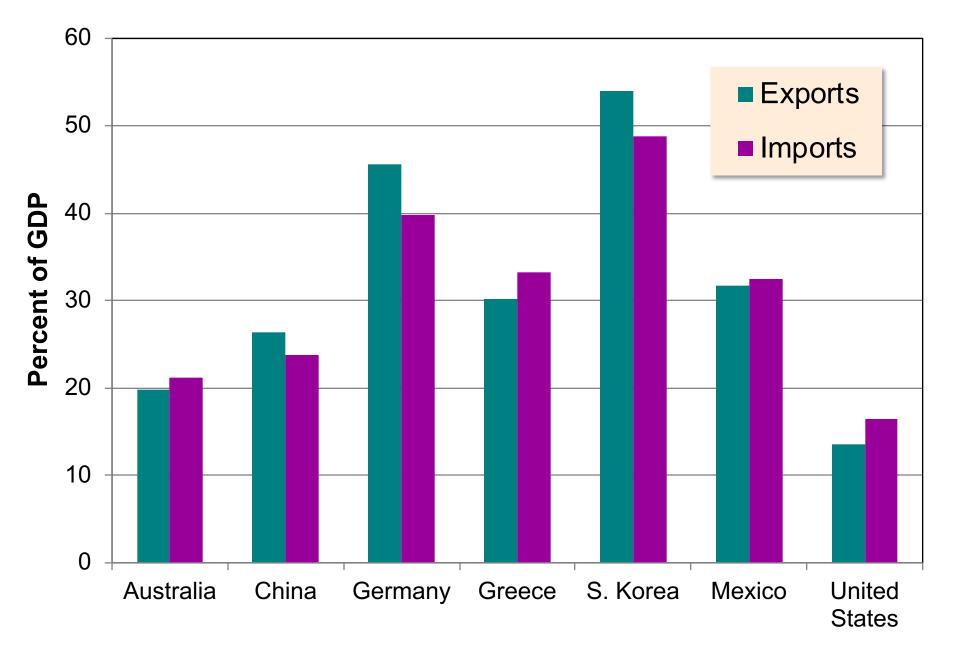
Chapter 6

The Open Economy

IN THIS CHAPTER, YOU WILL LEARN:

- accounting identities for the open economy
- the small open economy model
 - what makes it "small"
 - how the trade balance and exchange rate are determined
 - how policies affect trade balance & exchange rate

Imports and exports of selected countries, 2013



In an open economy,

- (Domestic) spending need not equal (domestically produced) output.
- saving need not equal investment

| Prelimina | arie superscripts: |
|-----------|---|
| C = ?? | d = spending on |
| I = ?? | domestic goods f = spending on |
| G = ?? | foreign goods |

EX = exports =

foreign spending on domestic goods

$$IM = imports = C^f + I^f + G^f$$

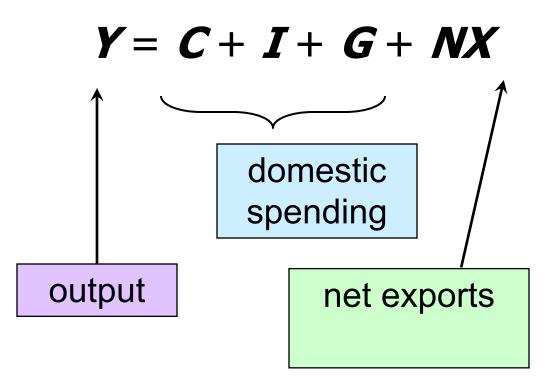
= spending on foreign goods

NX = net exports (a.k.a. the "trade balance") = EX - IM GDP = expenditure on domestically produced g & s

$\boldsymbol{Y} = \boldsymbol{C}^{\boldsymbol{d}} + \boldsymbol{I}^{\boldsymbol{d}} + \boldsymbol{G}^{\boldsymbol{d}} + \boldsymbol{E} \boldsymbol{X}$

$= \boldsymbol{C} + \boldsymbol{I} + \boldsymbol{G} + \boldsymbol{N}\boldsymbol{X}$

The national income identity in an open economy



Trade surpluses and deficits

NX = EX - IM = ??

