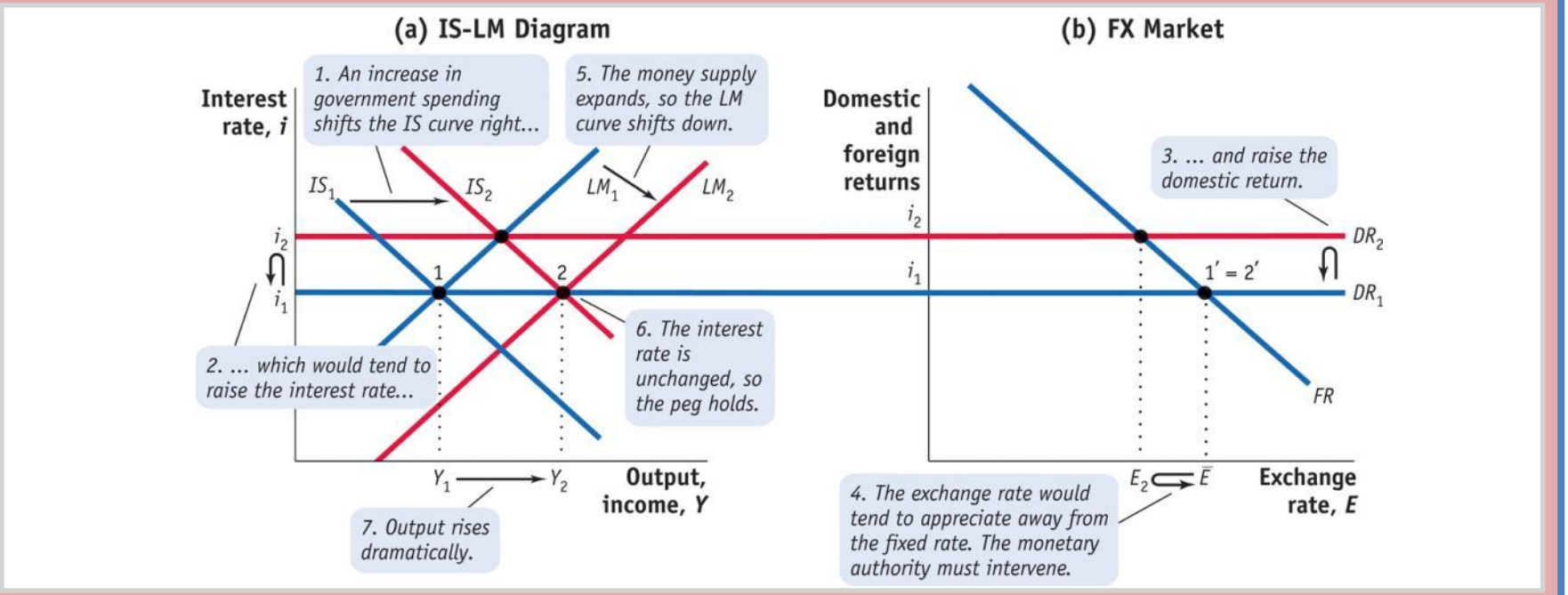
FIGURE 7-16 (1 of 3) Fiscal Policy Under Fixed Exchange Rates



In panel (a) in the IS–LM diagram, the goods and money markets are initially in equilibrium at point 1. The interest rate in the money market is also the domestic return, DR_1, that prevails in the forex market. In panel (b), the forex market is initially in equilibrium at point 1′.

Fiscal Policy Under Fixed Exchange Rates

FIGURE 7-16 (2 of 3) Fiscal Policy Under Fixed Exchange Rates (continued)

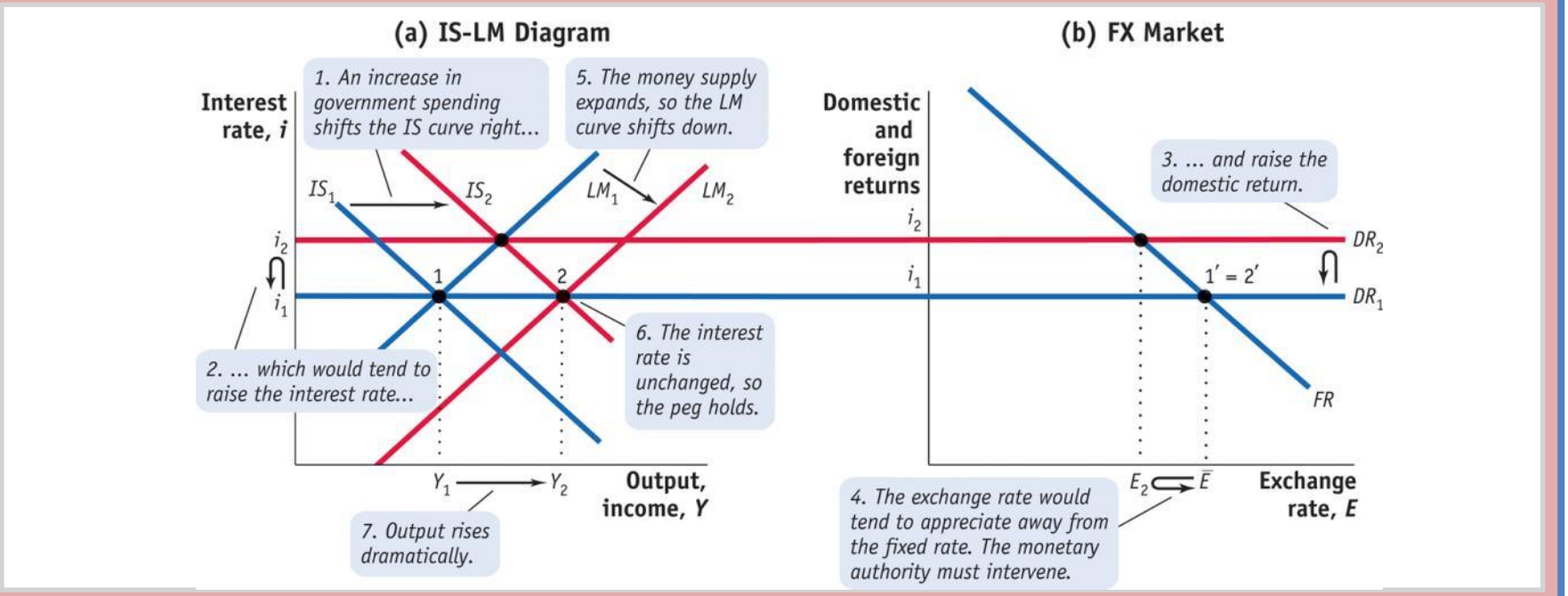


A temporary fiscal expansion on its own increases government spending from $\bar{G}_1$ to $\bar{G}_2$ and would shift the IS curve to the right in panel (a) from IS_1 to IS_2, causing the interest rate to rise from i_1 to i_2.

