

CHAPTER 8: THE OPEN ECONOMY

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QUESTIONS

- Measurement of the flow of funds to finance capital accumulation and the flow of goods and services across the border
- Determinants of the international flows of goods and capital
- Determinants of the nominal and real exchange rates

THE NATIONAL ACCOUNTS IDENTITY AND NET EXPORTS

Let C^d be consumption of domestically produced goods in the economy;

I^d —investment in domestically produced (capital) goods and services;

G^d —government purchases of domestically produced goods and services (both capital goods and goods for final consumption).

Similarly, define C^f , I^f , and G^f as consumption, investment and government purchases of goods produced abroad.

NATIONAL ACCOUNTS IDENTITY AND NX

Then production of output produced at home is distributed as:
 $Y = C^d + I^d + G^d + EX$. C , I , and G comprise both domestic and foreign components.

$$C = C^d + C^f$$

$$I = I^d + I^f$$

$$G = G^d + G^f$$

Plugging C^d , I^d , and G^d back into the national accounts identity, we obtain:

$$\begin{aligned} Y &= (C - C^f) + (I - I^f) + (G - G^f) + EX \\ &= C + I + G + EX - (C^f + I^f + G^f) \\ &= C + I + G + EX - IM \\ &= C + I + G + NX \end{aligned}$$

NX AND NET FOREIGN INVESTMENT

$$NX = Y - (C + I + G)$$

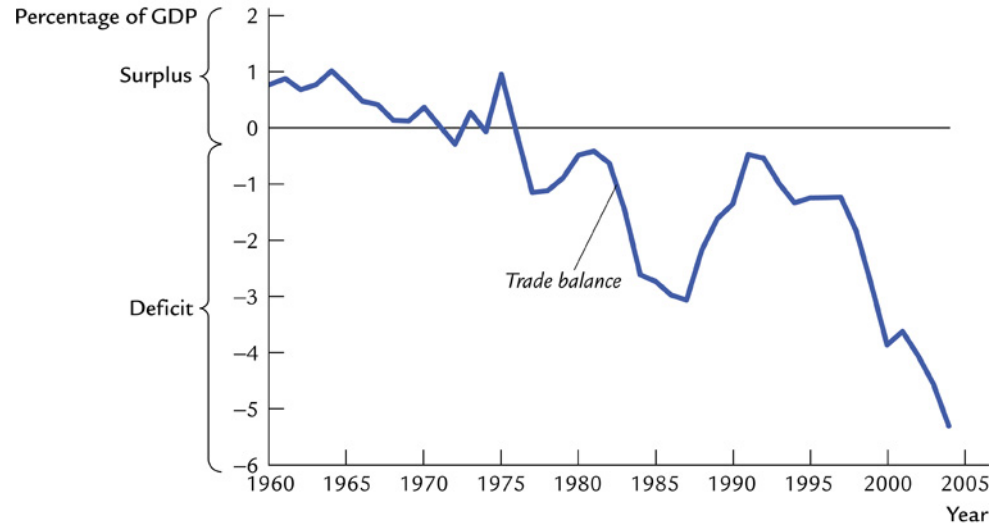
Net Exports=Excess of Domestic Production (Output) over Domestic Spending. Since $Y - (C + G) = S$,

$$NX = S - I \tag{1}$$

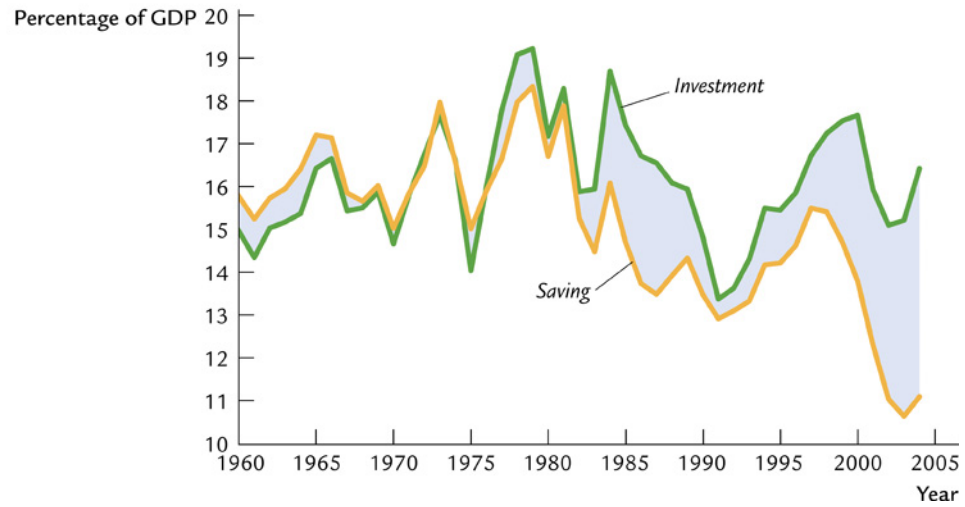
NX is called trade balance; $S - I$ is called net foreign investment (NFI). Thus, equation (1) reads as:

Trade Balance=Net Foreign Investment.

(a) The U.S. Trade Balance



(b) U.S. Saving and Investment



SAVING AND INVESTMENT IN A SMALL OPEN ECONOMY

How trade balance responds to changes in home and foreign policies?

Consider a small open economy (no influence over world interest rate) with perfect capital mobility (full access to foreign financial markets).

Let r^* be the world interest rate; and r —the domestic real interest rate. Then, $r = r^* + \theta$, where θ is the risk premium associated with domestic economy. Assume that $\theta = 0$ and so $r^* = r$.

THE MODEL OF NX AND NFI

$$Y = \bar{Y} = F(\bar{K}, \bar{L})$$

$$C = C(\bar{Y} - \bar{T})$$

$$I = I(r^*)$$

$$NX = Y - (C + I + G) = (\bar{Y} - \bar{C} - \bar{G}) - I(r^*)$$

$$NX = \bar{S} - I(r^*)$$

Thus, the trade balance, NX , is determined by the difference between domestic saving and investment at the world interest rate.

Trade balance depends on domestic fiscal policy.

