

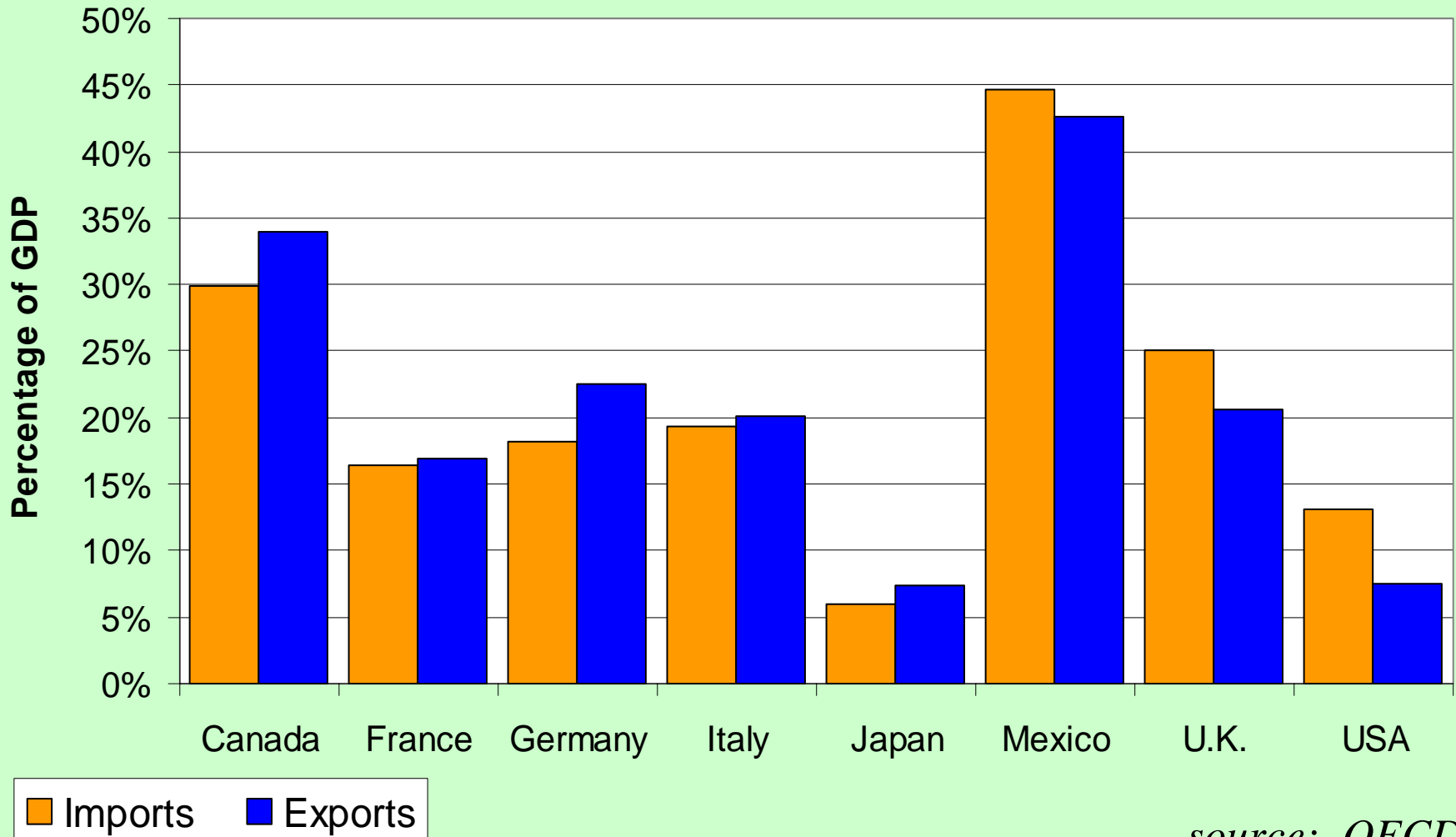
Announcements

- Midterm Related Matters
- Last week's lecture
 - Clarifying Contradiction in Slides
 - Unemployment??
- Homework Due
- Homework will be posted
- Today: Open Economy

Open -or- Closed

- Economic Interactions *between* countries
- Affects where consumption, investment, and government expenditure is allocated
 - Domestic product?
 - Foreign product?
- ***Must make a distinction between SAVINGS and INVESTMENT***
- ***Must make a distinction between LARGE and SMALL***

Imports and Exports as a percentage of output: 2003



Accounting: Basic Setup

$$\mathbf{C} = \mathbf{C}^d + \mathbf{C}^f$$

$$\mathbf{I} = \mathbf{I}^d + \mathbf{I}^f$$

$$\mathbf{G} = \mathbf{G}^d + \mathbf{G}^f$$

superscripts:

d = spending on
domestic goods

f = spending on
foreign goods

EX = exports =
foreign spending on domestic goods

IM = imports = $\mathbf{C}^f + \mathbf{I}^f + \mathbf{G}^f$
= spending on foreign goods

NX = net exports (*a.k.a.* the "trade balance")
= **EX** – **IM**

GDP = expenditure on domestically produced g & s

$$**Y = C^d + I^d + G^d + EX**$$

$$**= (C - C^f) + (I - I^f) + (G - G^f) + EX**$$

$$**= C + I + G + EX - (C^f + I^f + G^f)**$$

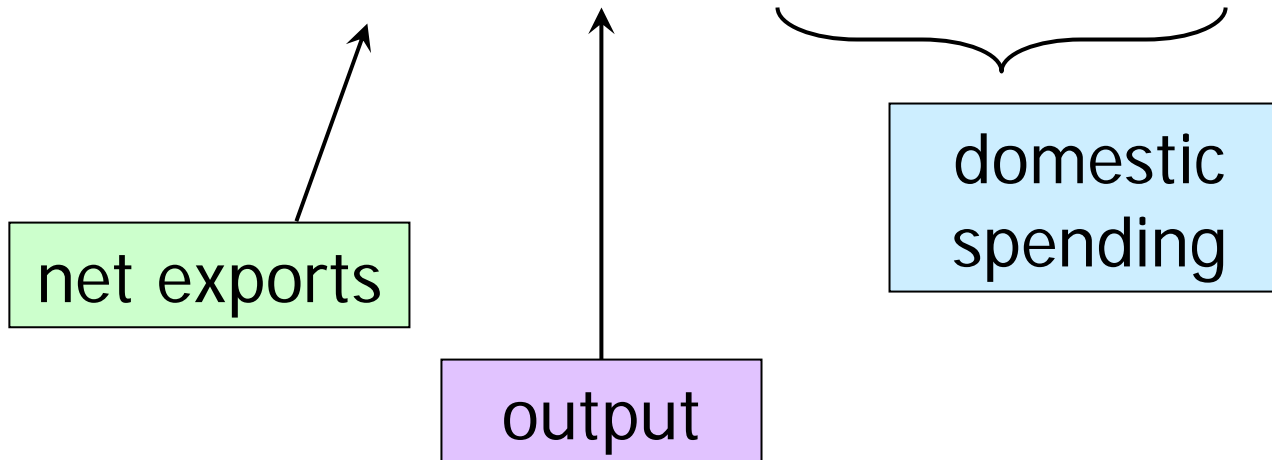
$$**= C + I + G + EX - IM**$$

$$**= C + I + G + NX**$$

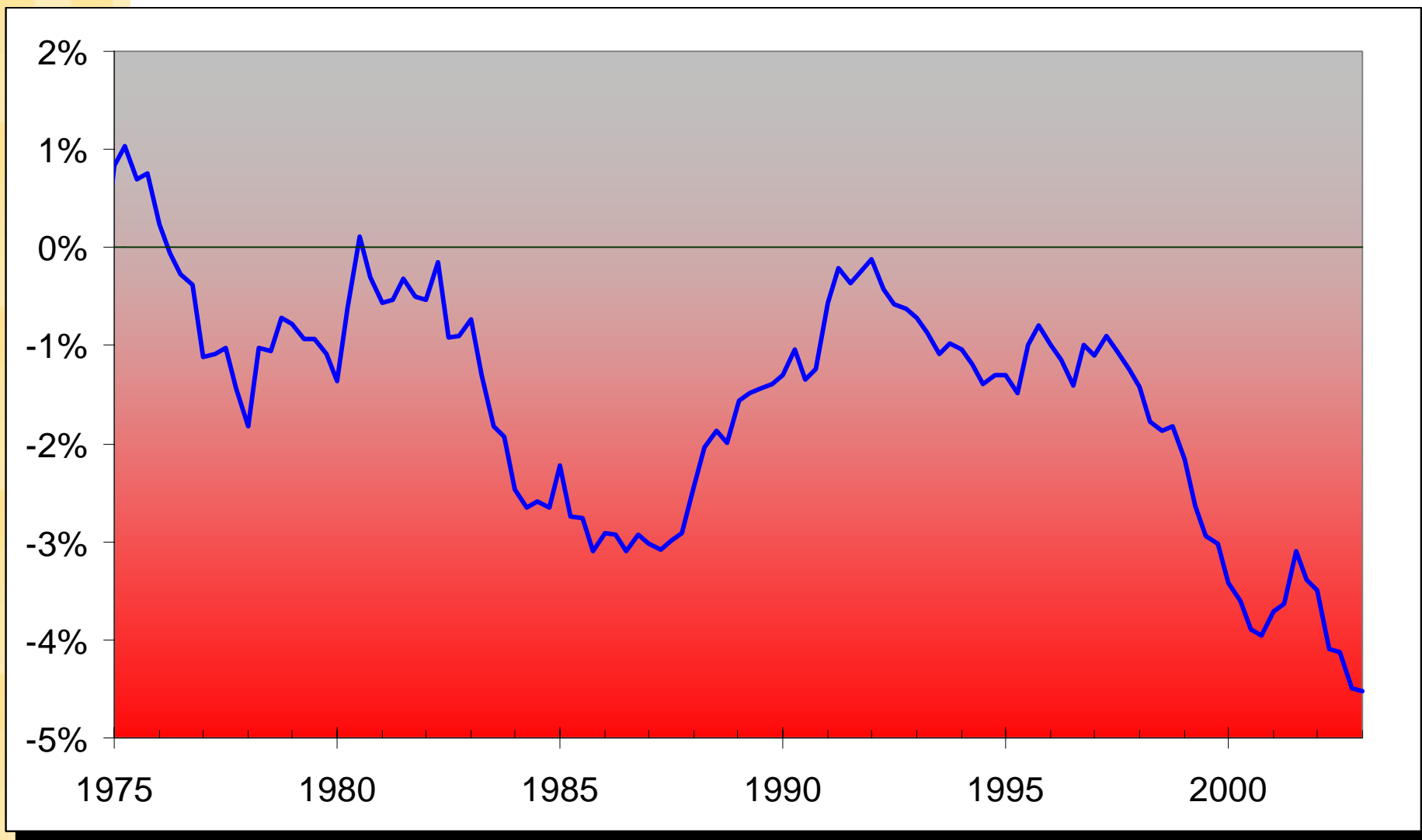
The national income identity in an open economy

$$Y = C + I + G + NX$$

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



U.S. net exports (% of GDP), 1975-2003



Trade surpluses and deficits

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

- **trade surplus:**

output > spending and exports > imports

Size of the trade surplus = **NX**

- **trade deficit:**

spending > output and imports > exports

Size of the trade deficit = **$-NX$**

International capital flows

- **Net capital outflows**

- = $S - I$

- = net outflow of “loanable funds”