The domestic return would then rise from DR_1 to DR_2.

Fiscal Policy Under Fixed Exchange Rates

FIGURE 7-16 (3 of 3) Fiscal Policy Under Fixed Exchange Rates (continued)



In panel (b), the higher interest rate would imply that the exchange rate must appreciate, falling from $\bar{E}$ to E_2. To maintain the peg, the monetary authority must intervene, shifting the LM curve down, from LM_1 to LM_2. The fiscal expansion thus prompts a monetary expansion. In the end, the interest rate and exchange rate are left unchanged, and output expands *dramatically* from Y_1 to Y_2. The new equilibrium occurs at points 2 and 2′.

Summary

A temporary expansion of fiscal policy under fixed exchange rates raises output at home by a considerable amount. (The case of a temporary contraction of fiscal policy would have similar but opposite effects.)

Responses to Policy Shocks in the IS-LM-FX Model

Exchange Rate Regime	Policy	Impact on: i	E	I	TB	Y
Floating	Monetary expansion	↓	↑	↑	↑?	↑
	Fiscal expansion	↑	↓	↓	↓	↑
Fixed	Monetary expansion	0	0	0	0	0
	Fiscal expansion	0	0	0	↓	↑

Authorities can use changes in policies to try to keep the economy at or near its full-employment level of output. This is the essence of **stabilization policy**.

- If the economy is hit by a temporary adverse shock, policy makers could use expansionary monetary and fiscal policies to prevent a deep recession.
- Conversely, if the economy is pushed by a shock above its full employment level of output, contractionary policies could tame the boom.

Application

The Right Time for Austerity?

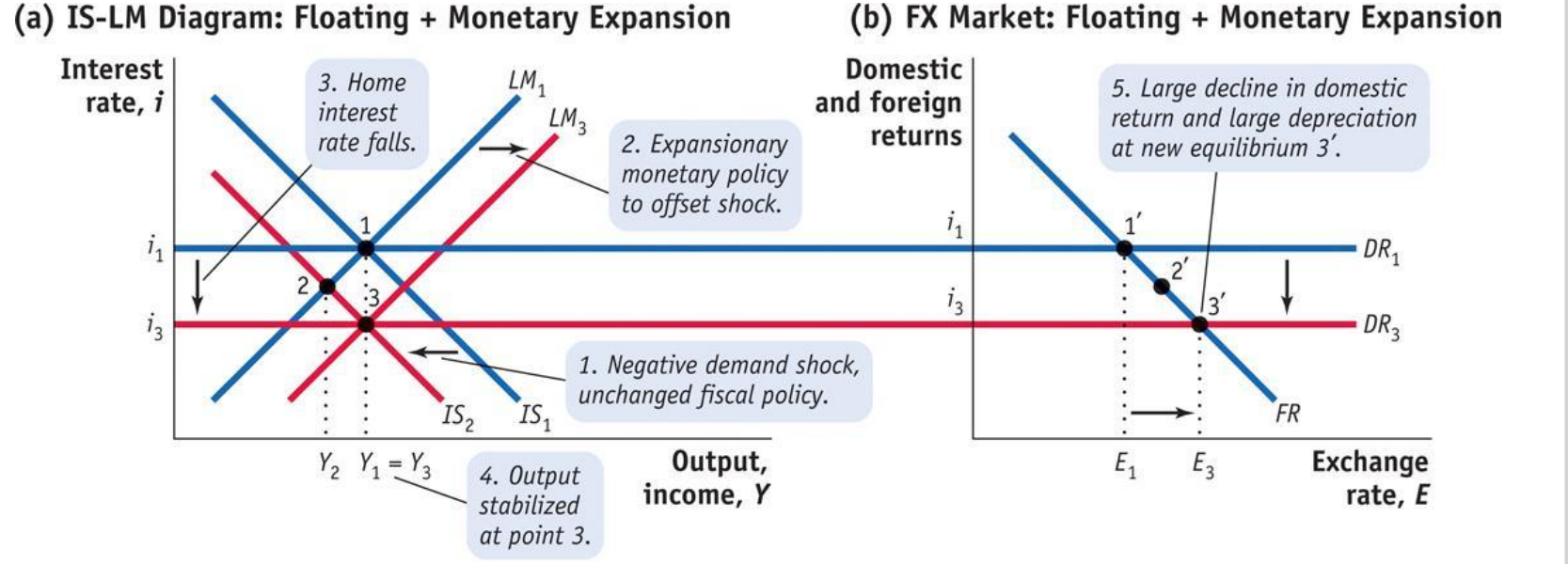
After the global financial crisis, many observers predicted economic difficulties for Eastern Europe in the short run. We use our analytical tools to look at two opposite cases: Poland, which fared well, and Latvia, which did not.

- Demand for Poland's and Latvia's exports declined with the contraction of foreign output. This, along with negative shocks to consumption and investment, can be represented as a leftward shift of the IS curve.
- The policy responses differed in each country, illustrating the contrasts between fixed and floating regimes.

Application

The Right Time for Austerity?

FIGURE 7-17(a–b) (1 of 3) Examples of Policy Choices Under Floating and Fixed Exchange Rates