Real interest rate, r

Trade surplus

S

NX

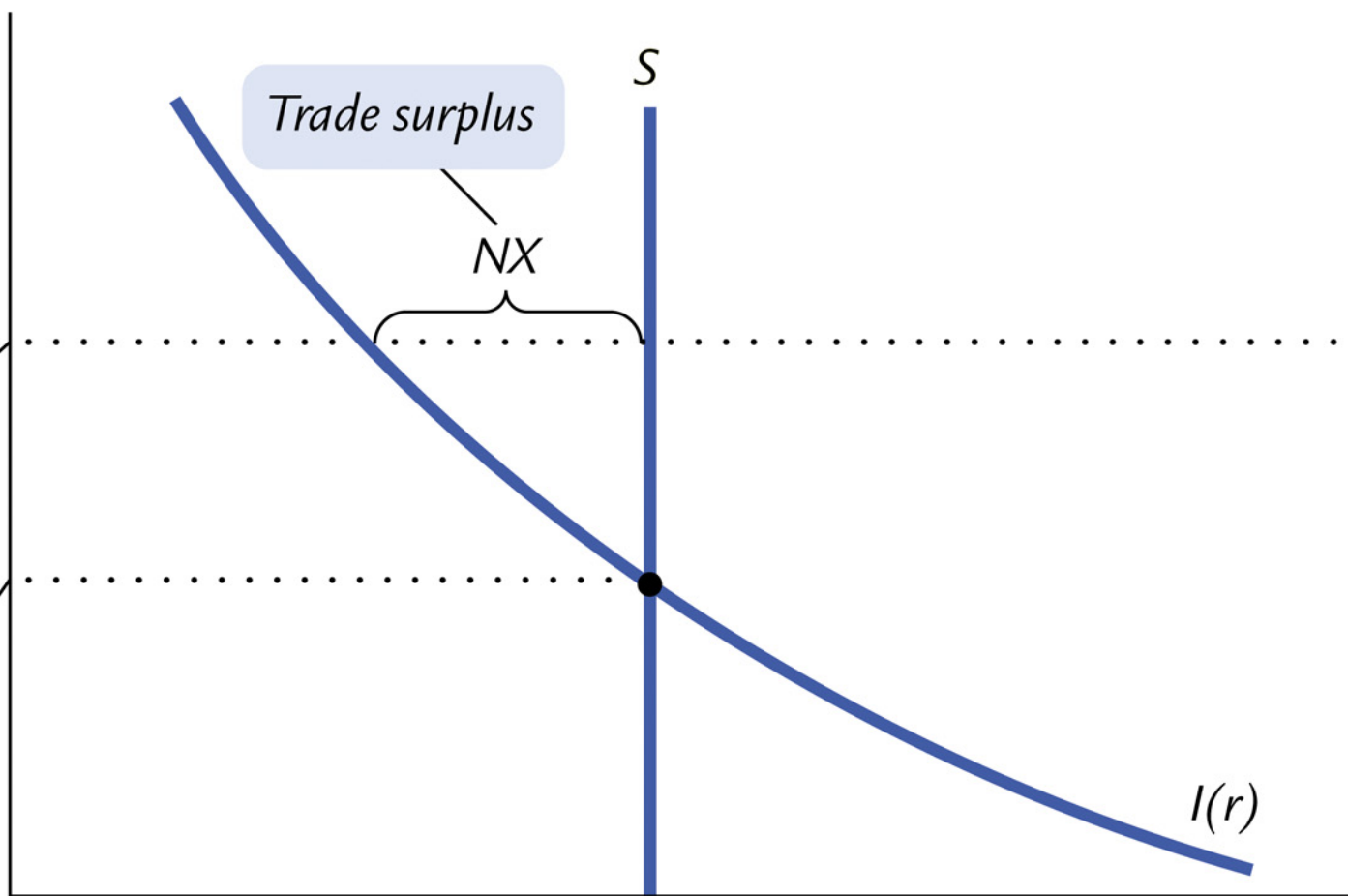
r^*

World interest rate

Interest rate if the economy were closed

$I(r)$

Investment, Saving, I, S



TWIN DEFICITS

$$\begin{aligned} -NX &= I - S = I - (Y - C - T + T - G) \\ &= (G - T) + (I - Pr.Saving). \end{aligned}$$

In words:

Trade deficit is equal to the sum of budget deficit and the excess of investment over private savings.

POLICIES AND TRADE BALANCE

We can evaluate the effect of policies on trade balance by evaluating their effects on domestic saving and investment.

Policies that raise domestic saving result in a trade surplus ($NX > 0$) and domestic lending to foreigners.

Policies that raise domestic investment cause trade deficit and indebtedness to foreigners (loans from foreigners).

EQUILIBRATING MECHANISMS IN THE OPEN ECONOMY

What are the mechanisms that ensure the equality between the flow of goods and services (NX), and the flow of capital funds ($NFI = S - I$)?

These are the real exchange rate and the world real interest rate.

Exchange Rates

Nominal Exchange Rate is the relative price of the currency of two countries. E.g., 100 Yen/\$ means that you can buy 100 Yen with \$1 in the market for foreign currency.

Real exchange rate is the relative price of the same good (or basket of goods) in two countries. Also called terms of trade.

E.g., if nominal exchange rate is 100 Yen/\$; the price of Canadian car is \$30,000, and the price of the same car in Japan is 2,500,000 Yen, then:

The real exchange rate=

$$\frac{100 \text{ Yen}/\$ \times \$30,000 / \text{Can.Car}}{2,500,000 \text{ Yen} / \text{Jap.Car}} = \frac{3,000,000 \text{ Yen} / \text{Can.Car}}{2,500,000 \text{ Yen} / \text{Jap.Car}} = 1.2 \frac{\text{Jap.Car}}{\text{Can.Car}}$$

THE REAL EXCHANGE RATE

The real exchange rate=(Nominal Exchange Rate× Price of Domestic Good)/Price of Foreign Good.

Note that the nominal exchange rate is measured as the amount of foreign currency per unit of domestic currency.