• trade surplus:

output > spending and exports _____ imports Size of the trade surplus = **NX**

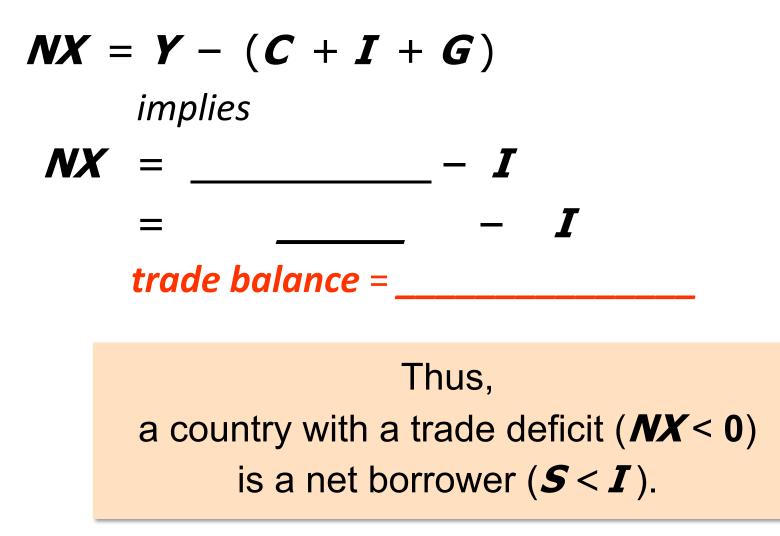
trade deficit:

spending > output and imports _____ exports Size of the trade deficit = -**NX**

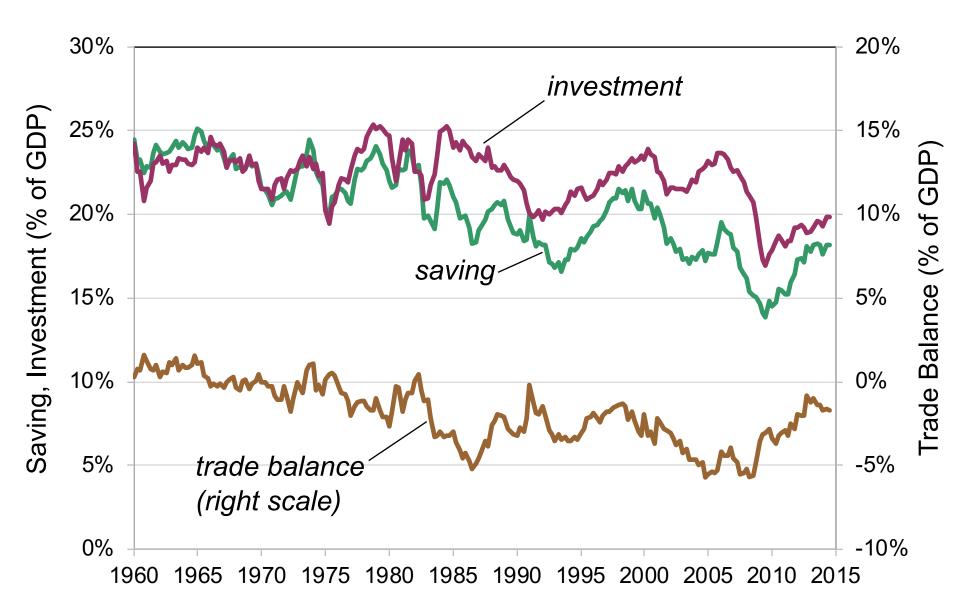
International capital flows

- Net capital outflow
 - = 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 or borrower)*.
- When *S* < *I*, country is a *net* (*lender or borrower*).

The link between trade & cap. flows



Saving, investment, and the trade balance 1960–2014



U.S.: The world's largest debtor nation

- As of 12/31/2011:
 - U.S. residents owned \$21.1 trillion worth of foreign assets
 - Foreigners owned \$25.1 trillion worth of U.S. assets
 - U.S. net indebtedness to rest of the world:
 \$4.0 trillion—higher than any other country,
 hence U.S. is the "world's largest debtor nation"

Trade deficits or surpluses

borrowing from or lending to

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
 - consumption function
 - investment function
 - exogenous policy variables
- $\boldsymbol{G}=\overline{\boldsymbol{G}}, \quad \boldsymbol{T}=\overline{\boldsymbol{T}}$