- = net purchases of foreign assets

- the country’s purchases of foreign assets
minus foreign purchases of domestic assets

- When $S > I$, country is a net lender

- When $S < I$, country is a net borrower

The link between trade & cap. flows

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

implies

$$\begin{aligned} NX &= (Y - C - G) - I \\ &= S - I \end{aligned}$$

trade balance = net capital outflows

Thus,
a country with a trade deficit ($NX < 0$)
is a net borrower ($S < I$).

Saving and Investment in a Small Open Economy

- An open-economy version of the loanable funds model from chapter 3.
- Includes many of the same elements:

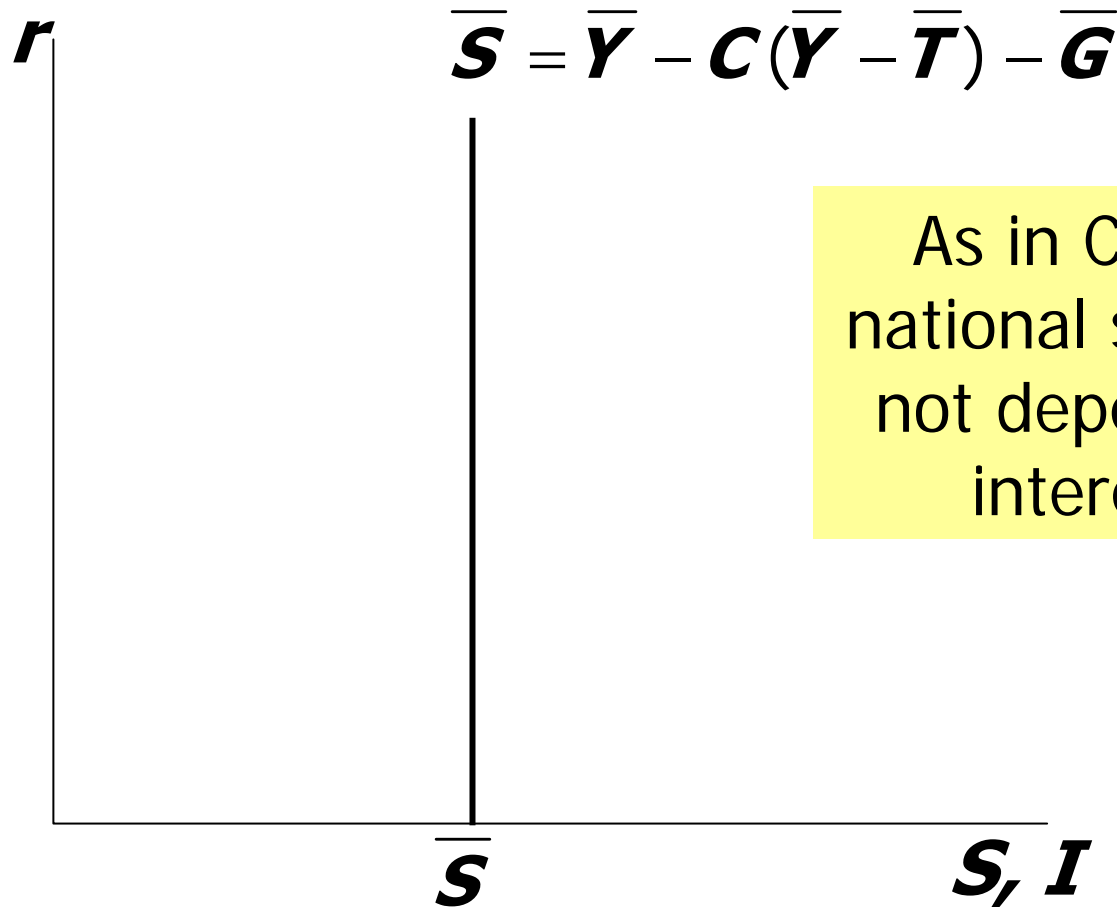
production function: $\mathbf{Y} = \bar{\mathbf{Y}} = \mathbf{F}(\bar{\mathbf{K}}, \bar{\mathbf{L}})$

consumption function: $\mathbf{C} = \mathbf{C}(\mathbf{Y} - \mathbf{T})$

investment function: $\mathbf{I} = \mathbf{I}(r)$

exogenous policy variables: $\mathbf{G} = \bar{\mathbf{G}}, \mathbf{T} = \bar{\mathbf{T}}$