Denote the real exchange rate by q , the nominal exchange rate by e , the price of domestic good by P , and the price of foreign good by P^* . Then,

$$q = \frac{e \times P}{P^*}$$

SOME SIMPLE ANALYSIS

$$q = \frac{e \times P}{P^*}$$

Note that q can be small if P^* is high, e is low, or P is low. Reduction in q , defined the way we've done, is called the depreciation of the real exchange rate. (Our good becomes less expensive in terms of foreign good.)

High values of q can be obtained if P is high, or P^* is low, or e is high. An increase in q is called the appreciation of the real exchange rate. (Our good 'buys' more of a foreign good.)

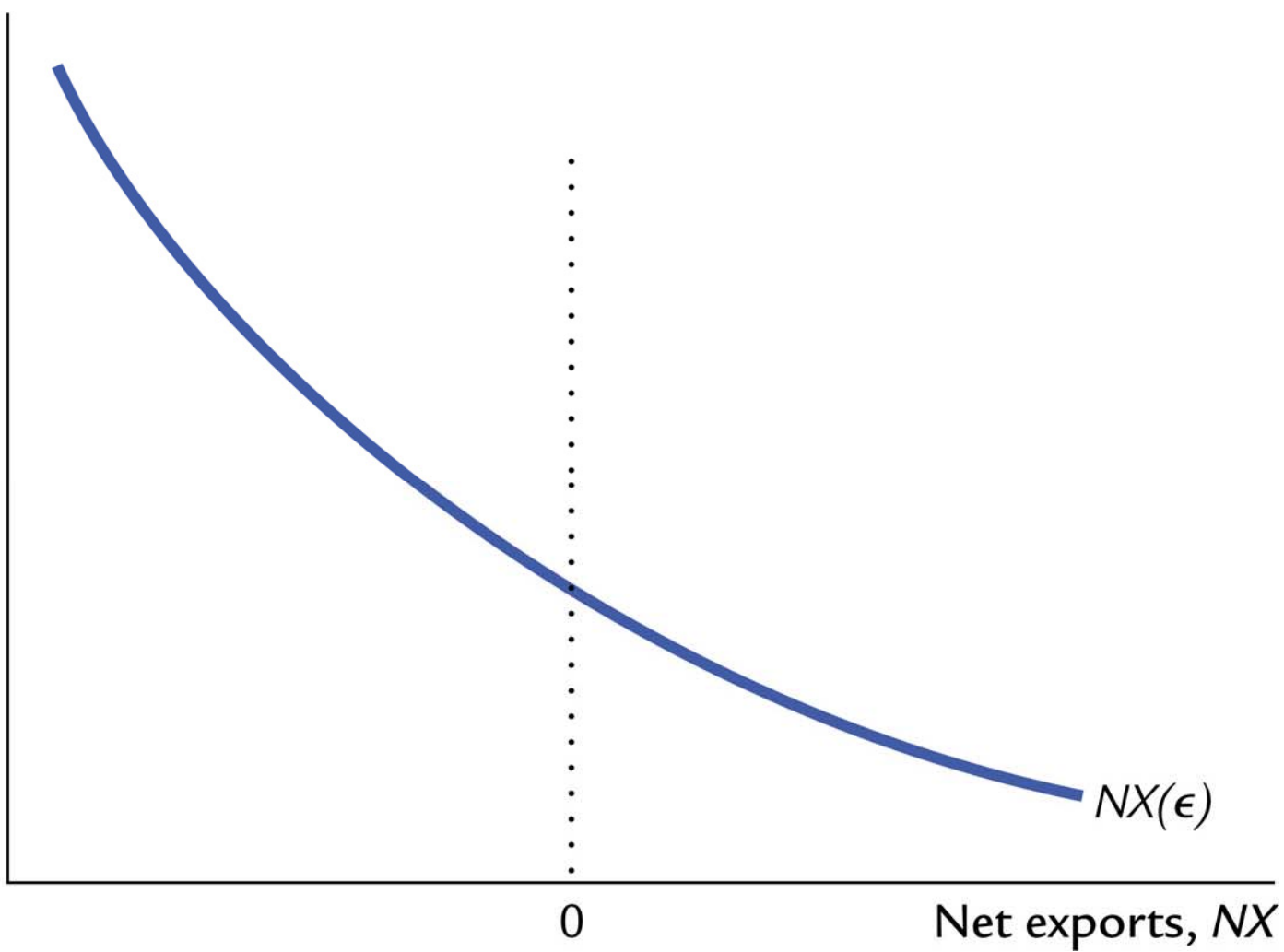
THE REAL EXCHANGE RATE AND TRADE BALANCE

If q is low, domestic goods are relatively cheap, and so the demand shifts towards domestic consumption and away from imports. Similarly, foreigners will demand more of our goods raising the amount of exports. Thus, NX are high.

Similarly, high levels of q mean that domestic goods are relatively expensive, and so NX should be low.

We can express this as $NX = NX(q)$, with NX being a decreasing function of q .

Real exchange rate, ϵ



THE DETERMINANTS OF THE REAL EXCHANGE RATE

In equilibrium, $NX(q) = S - I(r^*)$. Note that q is the equilibrating mechanism for a given world interest rate.

NX can be thought of as the demand for domestic currency; and $S - I(r^*)$ as the supply of domestic currency. q is the equilibrating real price.