Assumptions about capital flows

- a. domestic & foreign bonds are perfect substitutes (same risk, maturity, *etc*.)
- **b. perfect capital mobility:**

no restrictions on international trade in assets

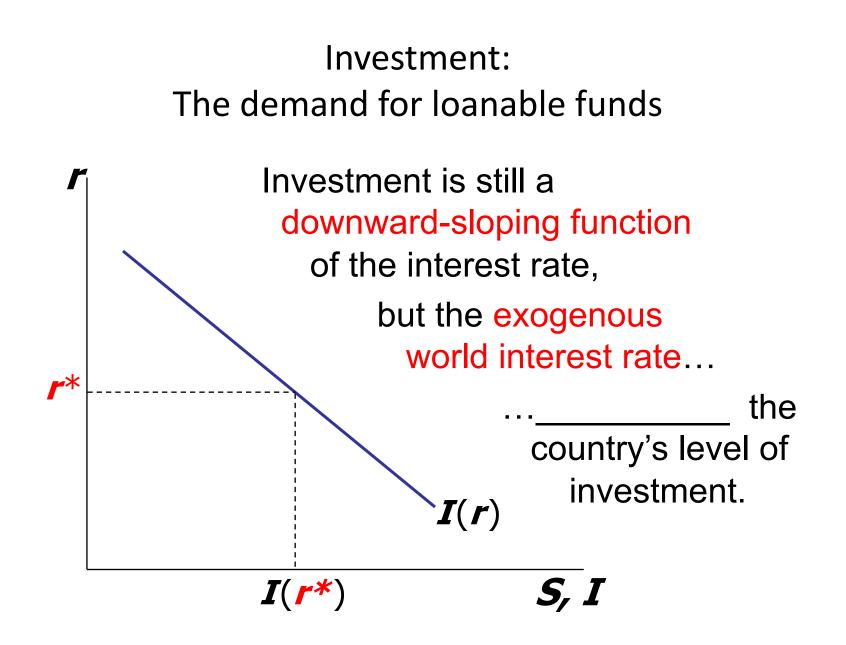
c. economy is small:

r*

cannot affect the world interest rate, denoted

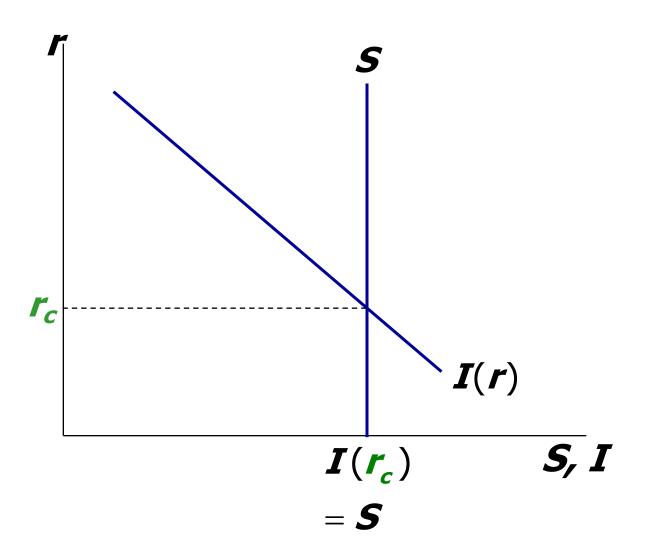
a & b imply **r** = **r***

c implies **r*** is exogenous



If the economy were closed...

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

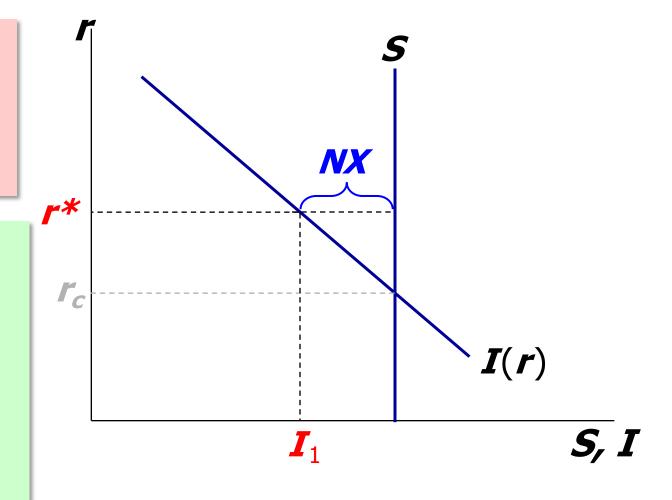


But in a small open economy...

the exogenous world interest rate determines investment...