National Saving: The Supply of Loanable Funds

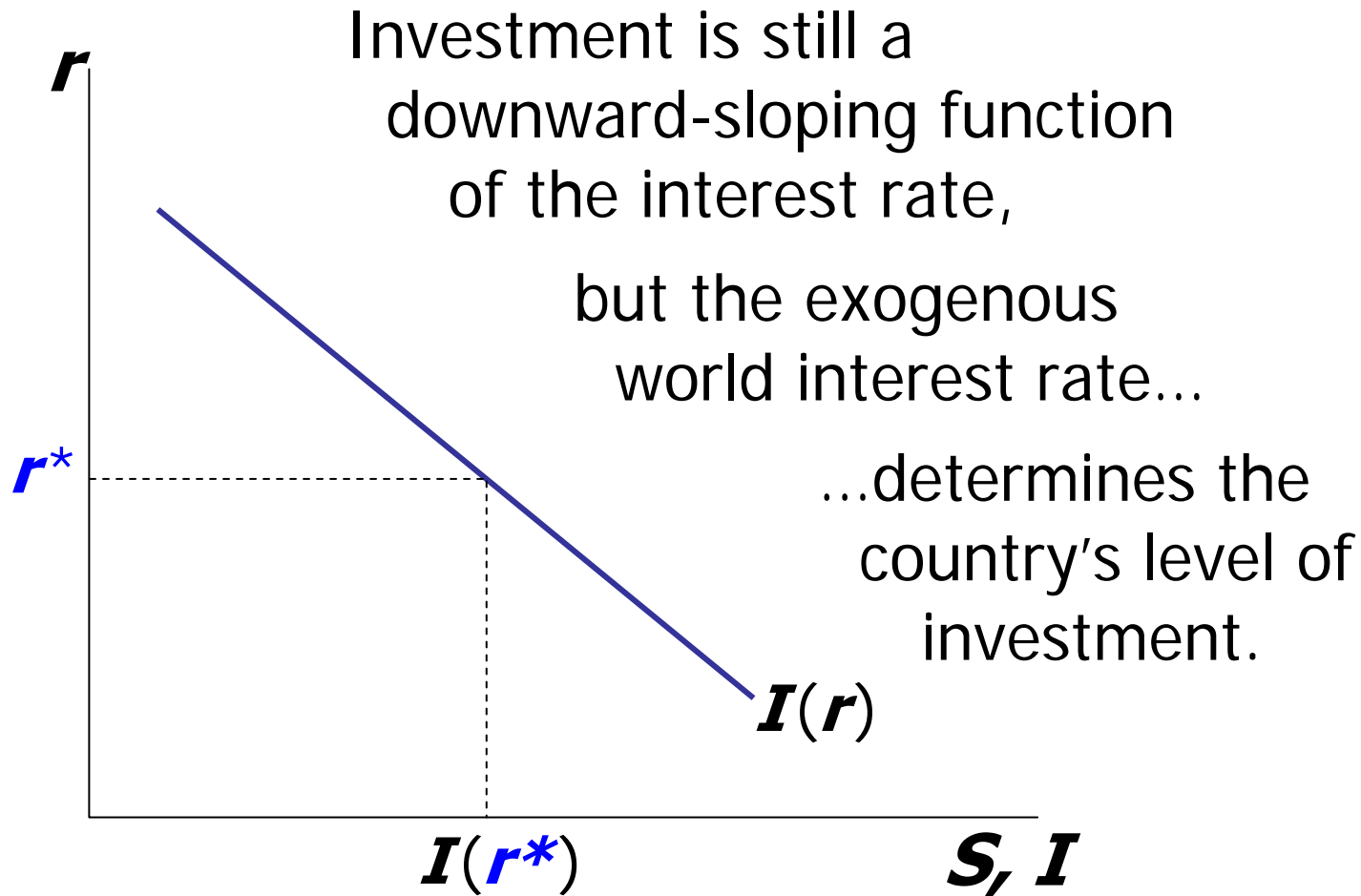


As in Chapter 3,
national saving does
not depend on the
interest rate

Small Open Economy Assumptions for Investment

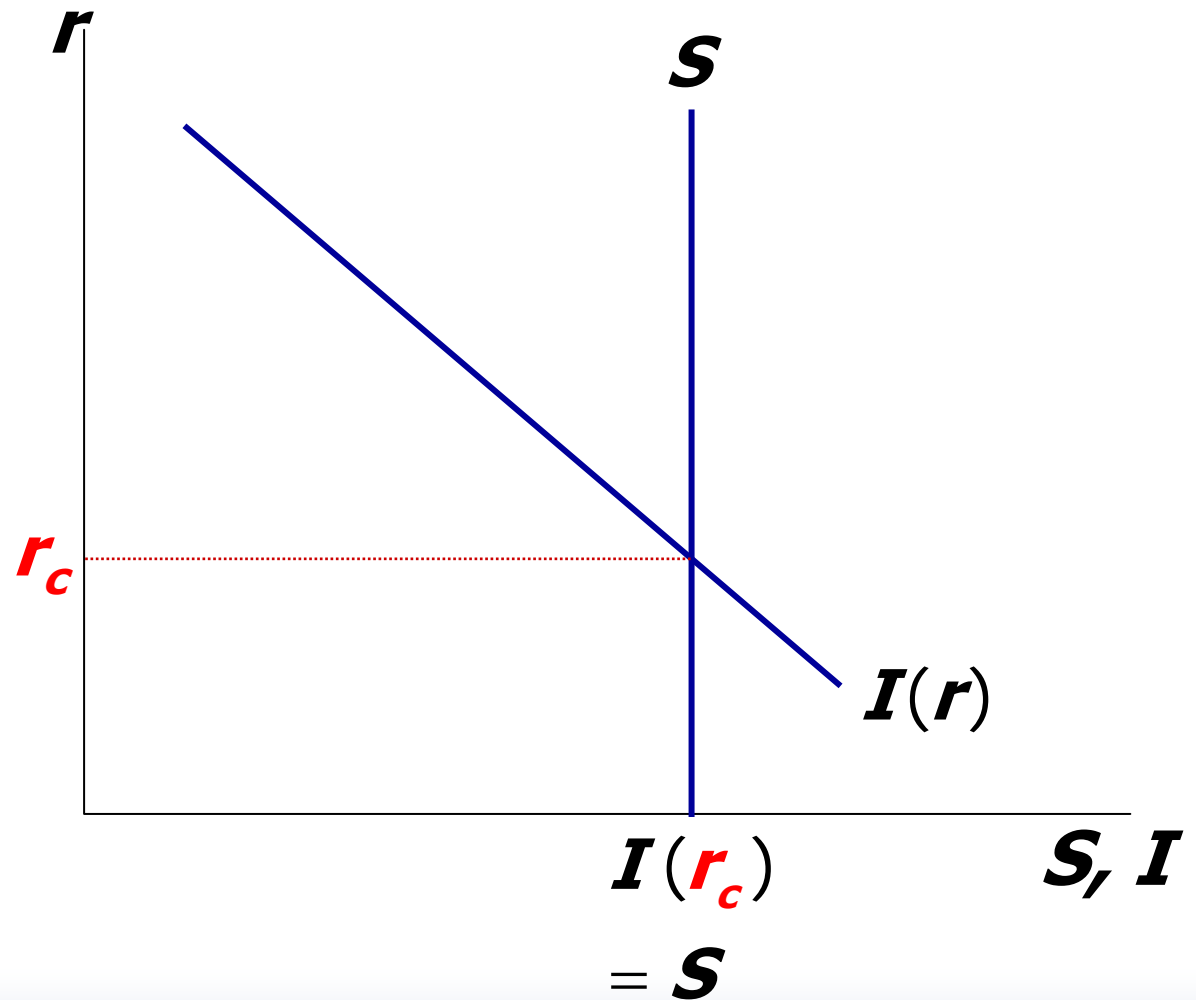
- a. domestic & foreign bonds (capital) are perfect substitutes
- b. in an open economy there is **perfect capital mobility**: no restrictions on international trade in assets
- c. economy is **small**: cannot affect the world interest rate, denoted r^*
- d. *All the above implies:*

Investment: The Demand for Loanable Funds



If the economy were closed...

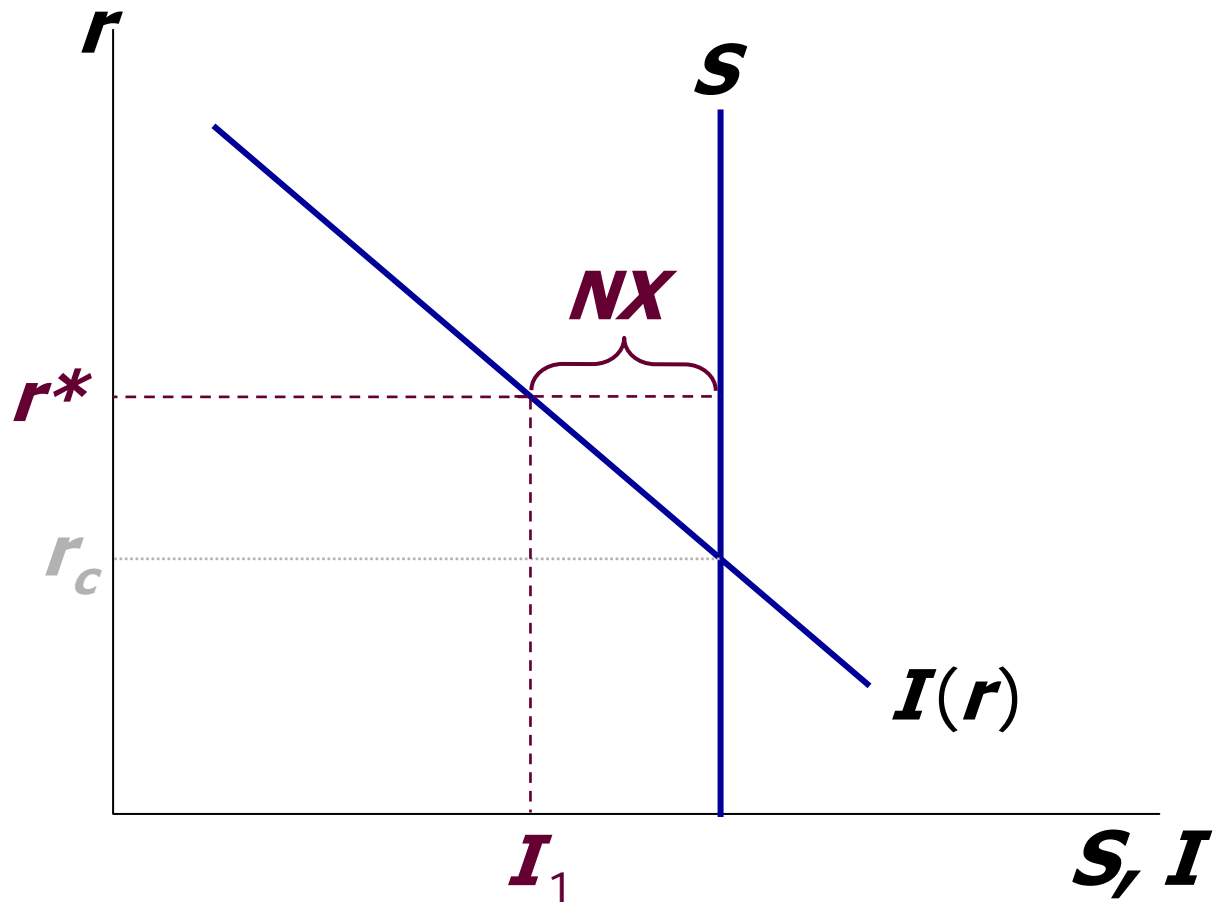
...the interest rate would adjust to equate investment and saving:



But in a small open economy...

the exogenous world interest rate determines investment...

...and the difference between saving and investment determines net capital outflows and net exports



Examples

1. Fiscal policy at home
2. Fiscal policy abroad
3. An increase in investment demand

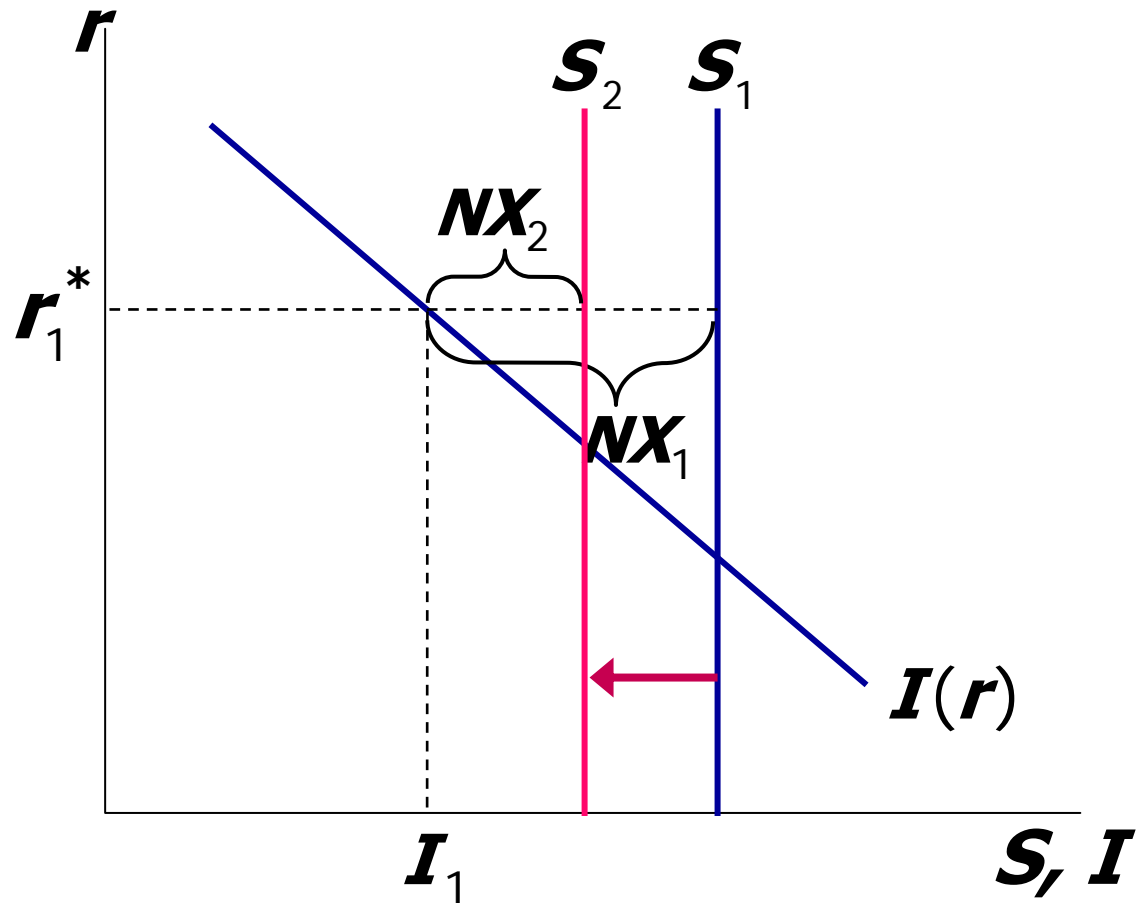
1. Fiscal policy at home

An increase in G
or decrease in T
reduces saving.