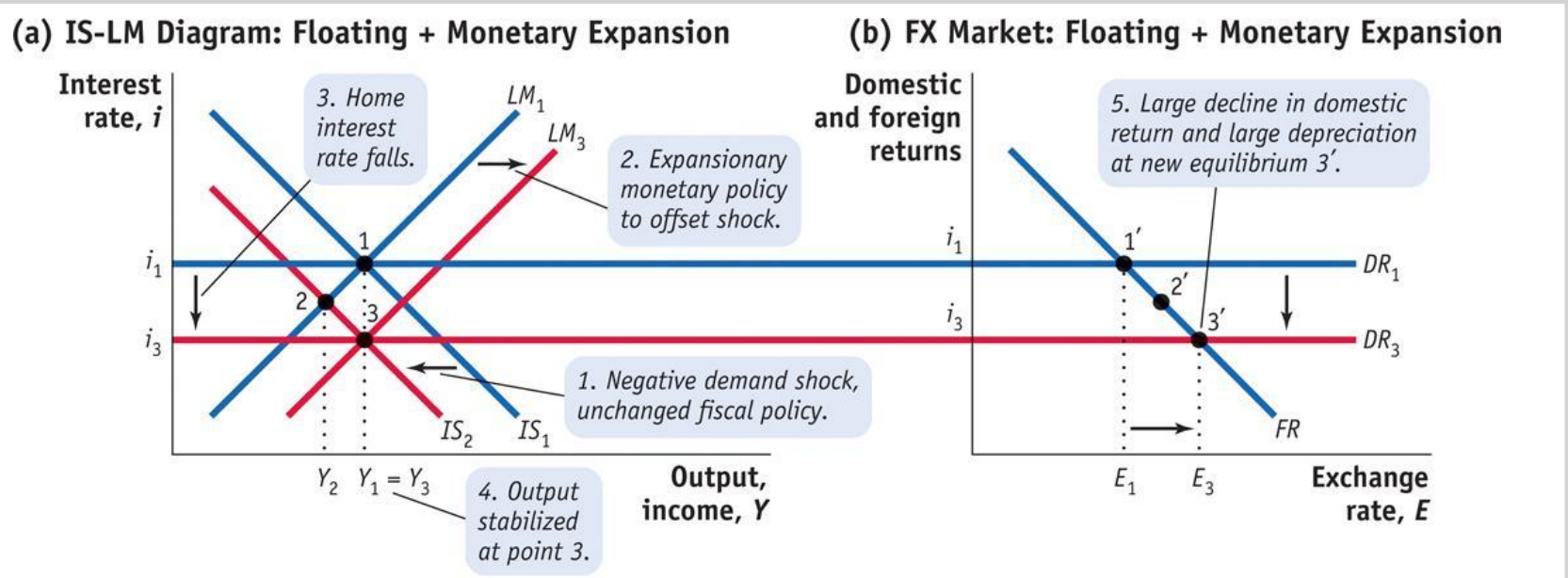


In panels (a) and (b), we explore what happens when the central bank can stabilize output by responding to a negative demand shock with a monetary policy expansion. In panel (a) in the IS–LM diagram, the goods and money markets are initially in equilibrium at point 1. The interest rate in the money market is also the domestic return, DR_1, that prevails in the forex market. In panel (b), the forex market is initially in equilibrium at point 1′.

Application

The Right Time for Austerity?

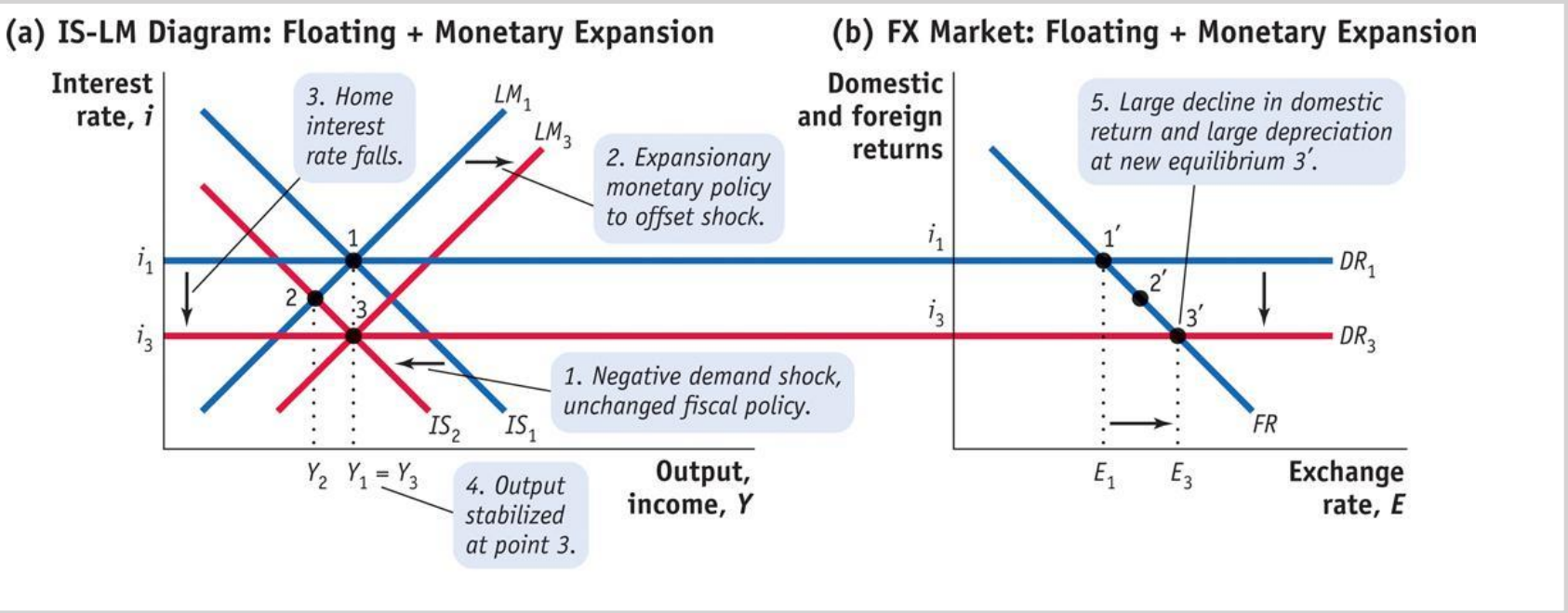
FIGURE 7-17 (a–b) (2 of 3) Examples of Policy Choices Under Floating and Fixed Exchange Rates (continued)



An exogenous negative shock to the trade balance (e.g., due to a collapse in foreign income and/or financial crisis at home) causes the IS curve to shift in from IS_1 to IS_2. Without further action, output and interest rates would fall and the exchange rate would tend to depreciate.

The Right Time for Austerity?

FIGURE 7-17 (a–b) (3 of 3) Examples of Policy Choices Under Floating and Fixed Exchange Rates (continued)