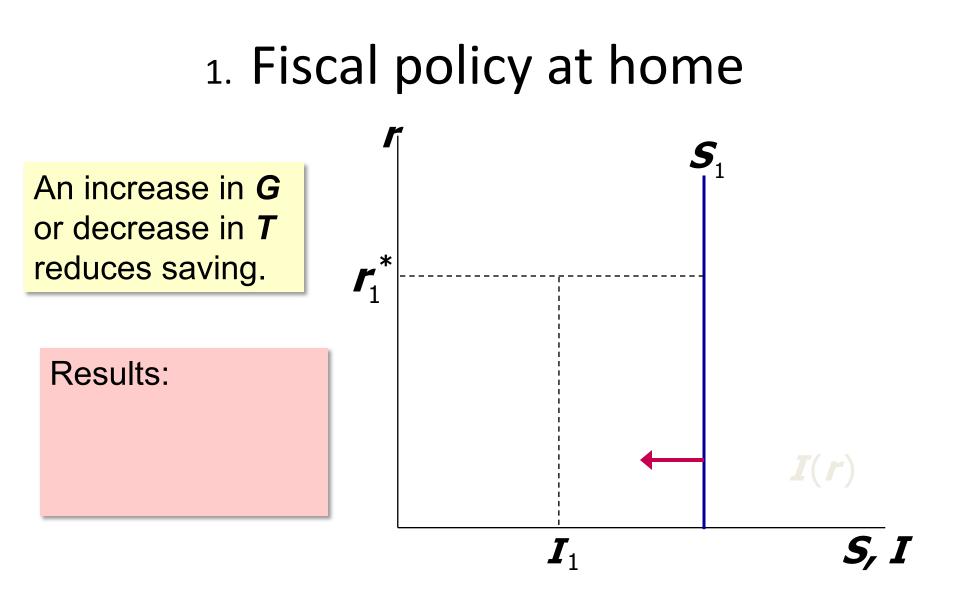
...and the difference between saving and investment determines net

and net

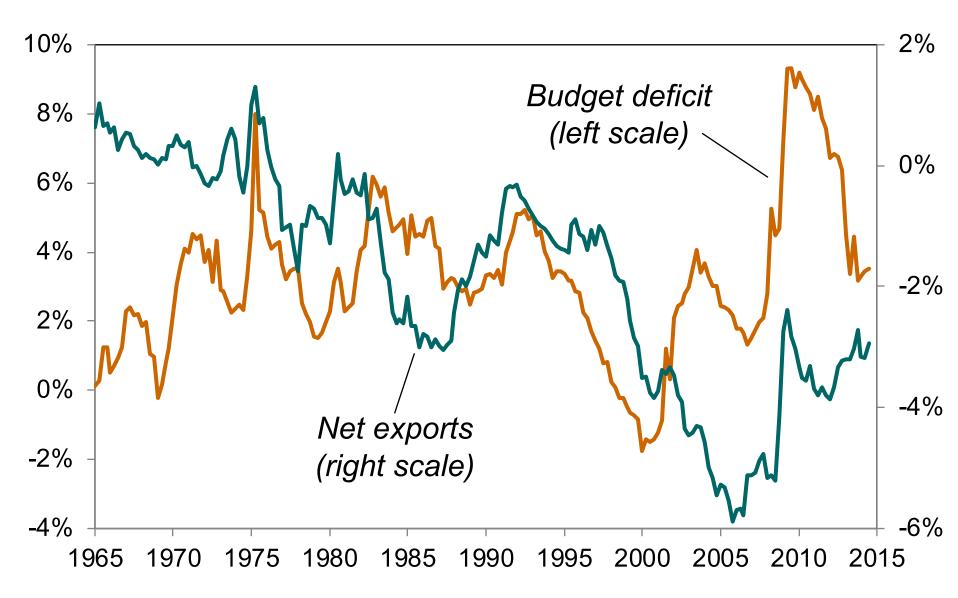


Next, three experiments:

- **1**. Fiscal policy at home
- 2. Fiscal policy abroad
- An increase in investment demand (exercise)



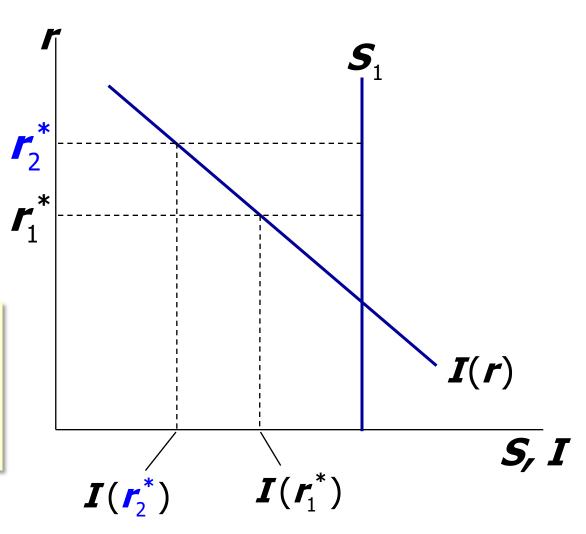
NX and the federal budget deficit (% of GDP), 1965–2014



2. Fiscal policy abroad

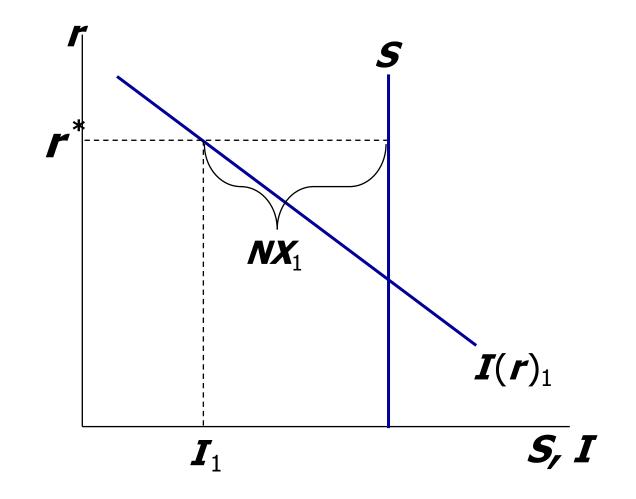
Expansionary fiscal policy abroad raises the world interest rate.

Results:

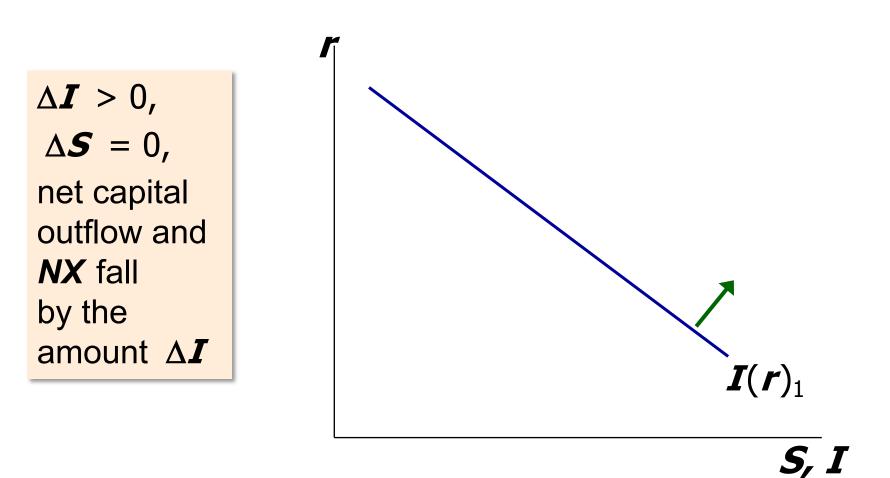


NOW YOU TRY 3. An increase in investment demand

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



ANSWERS 3. An increase in investment demand



The nominal exchange rate

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

A few exchange rates, as of 1/13/2015

| country | exchange rate |
|--------------|-------------------|
| Euro area | 0.85 euro/\$ |
| Indonesia | 12,576 rupiahs/\$ |
| Japan | 118.0 yen/\$ |
| Mexico | 14.6 pesos/\$ |
| Russia | 65.85 rubles/\$ |
| South Africa | 11.50 rand/\$ |
| U.K. | 0.66 pounds/\$ |