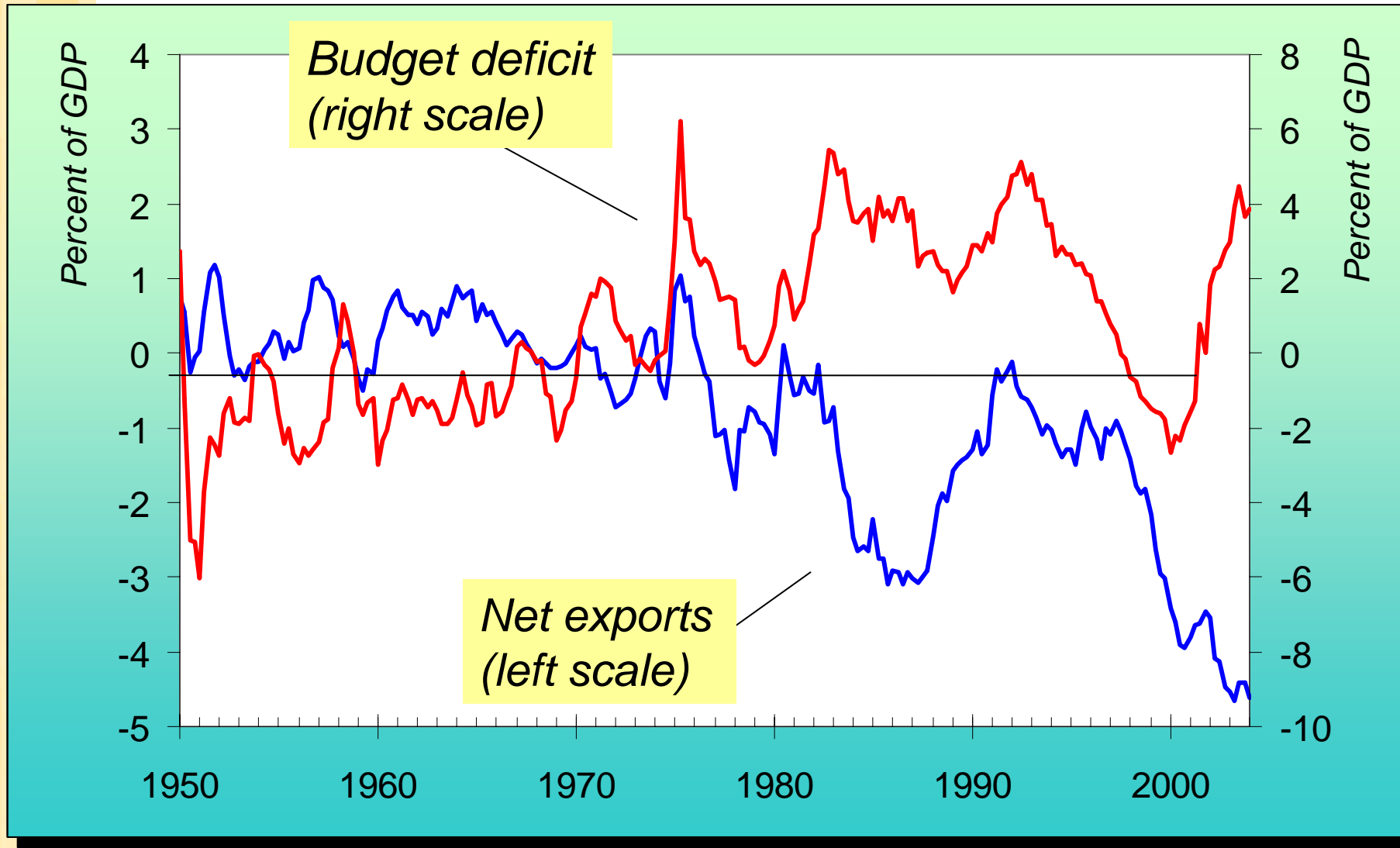
Results:

$$\Delta I = 0$$

$$\Delta NX = \Delta S < 0$$



NX and the Government Budget Deficit



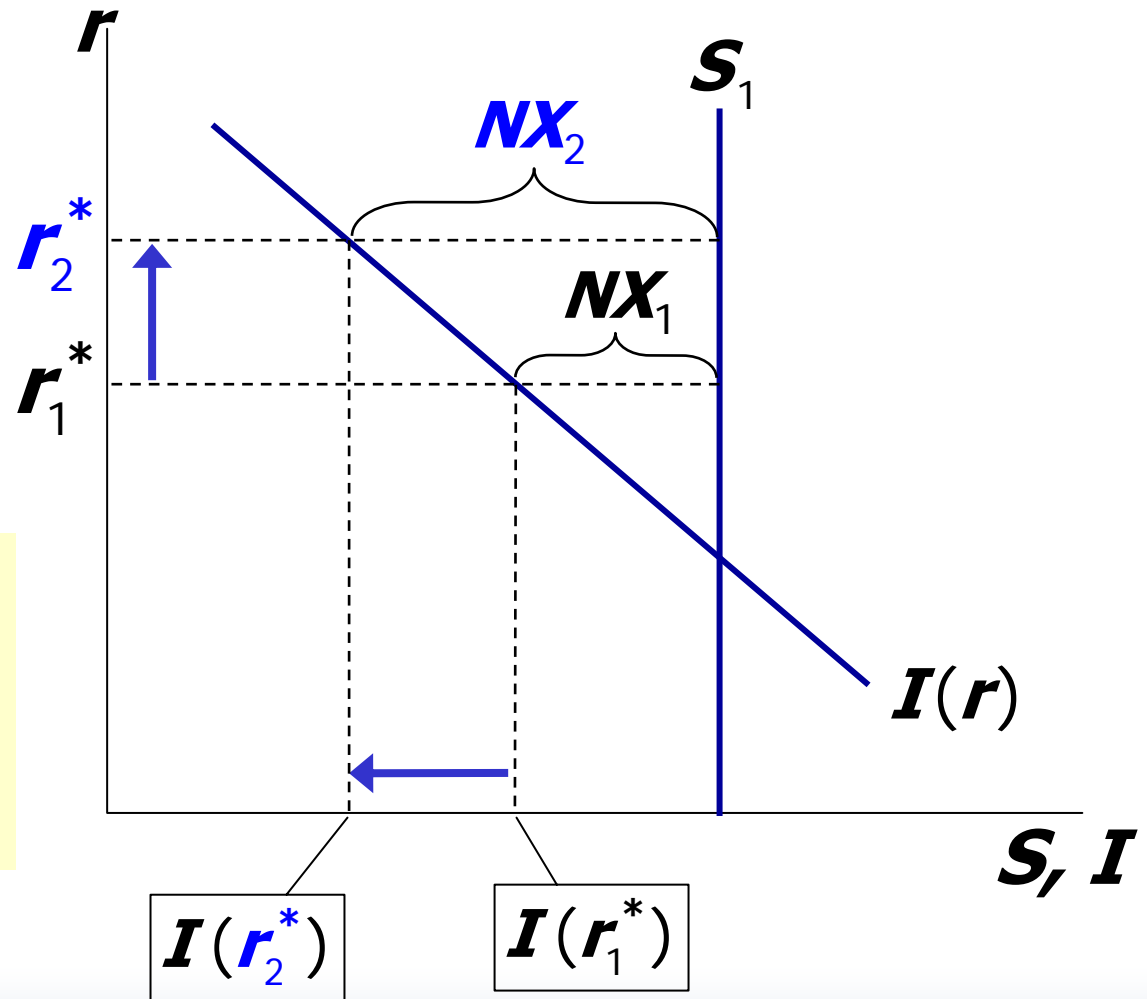
2. Fiscal policy abroad

Expansionary fiscal policy abroad raises the world interest rate.

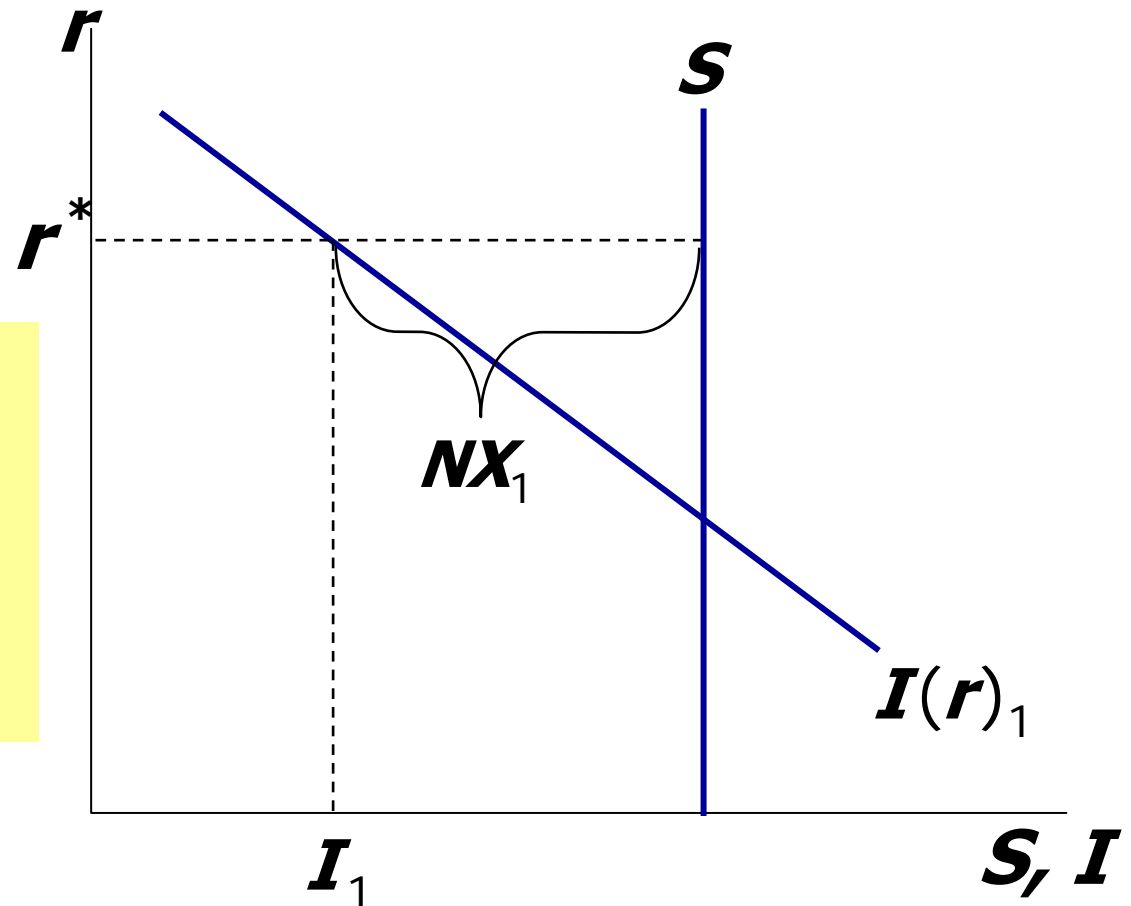
Results:

$$\Delta \mathbf{I} < 0$$

$$\Delta \mathbf{NX} = -\Delta \mathbf{I} > 0$$



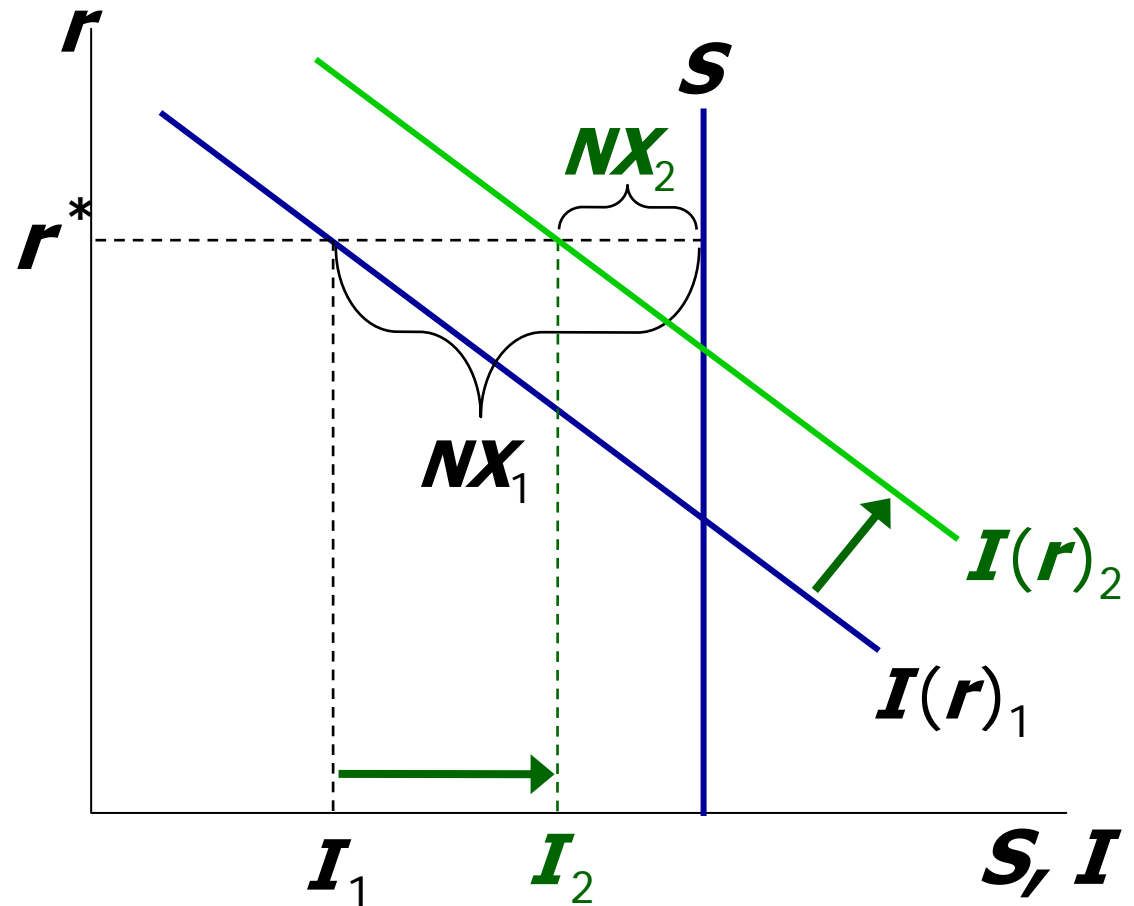
3. An increase in investment demand



the impact of an increase in investment demand on NX , S , I , and net capital outflow...

3. An increase in investment demand

$\Delta I > 0,$
 $\Delta S = 0,$
net capital
outflows and
net exports
fall by the
amount ΔI



Exchange Rates

- Because we are dealing with international flows, we must deal with the 'terms of trade'
- The exchange rate is simply the rate at which currencies of different countries are traded at on markets. Much like interest rates, (1) there are many and (2) they covary...hence we simply speak of only one exchange rate.

Exchange rates as of October 19, 2005

<i>country</i>	<i>exchange rate</i>
Euro	0.8377426748 Euro/\$
Japan	115.7615429415 Yen/\$
Mexico	10.8600003387 Pesos/\$
Russia	28.6450018950 Rubles/\$
South Africa	6.5636815742 Rand/\$
South Korea	1,054.9503820812 Won/\$
U.K.	0.5724258079 Pounds/\$

The nominal exchange rate

e = nominal exchange rate,
the relative price of
domestic currency
in terms of foreign currency
(e.g. Euro per Dollar)

The real exchange rate

*the lowercase
Greek letter
epsilon*

ϵ = real exchange rate,
the relative price of
domestic goods
in terms of foreign goods
(e.g. French Big Macs per
U.S. Big Mac)

Understanding the units of ϵ

$$\begin{aligned}\epsilon &= \frac{e \times P}{P^*} \\ &= \frac{(\text{Yen per } \$) \times (\$ \text{ per unit U.S. goods})}{\text{Yen per unit Japanese goods}} \\ &= \frac{\text{Yen per unit U.S. goods}}{\text{Yen per unit Japanese goods}} \\ &= \text{Units of Japanese goods} \\ &\quad \text{per unit of U.S. goods}\end{aligned}$$

~ *McZample* ~

- one good: Big Mac
- price in Japan:
 $P^* = 200$ Yen
- price in USA:
 $P = \$2.50$
- nominal exchange rate
 $e = 120$ Yen/\$

$$\begin{aligned}\mathcal{E} &= \frac{e \times P}{P^*} \\ &= \frac{120 \times \$2.50}{200 \text{ Yen}} = 1.5\end{aligned}$$



To buy a U.S. Big Mac, someone from Japan would have to pay an amount that could buy 1.5 Japanese Big Macs.

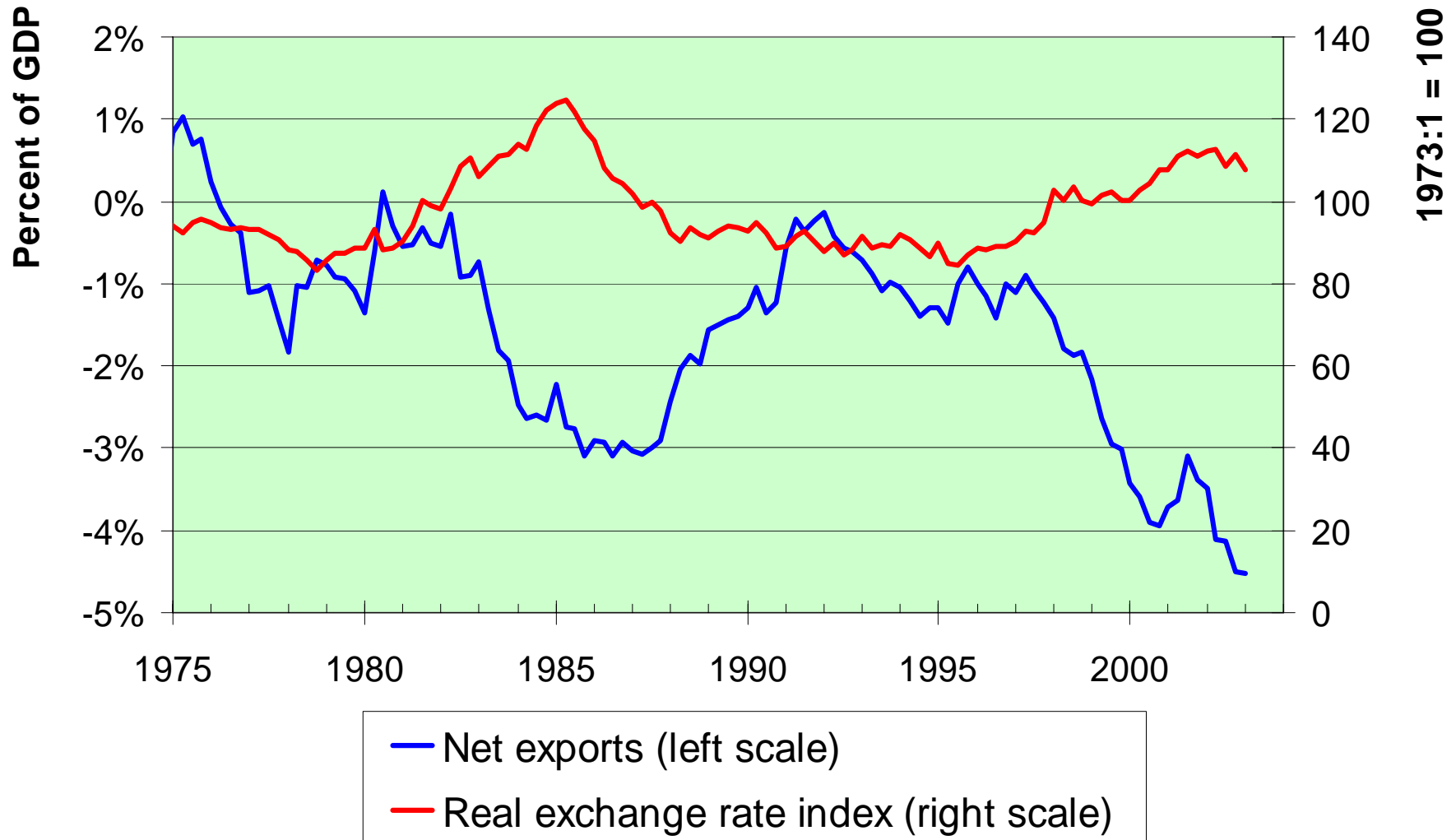
How NX depends on ϵ

$\uparrow \epsilon \Rightarrow$ U.S. goods become more expensive relative to foreign goods