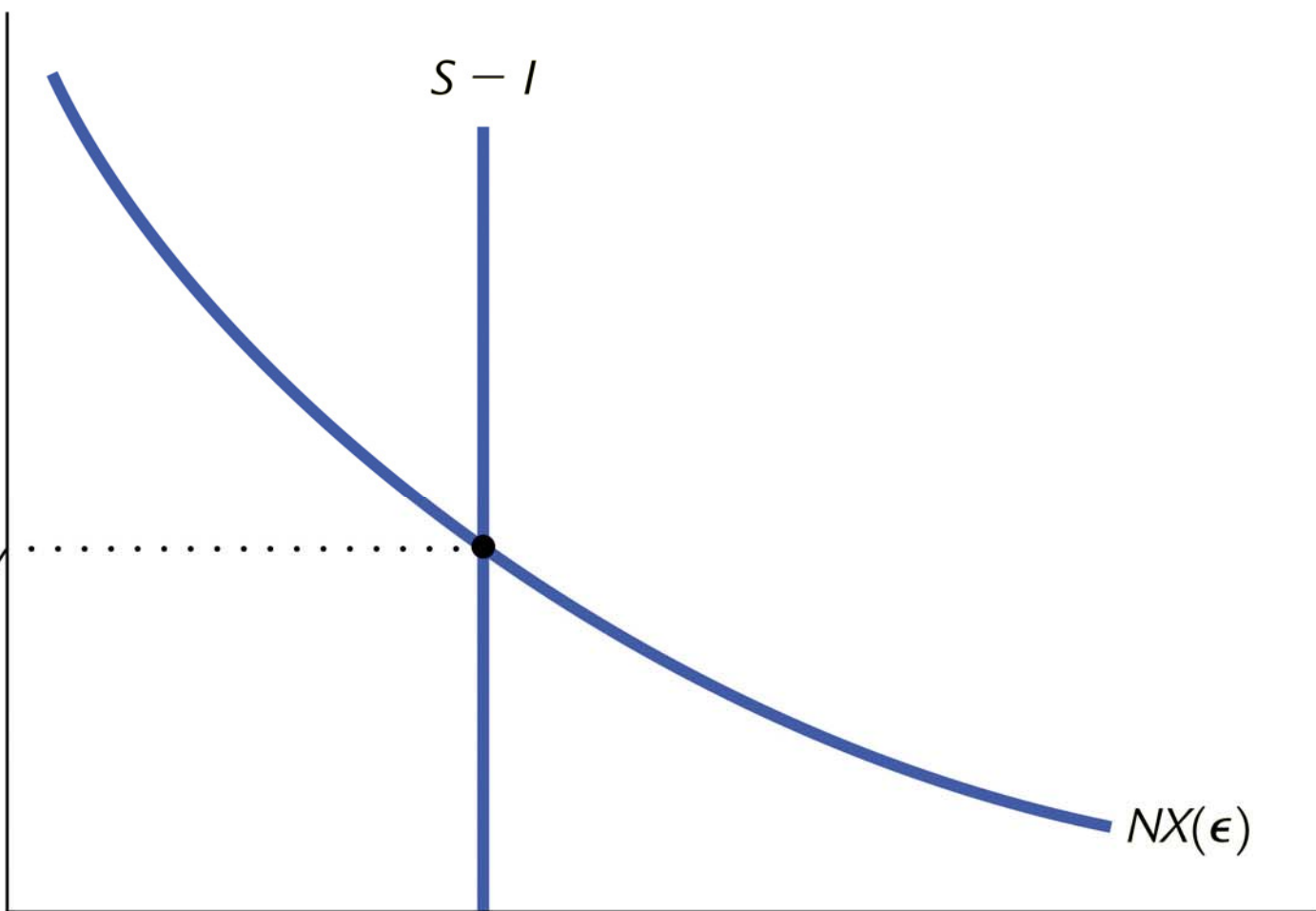
Real exchange rate, ϵ

$S - I$

*Equilibrium
real exchange
rate*

$NX(\epsilon)$

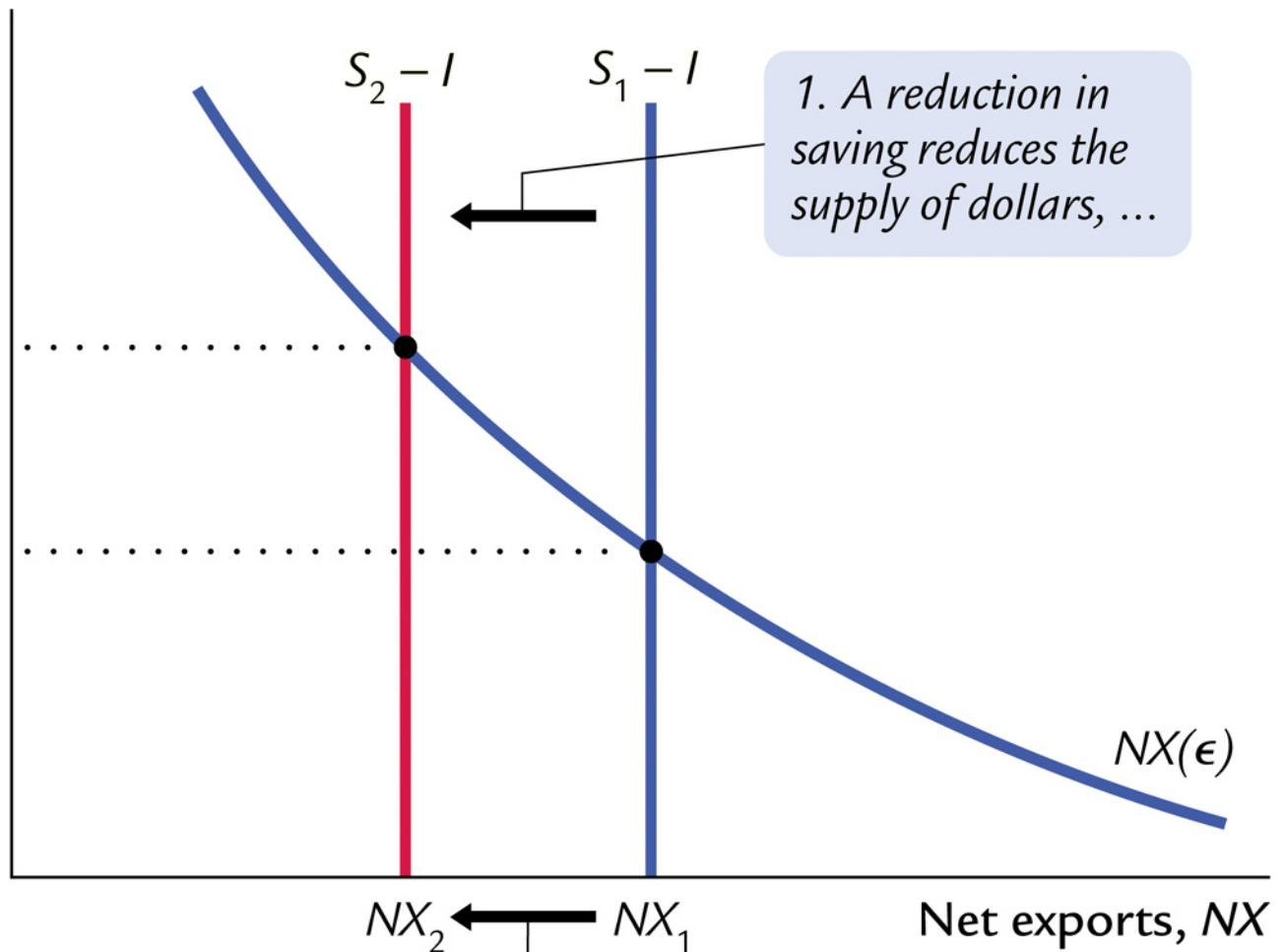
Net exports, NX



THE EFFECT OF POLICIES ON q AND NX

- Fiscal Policy at Home. Government increase G or cuts T .
(Public Saving) \downarrow , and $(S - I)\downarrow$. For a given r^* , demand for domestic currency $>$ the supply of domestic currency $\Rightarrow e\uparrow \Rightarrow$ Domestic goods become relatively expensive $(q)\uparrow \Rightarrow (NX)\downarrow$.
- Fiscal Policy Abroad. Foreign countries increase G or cut T .