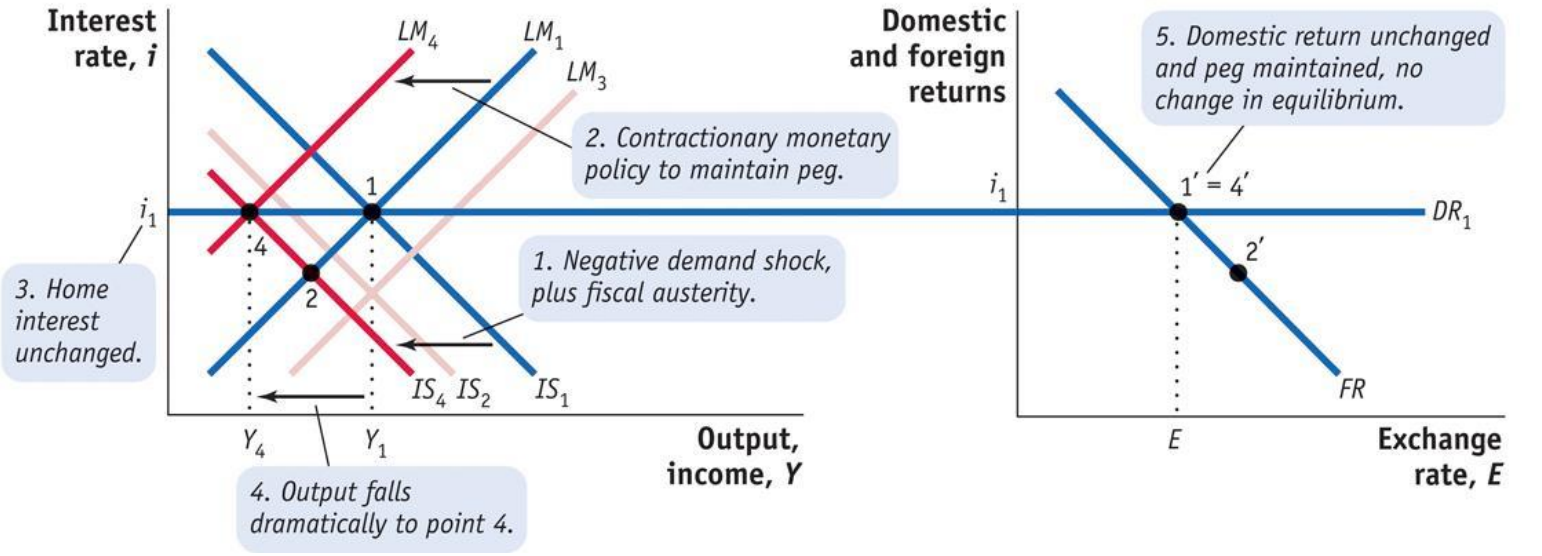


With a floating exchange rate, the central bank can stabilize output at its former level by responding with a monetary policy expansion, increasing the money supply from M_1 to M_2. This causes the LM curve to shift down from LM_1 to LM_2.The new equilibrium corresponds to points 3 and 3′. Output is now stabilized at the original level $Y1$. The interest rate falls further. The exchange rate depreciates all the way from E_1 to E_2.

Application

The Right Time for Austerity?

FIGURE 7-17 (c–d) (1 of 3) Examples of Policy Choices Under Floating and Fixed Exchange Rates (continued)

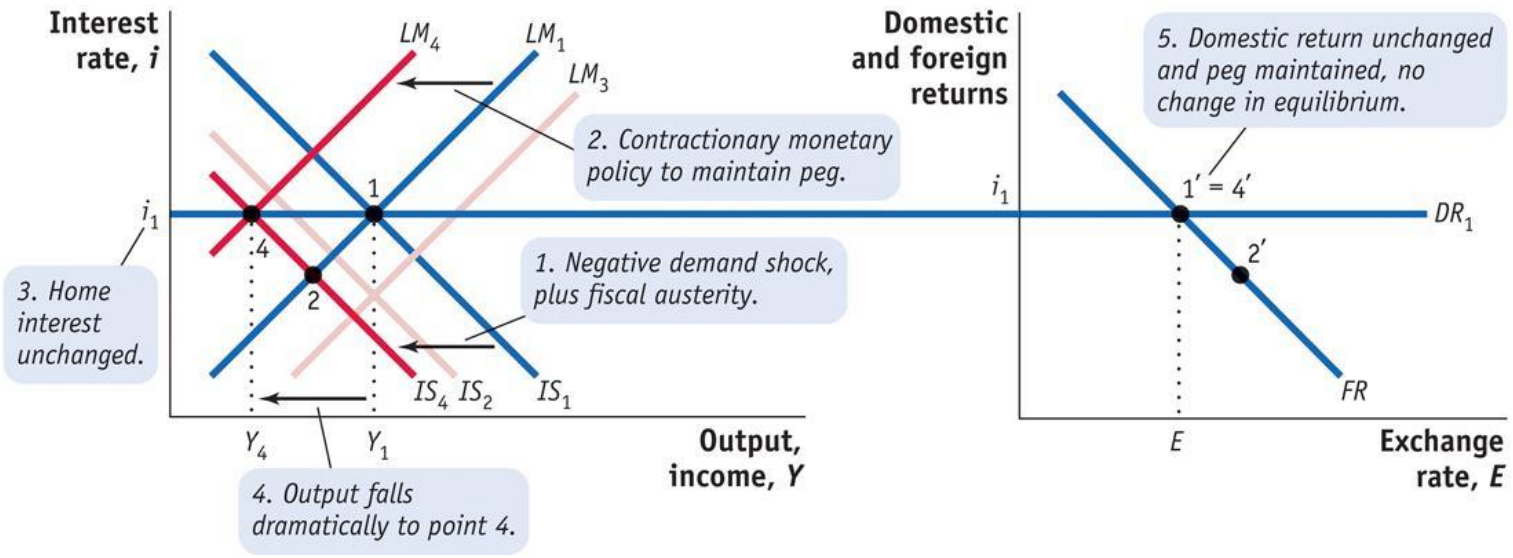


In panels (c) and (d) we explore what happens when the exchange rate is fixed and the government pursues austerity and cuts government spending *G*.

Application

The Right Time for Austerity?

FIGURE 7-17 (c–d) (2 of 3) Examples of Policy Choices Under Floating and Fixed Exchange Rates (continued)