$\Rightarrow \downarrow EX, \uparrow IM$

$\Rightarrow \downarrow NX$

U.S. Net Exports and the Real Exchange Rate, 1975-2003

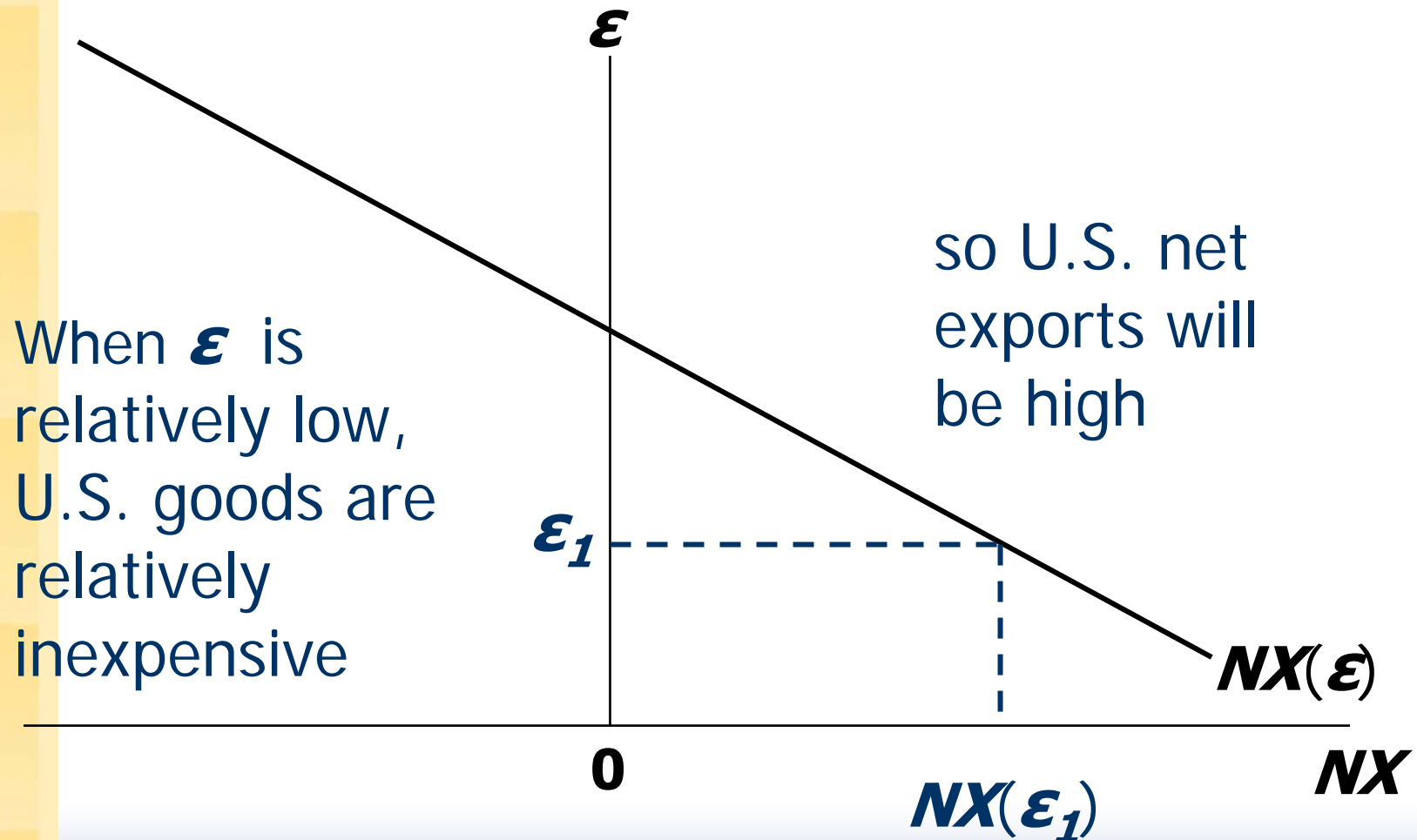


The net exports function

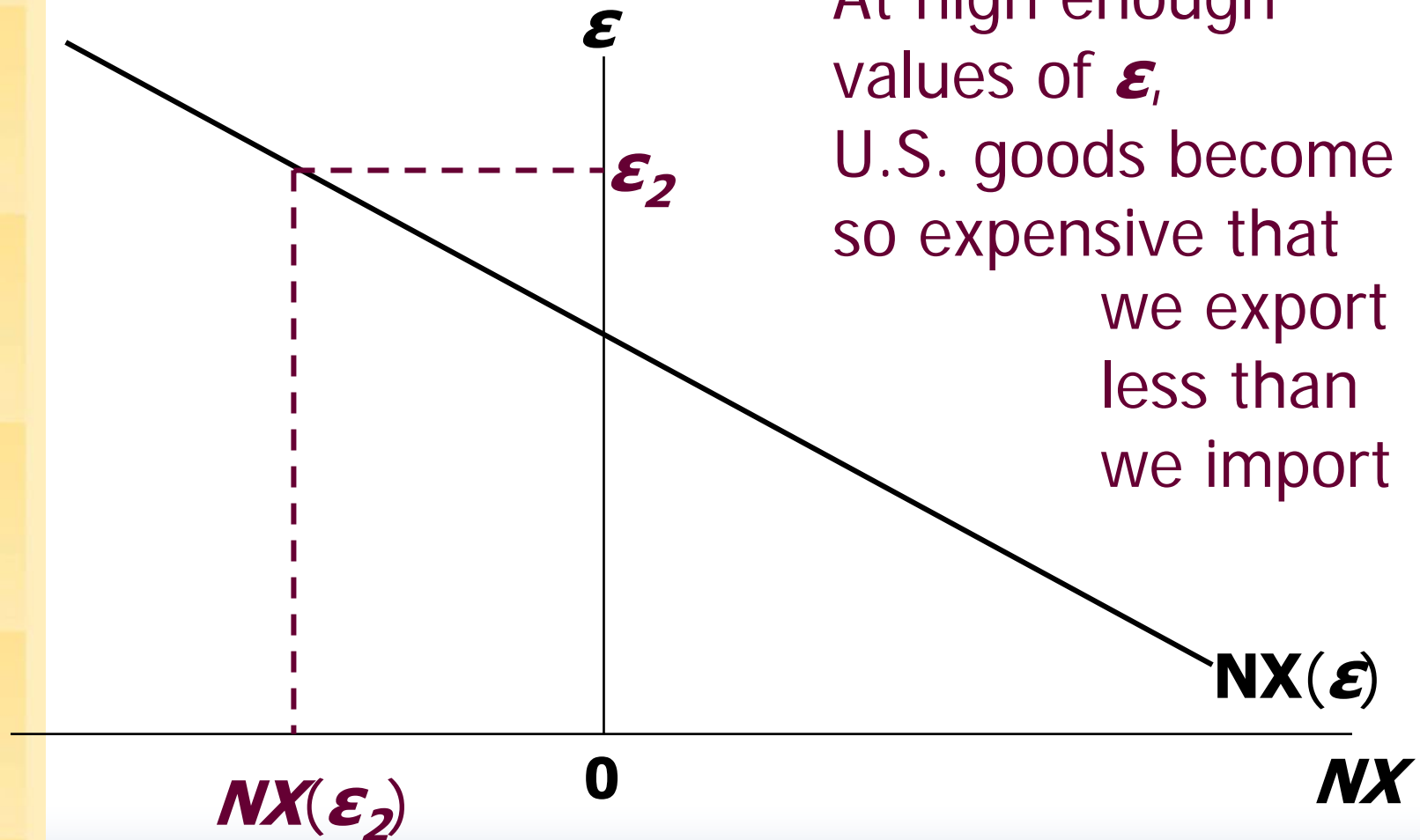
- The **net exports function** reflects this inverse relationship between NX and ϵ :

$$NX = NX(\epsilon)$$

The NX curve for the U.S.



The NX curve for the U.S.