 $r^*\uparrow \Rightarrow (S - I(r^*))\uparrow \Rightarrow$ Supply of domestic currency $>$ Demand for domestic currency $\Rightarrow e\downarrow \Rightarrow q\downarrow \Rightarrow$ domestic goods are relatively cheaper $\Rightarrow NX\uparrow$.
- Shifts in Investment Demand.
 $I\uparrow \Rightarrow (S - I)\downarrow \Rightarrow$ Supply for domestic currency $<$ Demand for domestic currency $\Rightarrow e\uparrow \Rightarrow q\uparrow \Rightarrow$ domestic goods relatively expensive $\Rightarrow NX\downarrow$.

Real exchange rate, ϵ

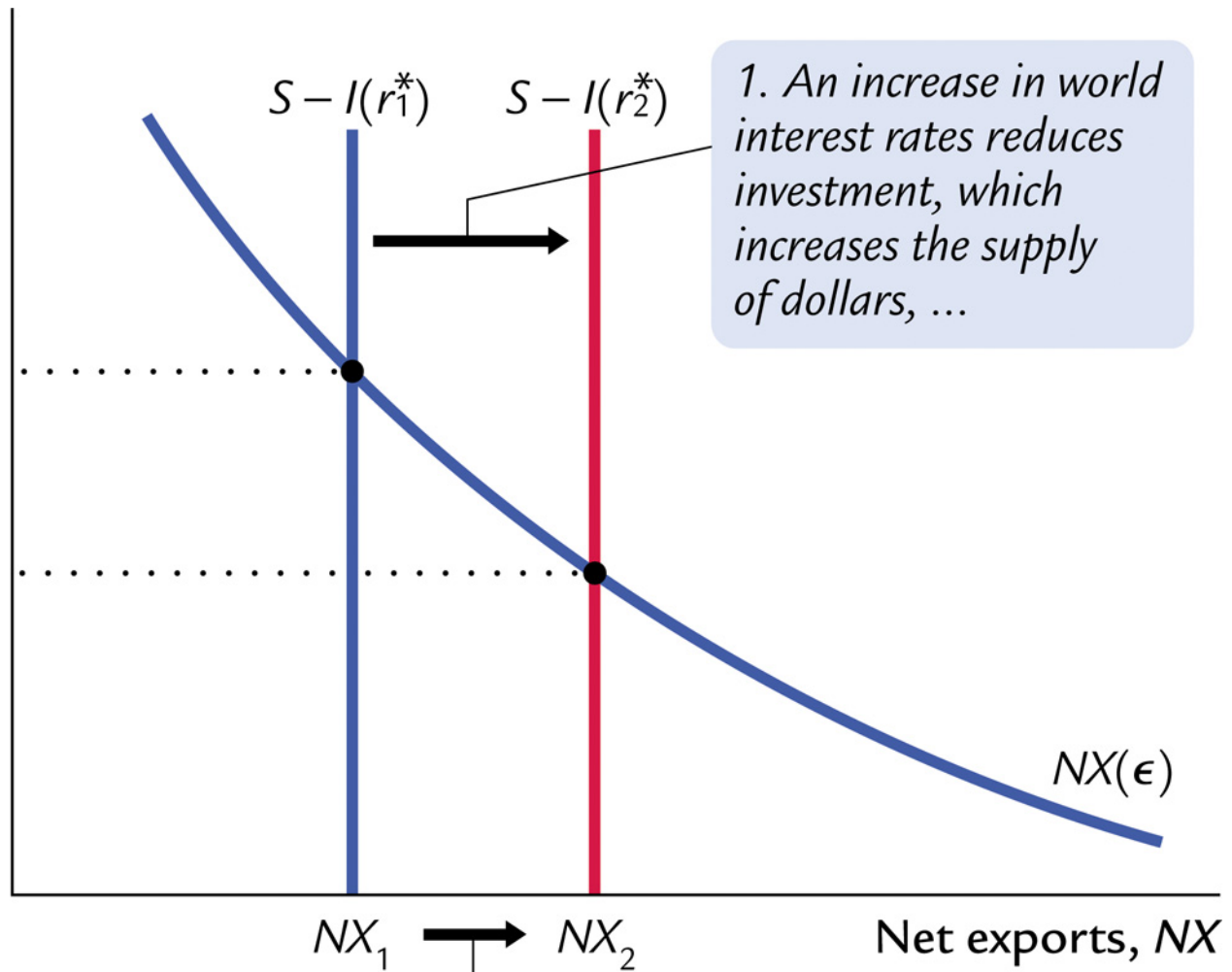


1. A reduction in saving reduces the supply of dollars, ...

2. ... which raises the real exchange rate ...

3. ... and causes net exports to fall.