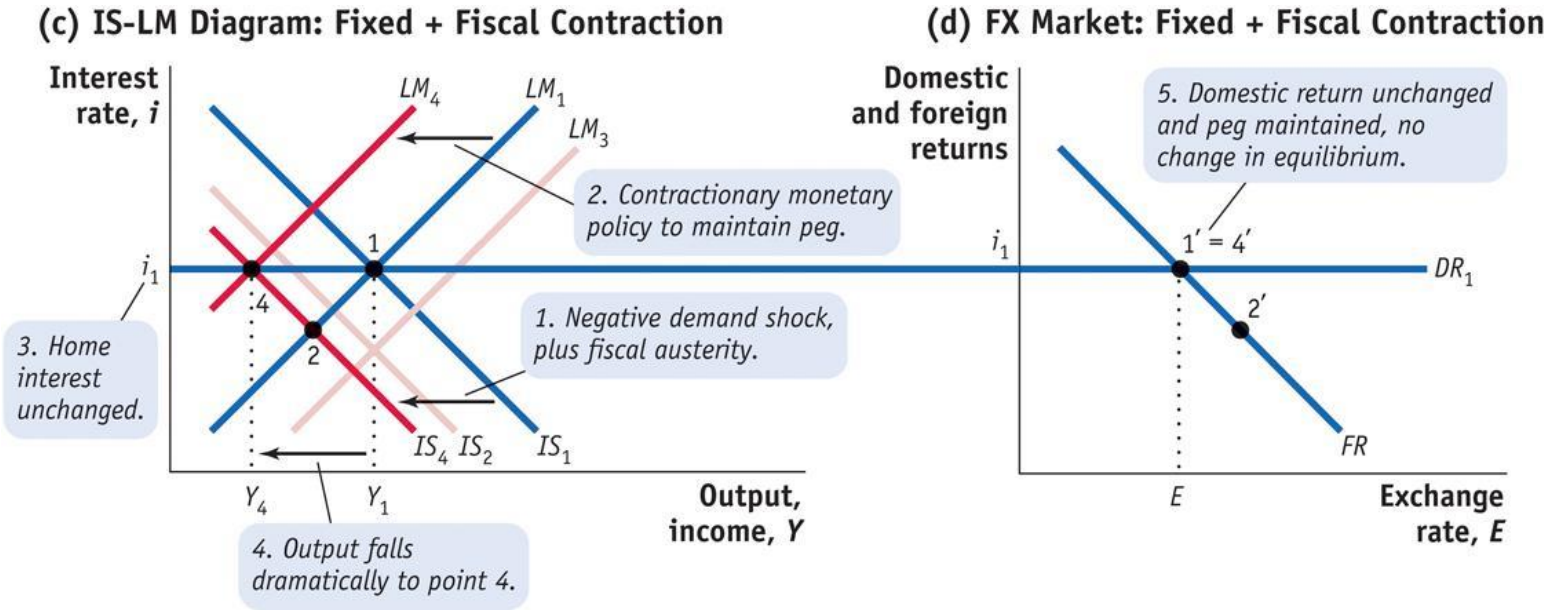


Once again, an exogenous negative shock to the trade balance (e.g., due to a collapse in foreign income and domestic consumption and investment) causes the IS curve to shift in from IS_1 *to* IS_2. Without further action, output and interest rates would fall and the exchange rate would tend to depreciate.

Application

The Right Time for Austerity?

FIGURE 7-17 (c–d) (3 of 3) Examples of Policy Choices Under Floating and Fixed Exchange Rates (continued)

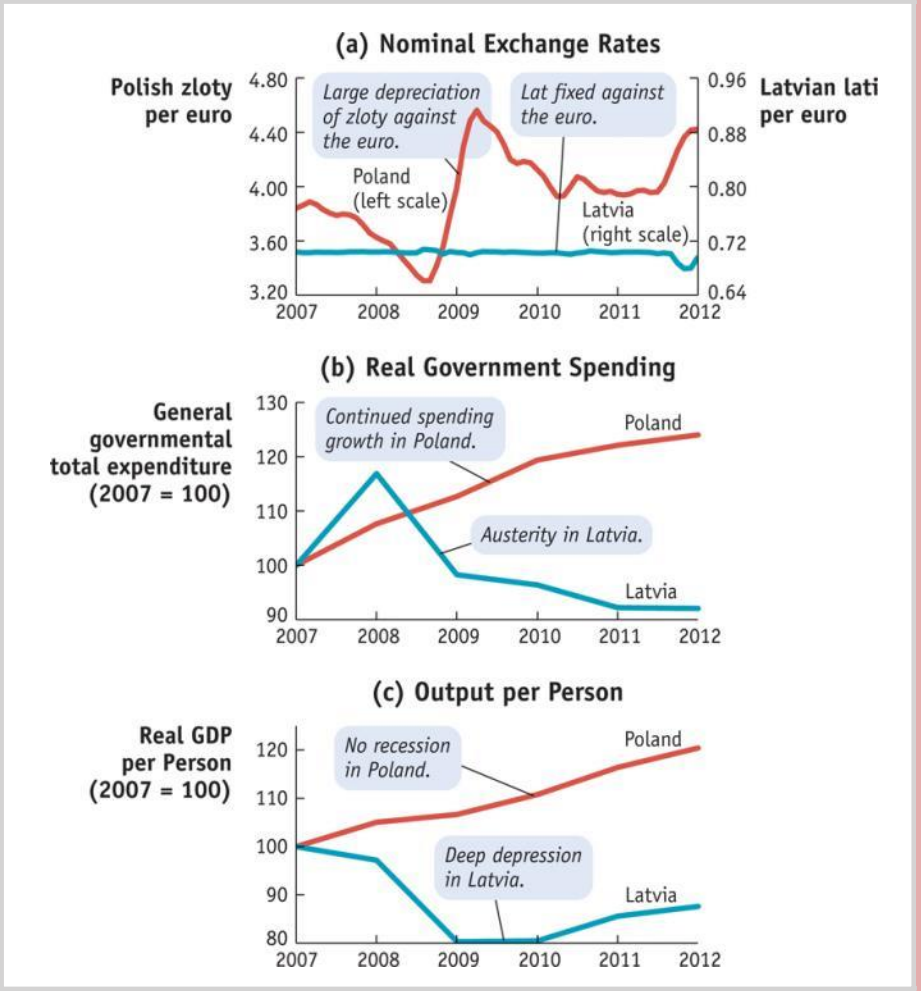


With austerity policy, government cuts spending *G* and the IS shifts leftward more to IS_4. If the central bank does nothing, the home interest rate would fall and the exchange rate would depreciate at point 2 and 2′. To maintain the peg, as dictated by the trilemma, the home central bank must engage in contractionary monetary policy, decreasing the money supply and causing the LM curve to shift in all the way from LM_1 to LM_4.

HEADLINES

Poland Is Not Latvia

FIGURE 7-18



Macroeconomic Policy and Outcomes in Poland and Latvia, 2007–2012

Poland and Latvia reacted differently to adverse demand shocks from outside and inside their economies.

Panels (a) and (b) show that Poland pursued expansionary monetary policy, let its currency depreciate against the euro, and kept government spending on a stable growth path. Latvia maintained a fixed exchange rate with the euro and pursued an austerity approach with large government spending cuts from 2009 onward.

Panel (c) shows that Poland escaped a recession, with positive growth in all years. In contrast, Latvia fell into a deep depression, and real GDP per capita fell 20% from its 2007 peak.

Problems in Policy Design and Implementation

Policy Constraints A fixed exchange rate rules out use of monetary policy. Other firm monetary or fiscal policy rules, such as interest rate or balanced-budget rules, limit policy.

Incomplete Information and the Inside Lag It takes weeks or months for policy makers to understand the state of the economy today. Then, it takes time to formulate a policy response (the lag between shock and policy actions is called the *inside lag*).

Policy Response and the Outside Lag It takes time for whatever policies are enacted to have any effect on the economy (the lag between policy actions and effects is called the *outside lag*).

Problems in Policy Design and Implementation

Long-Horizon Plans If the private sector understands that a policy change is temporary, there may be reasons not to change expenditures. A temporary real appreciation may also have little effect on whether a firm can profit in the long run from sales in the foreign market.

Weak Links from the Nominal Exchange Rate to the Real Exchange Rate Changes in the nominal exchange rate may not translate into changes in the real exchange rate for some goods and services.

Pegged Currency Blocs Exchange rate arrangements in some countries may be characterized by a mix of floating and fixed exchange rate systems with different trading partners.