At high enough values of ϵ , U.S. goods become so expensive that we export less than we import

How ϵ is determined

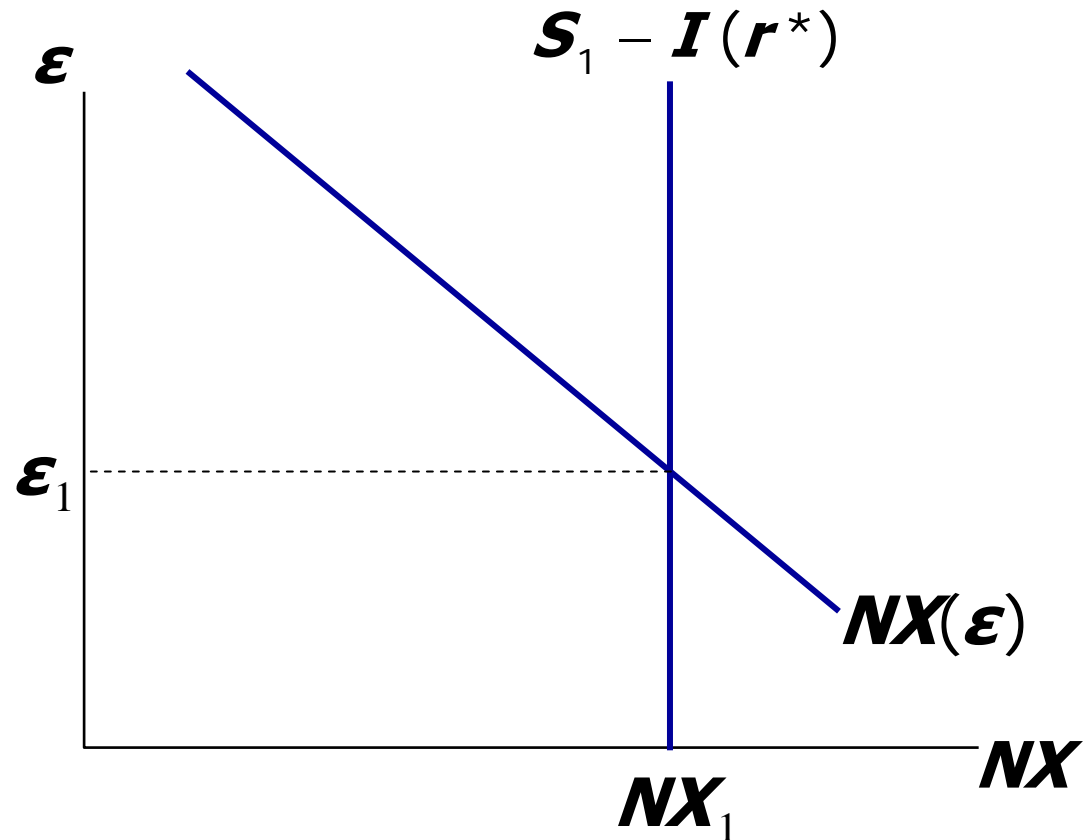
- The accounting identity says $NX = S - I$
- We saw earlier how $S - I$ is determined:
 - S depends on domestic factors (output, fiscal policy variables, etc)
 - I is determined by the world interest rate r^*
- So, ϵ must adjust to ensure

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

How ε is determined

Neither S nor I depend on ε , so the net capital outflow curve is vertical.

ε adjusts to equate NX with net capital outflow, $S - I$.



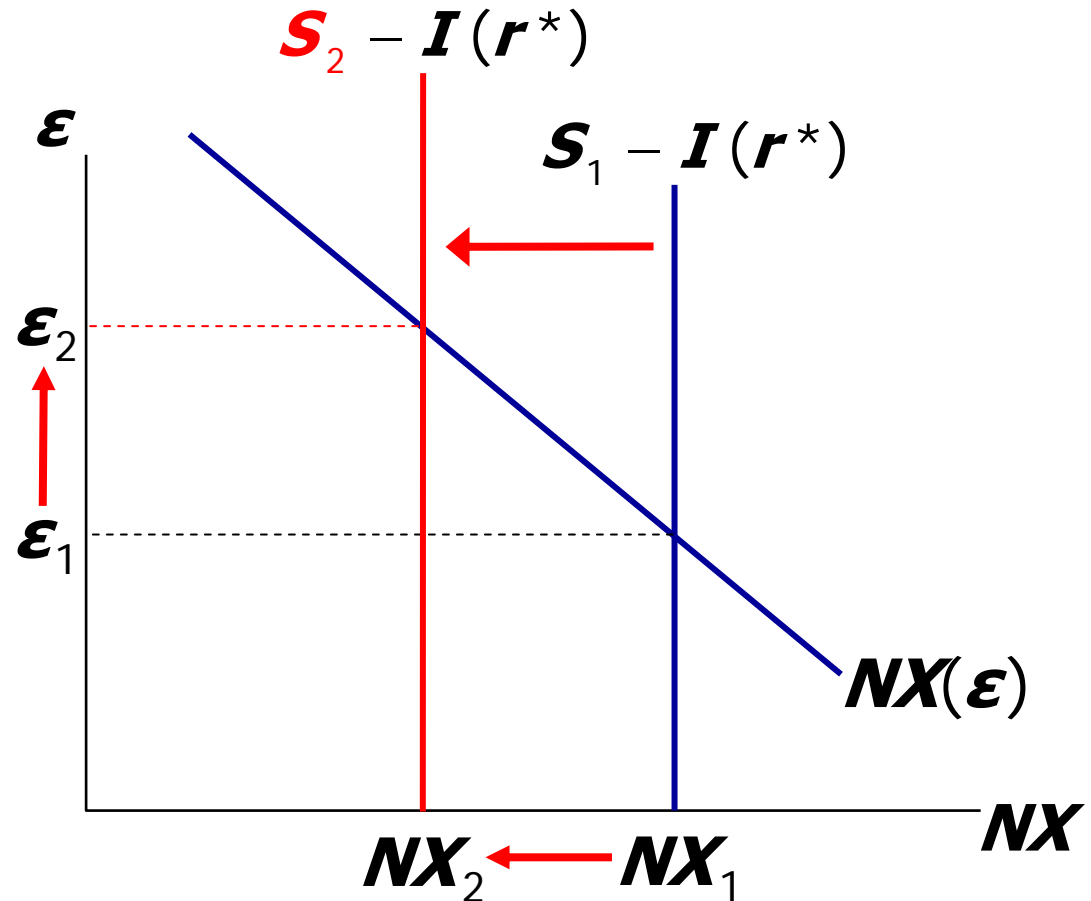
Four experiments

1. Fiscal policy at home
2. Fiscal policy abroad
3. An increase in investment demand
4. Trade policy to restrict imports

1. Fiscal policy at home

A fiscal expansion reduces national saving, net capital outflows, and the supply of dollars in the foreign exchange market...

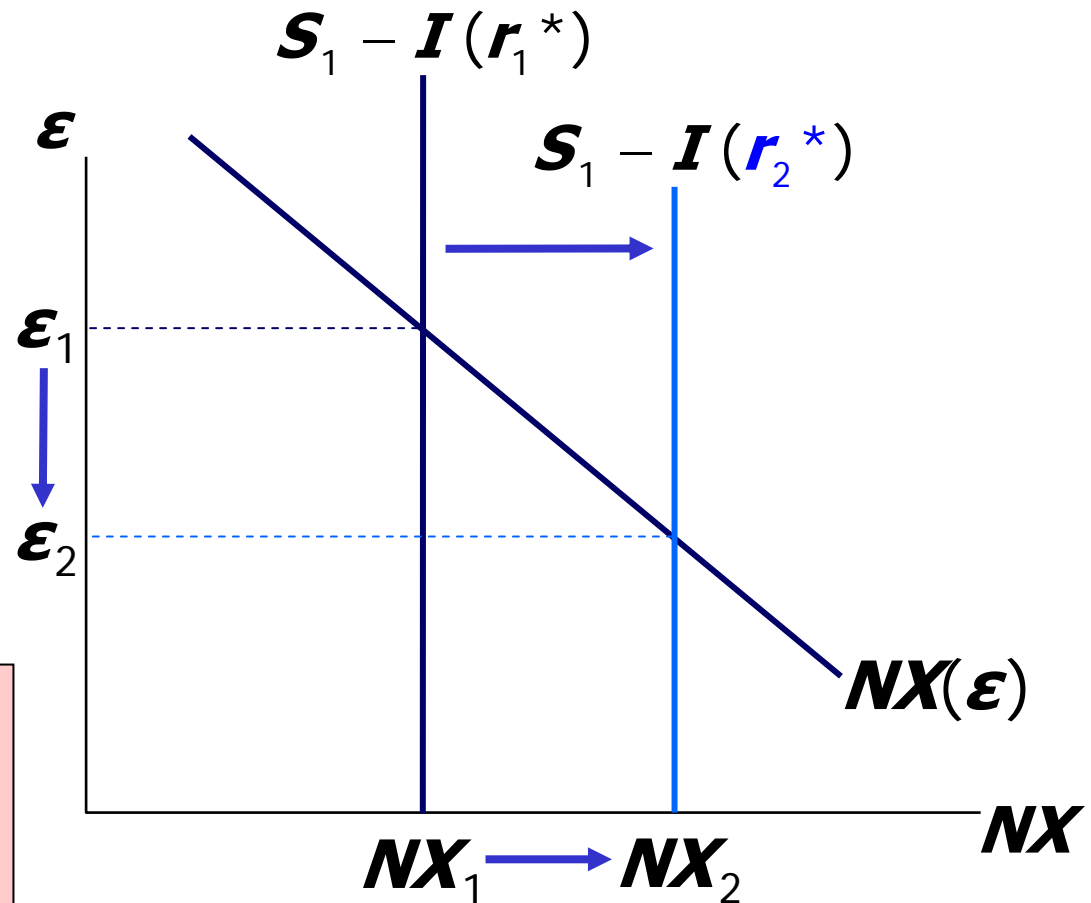
...causing the real exchange rate to rise and NX to fall.



2. Fiscal policy abroad

An increase in r^* reduces investment, increasing net capital outflows and the supply of dollars in the foreign exchange market...