Real exchange rate, ϵ

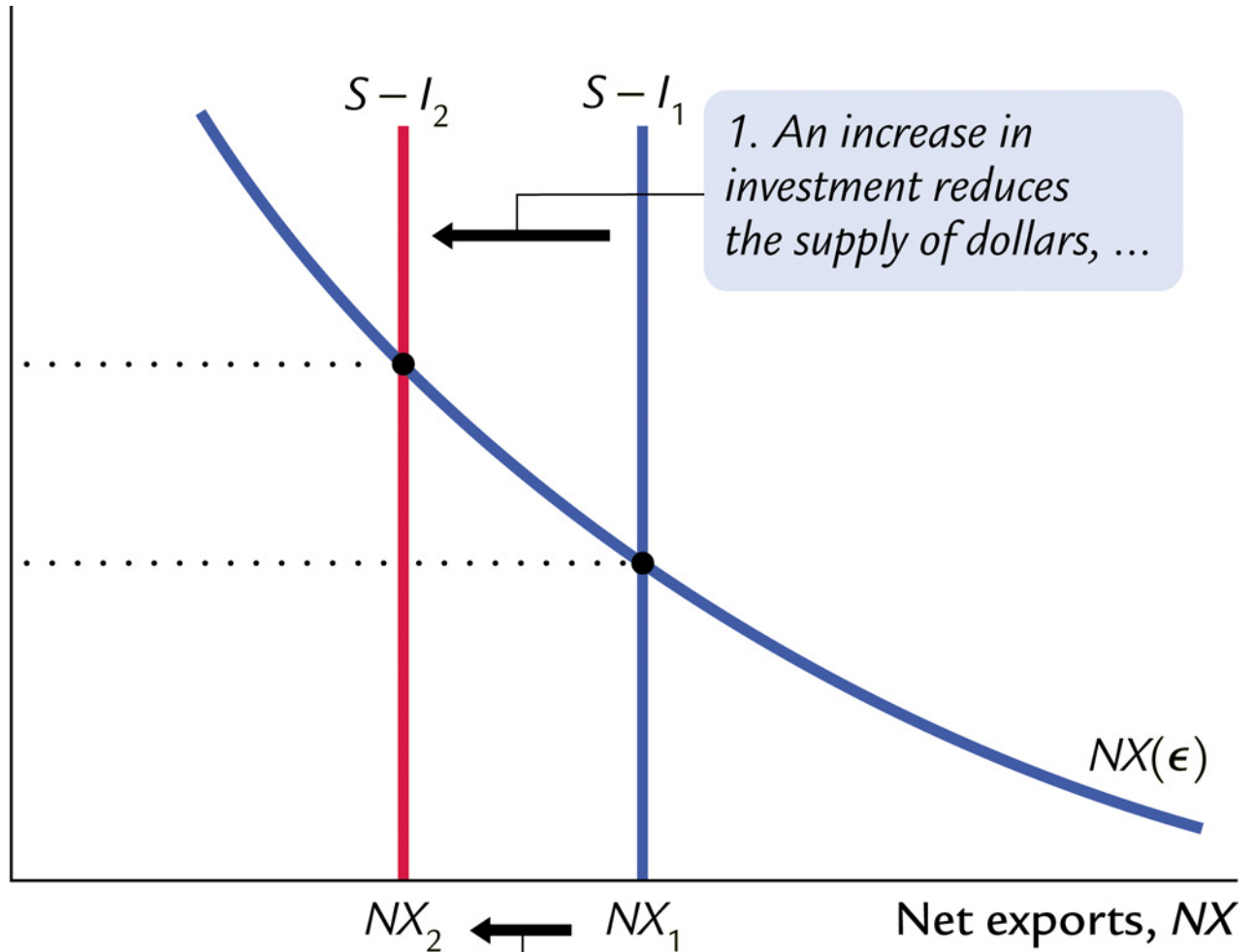


1. An increase in world interest rates reduces investment, which increases the supply of dollars, ...

2. ... causes the real exchange rate to fall, ...

3. ... and raises net exports.