Problems in Policy Design and Implementation

Weak Links from the Real Exchange Rate to the Trade Balance

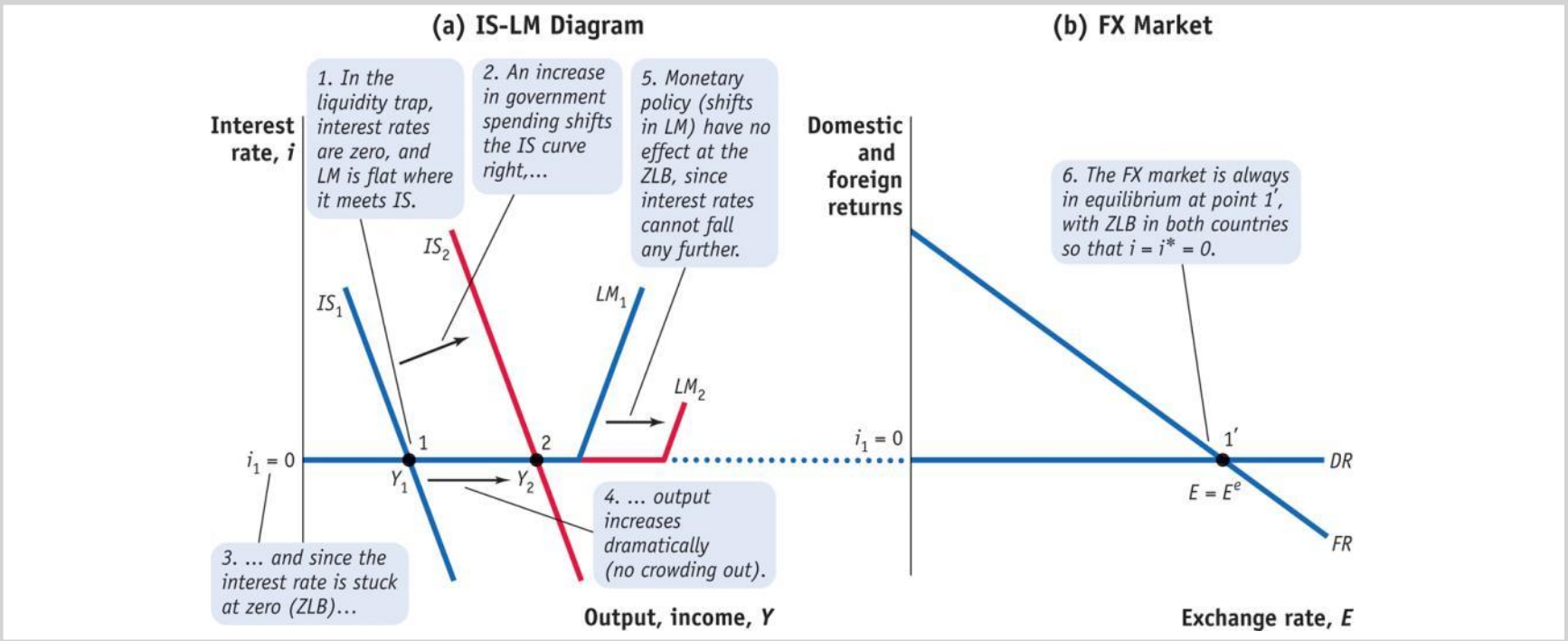
Changes in the real exchange rate may not lead to changes in the trade balance. The reasons for this weak linkage include transaction costs in trade, and **J curve** effects.

- These effects may cause expenditure switching to be a nonlinear phenomenon: It will be weak at first and then much stronger as the real exchange rate change grows larger.
- For example: Prices of BMWs in the United States barely change in response to changes in the dollar–euro exchange rate.

Application

Macroeconomic Policies in the Liquidity Trap

FIGURE 7-19 (1 of 3) Macroeconomic Policies in the Liquidity Trap

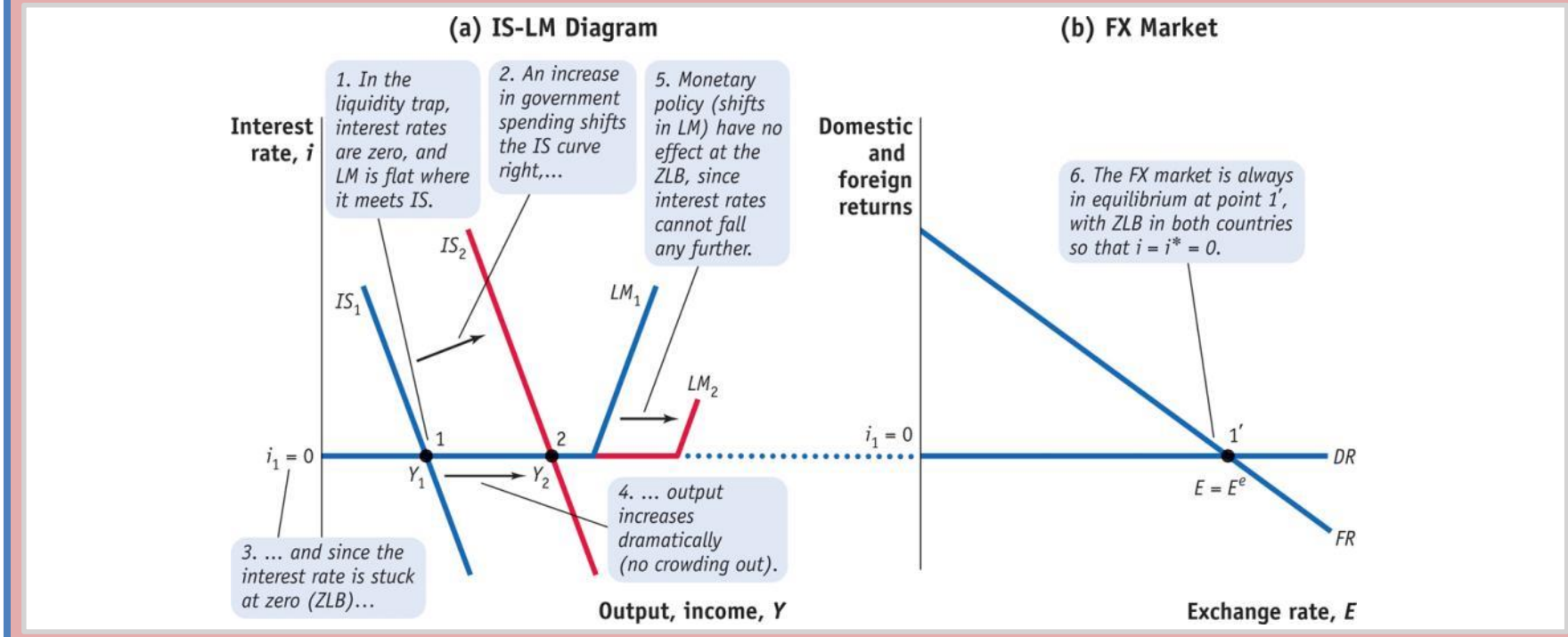


After a severe negative shock to demand, the IS curve may move very far to the left (IS_1). The nominal interest rate may then fall all the way to the zero lower bound (ZLB), with IS_1 intersecting the flat portion of the LM_1 curve at point 1, in panel (a). Output is depressed at a level Y_1.