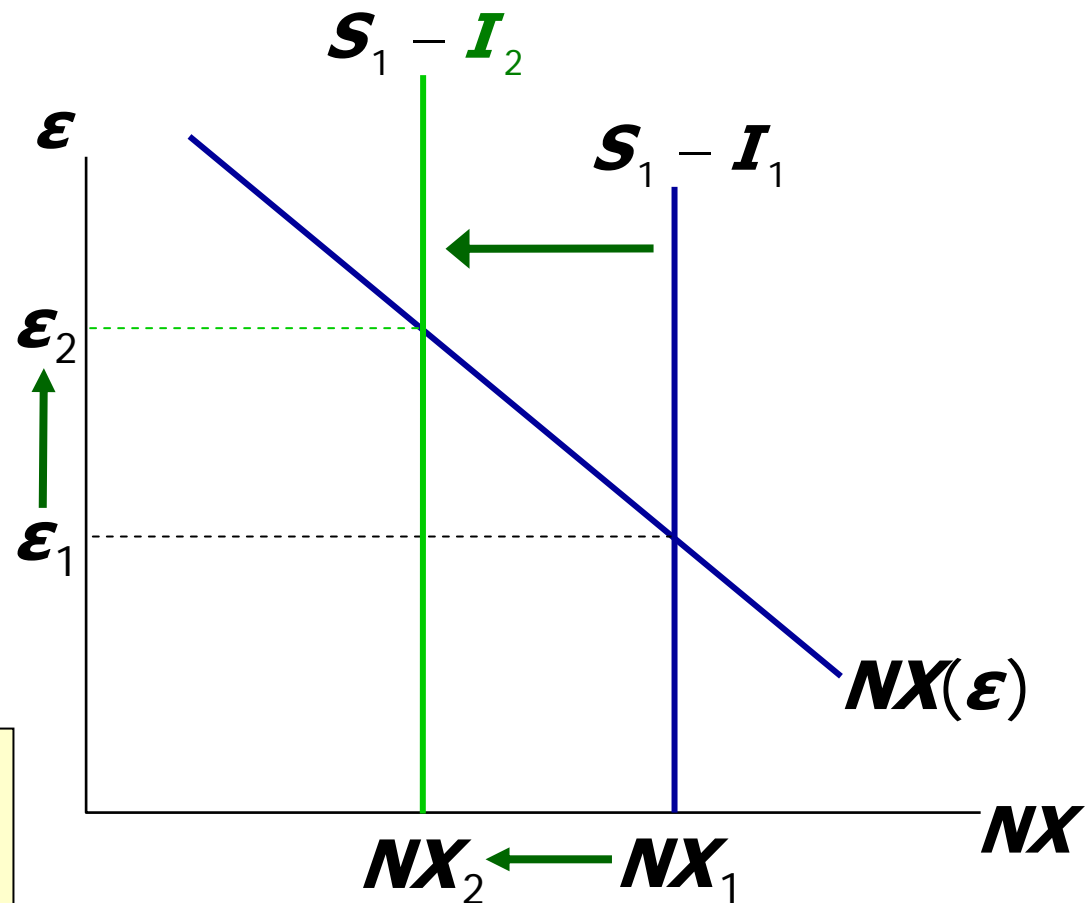
...causing the real exchange rate to fall and NX to rise.



3. An increase in investment demand

An increase in investment reduces net capital outflows and the supply of dollars in the foreign exchange market...

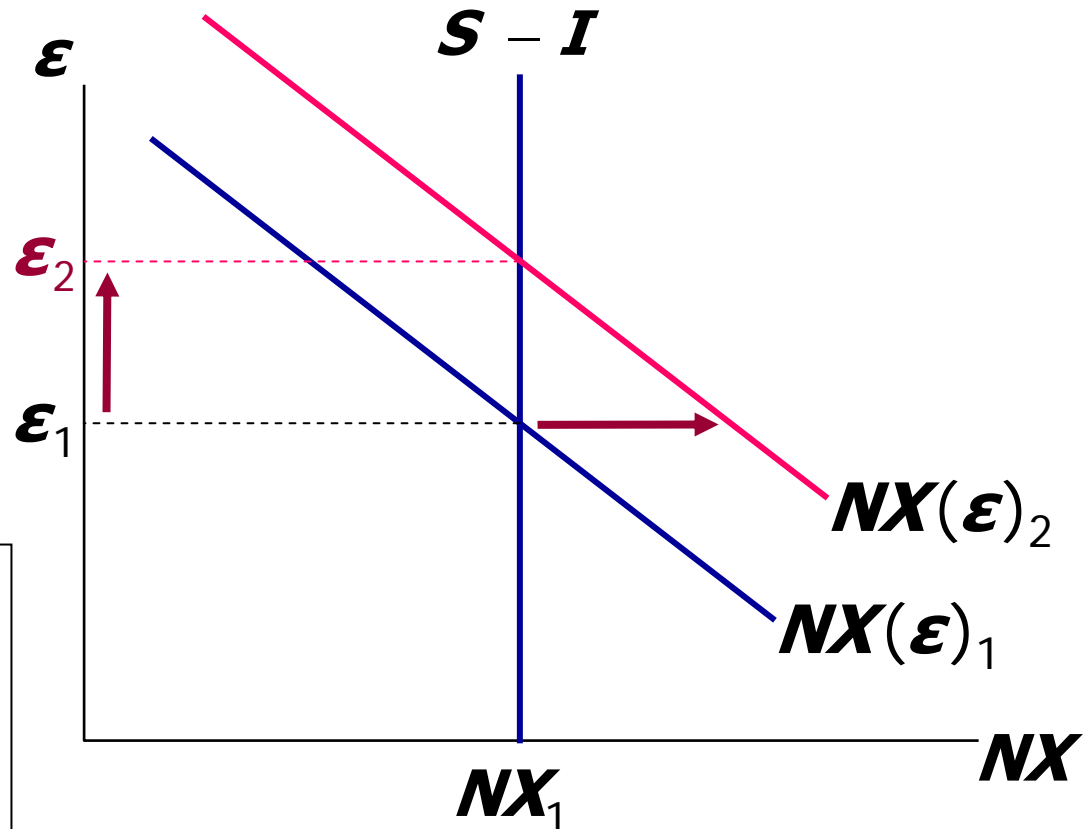
...causing the real exchange rate to rise and **NX** to fall.



4. Trade policy to restrict imports

At any given value of ϵ , an import quota
 $\Rightarrow \downarrow \mathbf{IM} \Rightarrow \uparrow \mathbf{NX}$
 \Rightarrow demand for dollars shifts right

Trade policy doesn't affect \mathbf{S} or \mathbf{I} , so capital flows and the supply of dollars remains fixed.



4. Trade policy to restrict imports

Results:

$$\Delta \boldsymbol{\varepsilon} > 0$$

(demand
increase)

$$\Delta \boldsymbol{NX} = 0$$

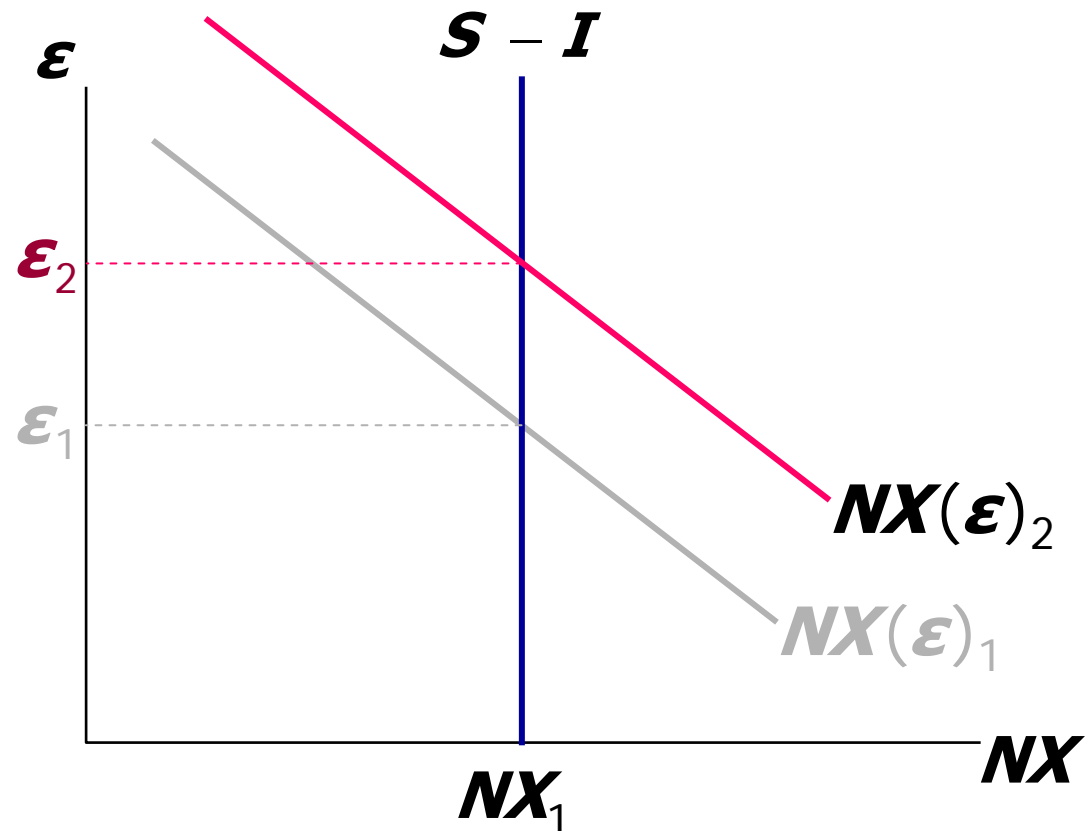
(supply fixed)

$$\Delta \boldsymbol{IM} < 0$$

(policy)

$$\Delta \boldsymbol{EX} < 0$$

(rise in $\boldsymbol{\varepsilon}$)



The Determinants of the Nominal Exchange Rate

- Start with the expression for the real exchange rate:

$$\boldsymbol{\varepsilon} = \frac{\boldsymbol{e} \times \boldsymbol{P}}{\boldsymbol{P}^*}$$

- Solve it for the nominal exchange rate:

$$\boldsymbol{e} = \boldsymbol{\varepsilon} \times \frac{\boldsymbol{P}^*}{\boldsymbol{P}}$$

The Determinants of the Nominal Exchange Rate

- So e depends on the real exchange rate and the price levels at home and abroad...
- ...and we know how each of them is determined:

$$\frac{M^*}{P^*} = L^*(r^* + \pi^*, Y^*)$$

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

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

$$\frac{M}{P} = L(r^* + \pi, Y)$$

The Determinants of the Nominal Exchange Rate

$$e = \varepsilon \frac{P^*}{P}$$

$$\ln(e) = \ln(\varepsilon) + \ln(P^*) - \ln(P)$$

$$\frac{\partial \ln(e)}{\partial t} = \frac{\partial \ln(\varepsilon)}{\partial t} + \frac{\partial \ln(P^*)}{\partial t} - \frac{\partial \ln(P)}{\partial t}$$

$$\frac{\dot{e}}{e} = \frac{\dot{\varepsilon}}{\varepsilon} + \frac{\dot{P}^*}{P^*} - \frac{\dot{P}}{P}$$

$$\hat{e} = \hat{\varepsilon} + \pi^* - \pi$$

Inflation and nominal exchange rates