Real exchange rate, ϵ

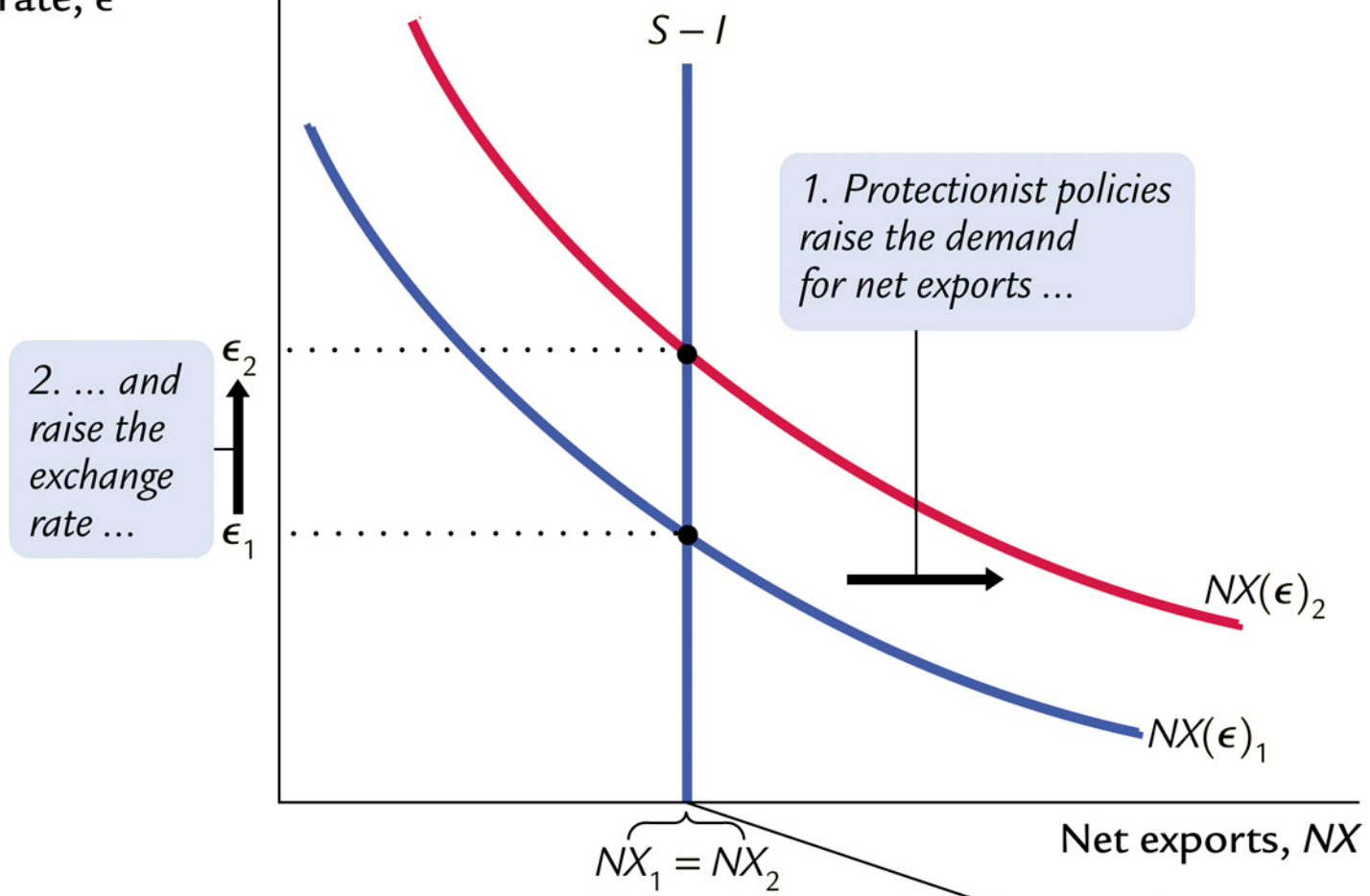


1. An increase in investment reduces the supply of dollars, ...

2. ... which raises the exchange rate ...

3. ... and reduces net exports.

Real exchange rate, ϵ



1. Protectionist policies raise the demand for net exports ...

2. ... and raise the exchange rate ...

3. ... but leave net exports unchanged.

THE DETERMINANTS OF THE NOMINAL EXCHANGE RATE

Since $q = \frac{e \times P}{P^*}$,

$$e = \frac{q \times P^*}{P}.$$

For a constant q , if P increases, the value of domestic currency falls and domestic currency buys less of foreign currency. Thus, e —the nominal exchange rate measured as the number of foreign currency units per one unit of domestic currency—falls.

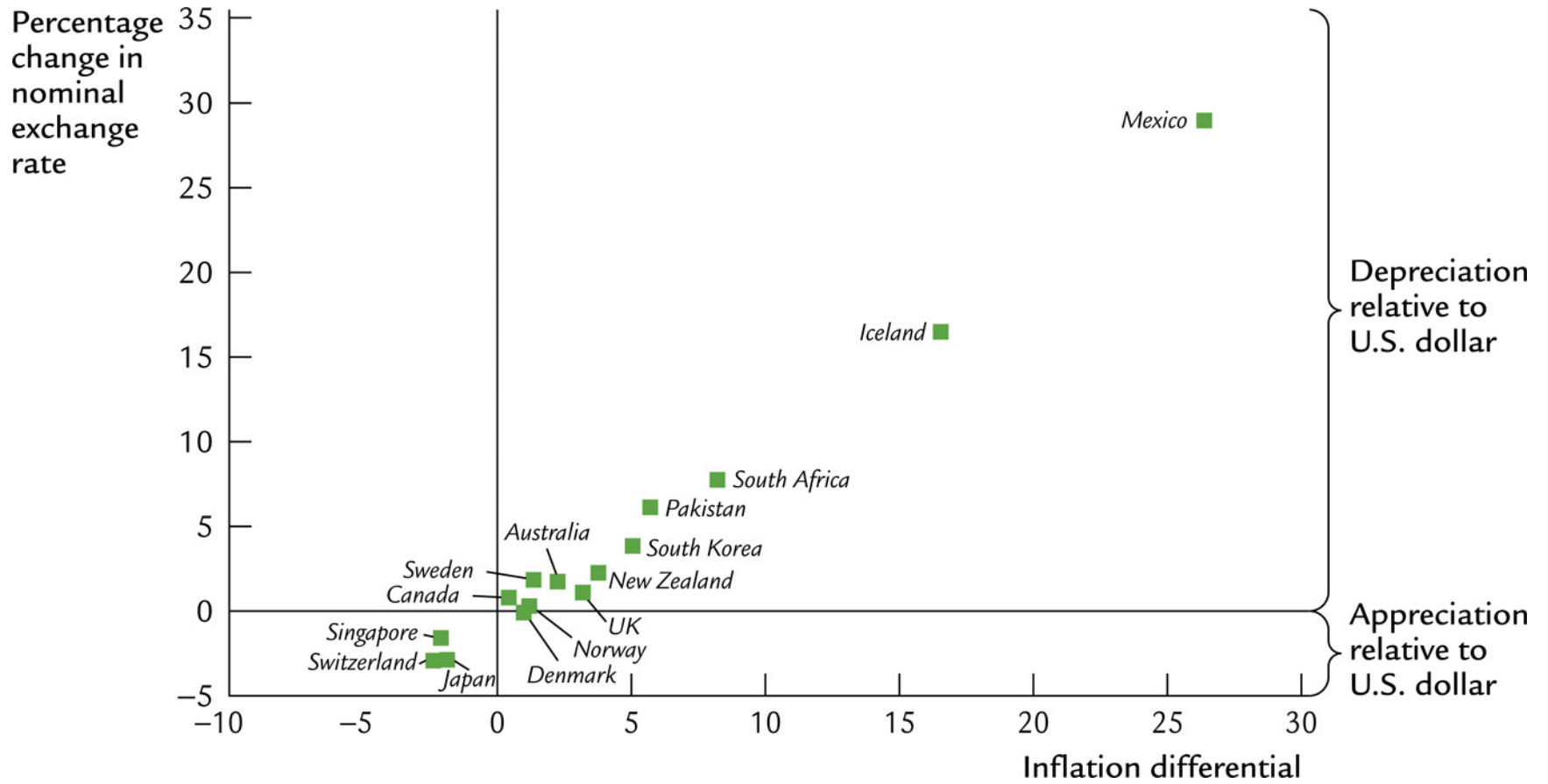
Conversely, if P^* increases, the value of foreign currency falls, and e increases—domestic currency buys more of foreign currency.