Application

Macroeconomic Policies in the Liquidity Trap

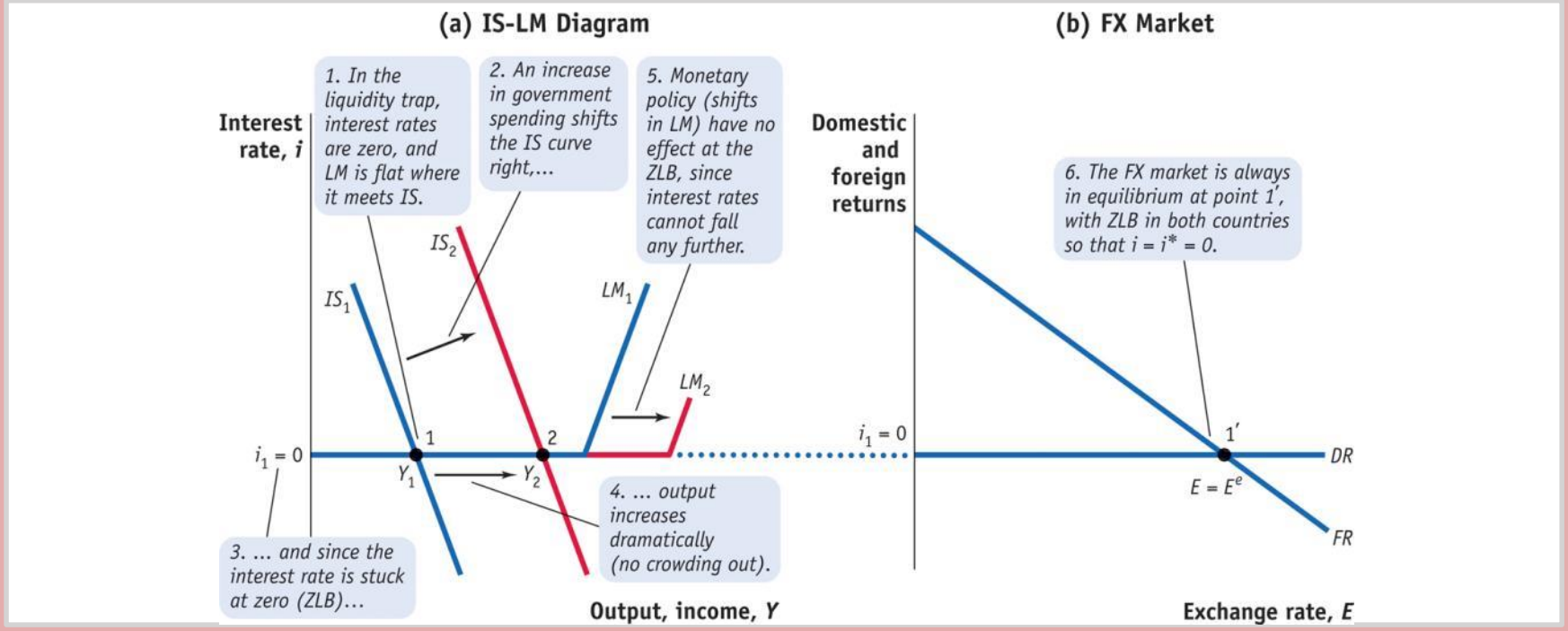
FIGURE 7-19 (2 of 3) Macroeconomic Policies in the Liquidity Trap (continued)



In this scenario, monetary policy is impotent because expansionary monetary policy (e.g., a rightward shift from LM_1 to LM_2) cannot lower the interest rate any further.

Macroeconomic Policies in the Liquidity Trap

FIGURE 7-19 (3 of 3) Macroeconomic Policies in the Liquidity Trap (continued)

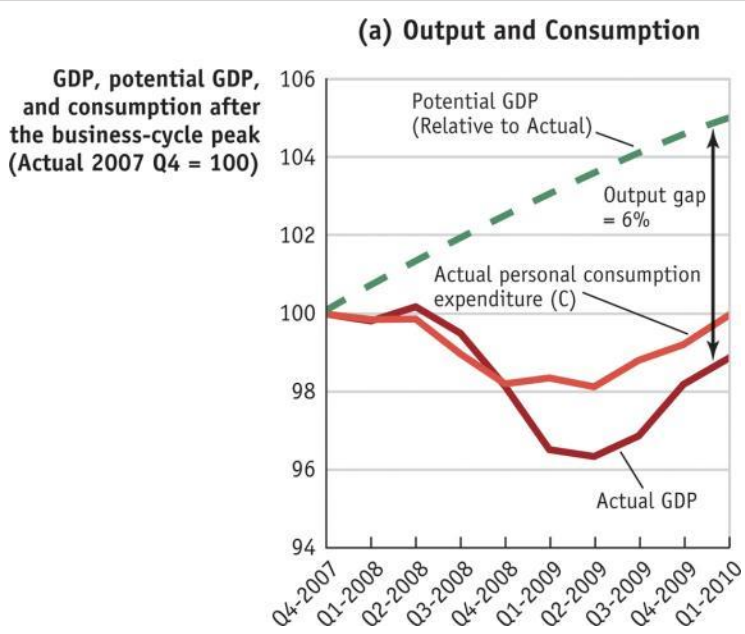


However, fiscal policy may be very effective, and a shift right from IS_1 to IS_2 leaves the economy still at the ZLB, but with a higher level of output Y_2. (The figure is drawn assuming the ZLB holds in both home and foreign economies, so the FX market is in equilibrium at point 1' with $E = E^e$ at all times.)

Application

Macroeconomic Policies in the Liquidity Trap

FIGURE 7-20 (1 of 3) U.S. Fiscal Policy in the Great Recession: Didn't Work or Wasn't Tried?