HOW THE NOMINAL EXCHANGE RATE CHANGES

$$e = \frac{q \times P^*}{P}.$$

$$\begin{aligned}\frac{\Delta e}{e} &= \frac{\Delta q}{q} + \frac{\Delta P^*}{P^*} - \frac{\Delta P}{P} \\ &= \frac{\Delta q}{q} + (\pi^* - \pi).\end{aligned}$$

In words: If the rate of inflation in foreign country is higher than the rate in inflation in Canada, Canadian \$ will buy more of the foreign currency over time (i.e., e increases and Canadian \$ appreciates relative to foreign currency); conversely, if the rate of inflation in foreign country is smaller than the rate of inflation in Canada, Canadian \$ will buy less of the foreign currency over time (i.e., e falls and Canadian \$ depreciates relative to foreign currency).



THE PURCHASING POWER PARITY (PPP)

The law of one price: The same good cannot sell for different prices in two locations.

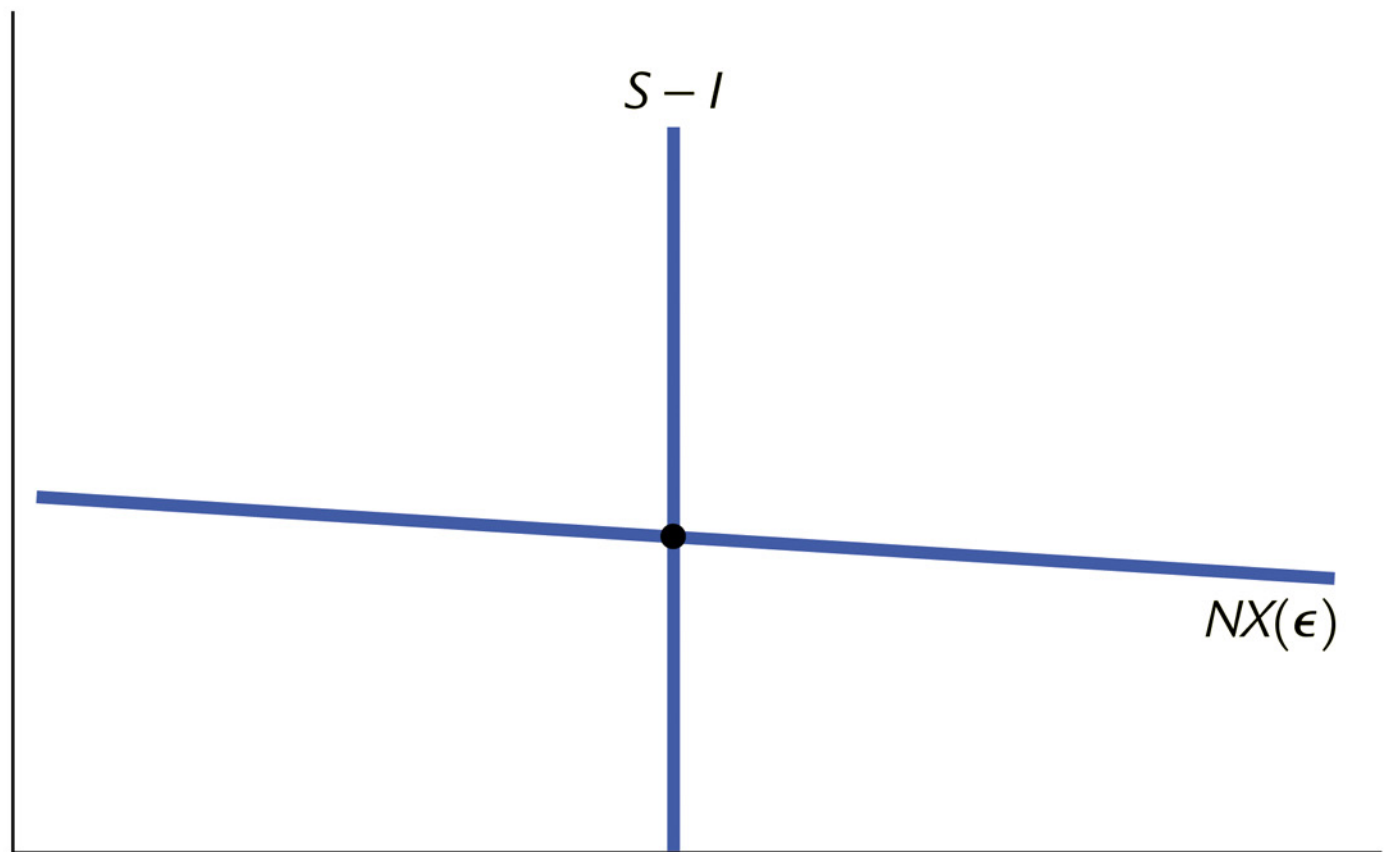
When applied to international transactions, it is called the purchasing power parity, i.e. the domestic currency should have the same purchasing power in different countries.

The PPP and the law of one price rely on the absence of frictions in international markets, i.e. on the possibility of realizing the arbitrage opportunities were they present.

In its strong form, PPP states that the real exchange rate q should be 1.

$$q = \frac{e \times P}{P^*} = 1.$$

Real exchange rate, ϵ



Net exports, NX

IMPLICATIONS OF PPP

If PPP holds, the NX should be flat since small movements in q will result in arbitrage opportunities and prompt large swings in NX .

Thus, q will be fixed and unaffected by $S - I$, and all changes in the nominal exchange rate, e , are due to changes in domestic and foreign prices.

Why PPP is not completely realistic (at least in the SR)?

- Many goods are non-tradeable (e.g., services such as haircuts).
- Tradeable goods are not perfect substitutes.

In the LR, we expect that most of changes in q are temporary.