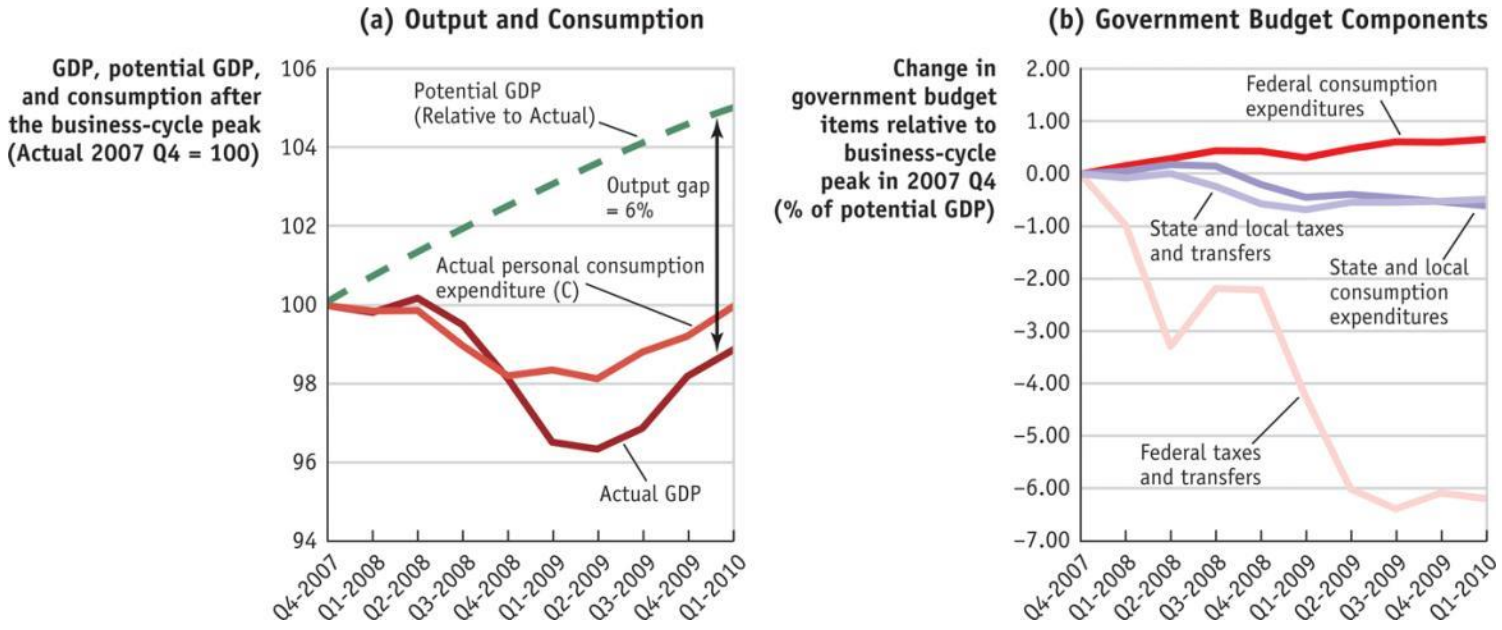


In the U.S. economic slump of 2008–2010, output had fallen 6% below the estimate of potential level of GDP by the first quarter of 2009, as seen in panel (a). This was the worst U.S. recession since the 1930s. Policy responses included automatic fiscal expansion (increases in spending and reductions in taxes), plus an additional discretionary stimulus.

Application

Macroeconomic Policies in the Liquidity Trap

FIGURE 7-20 (2 of 3) U.S. Fiscal Policy in the Great Recession: Didn't Work or Wasn't Tried? (continued)

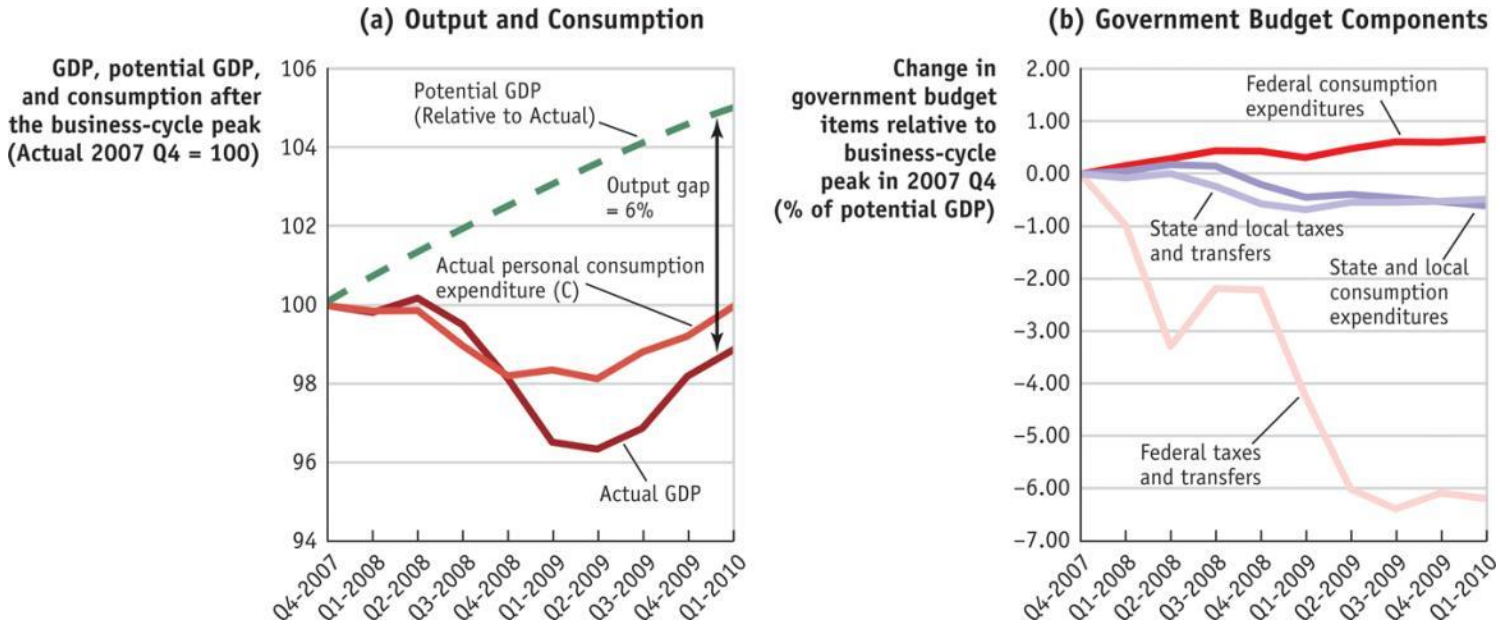


The tax part of the stimulus appeared to do very little: Significant reductions in taxes seen in panel (b) were insufficient to prop up consumption expenditure, as seen in panel (a), as consumers saved the extra disposable income.

Application

Macroeconomic Policies in the Liquidity Trap

FIGURE 7-20 (3 of 3) U.S. Fiscal Policy in the Great Recession: Didn't Work or Wasn't Tried? (continued)



And on the government spending side, there was no stimulus at all in the aggregate: Increases in federal government expenditure were fully offset by cuts in state and local government expenditure, as seen in panel (b).

Application

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The aggregate U.S. fiscal stimulus had four major weaknesses:

1. It was rolled out too slowly, due to policy lags.
2. The overall package was too small, given the magnitude of the decline in aggregate demand.
3. The government spending portion of the stimulus, for which positive expenditure effects were certain, ended up being close to zero, due to state and local cuts.
4. This left almost all the work to tax cuts, that recipients, for good reasons, were more likely to save rather than spend.

With monetary policy impotent and fiscal policy weak and ill designed, the economy remained mired in its worst slump since the 1930s Great Depression.

KEY TERMS

consumption

disposable income

marginal propensity to consume (MPC)

expected real interest rate

taxes

government consumption

transfer programs

expenditure switching

real effective exchange rate

pass-through

J curve

goods market equilibrium condition

Keynesian cross

IS curve

LM curve

monetary policy

fiscal policy

stabilization policy

Thank You for your attention!