The real exchange rate

the lowercase Greek letter epsilon

E =

real exchange rate, the relative price of domestic goods in terms of foreign goods (e.q. Japanese Big Macs per

U.S. Big Mac)

Exchange Rates

- Exchange rates
 - nominal: the price of a country's _____ in terms of another country's _____
 - real: the price of a country's _____ in terms of another country's _____
 - The real exchange rate equals the nominal rate times the ratio of prices of the two countries.

Understanding the units of ε

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

= (Yen per \$) × (\$ per unit U.S. goods)
Yen per unit Japanese goods

Yen per unit U.S. goods Yen per unit Japanese goods

Units of Japanese goods per unit of U.S. goods

~ McZample ~

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





At these prices and exchange rate, we could get ____ Big Mac in Japan per Big Mac in U.S.

Another Example

- U.S.: a chair \$10/per chair
- Japan: a chair ¥800/per chair
- Nominal exchange rate: ¥100/per US dollar
- Real exchange rate:

Thus, real exchange rate depends on two things:(a) Nominal exchange rate(b) The prices of goods

ε in the real world & our model

• In the real world:

We can think of $\boldsymbol{\varepsilon}$ as the relative price of a basket of domestic goods in terms of a basket of foreign goods

 In our macro model: There's just one good, "output."
 So *ɛ* is the relative price of one country's output in terms of the other country's output

The meaning of e or ε

• Nominal exchange rate e:

Which currency depreciates? What happens to U.S. dollar? (think about oranges.)

Real exchange rate: ε

 ε = 2 Japanese chairs/per U.S. chair

 ε = 20 Japanese chairs/per U.S. chair

Which chair become cheaper? What happens to U.S. chair?

The meaning of e or ε

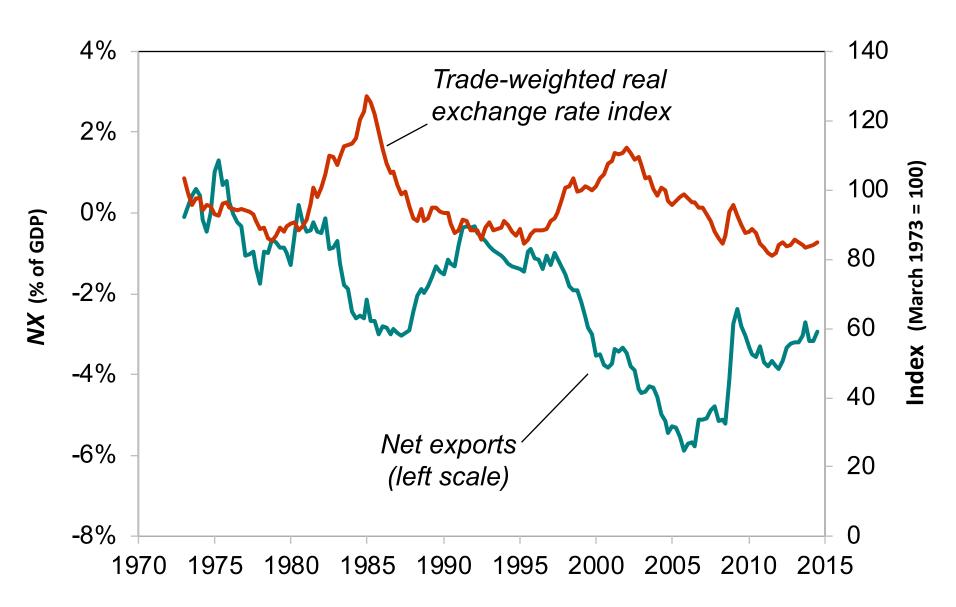
- Under the current definition:
- That e goes up, _____ currency becomes cheaper and _____ currency becomes more expensive.
- That *ɛ* goes up, _____ goods become cheaper and _____ goods become more expensive.

How NX depends on ε

 $\uparrow \boldsymbol{\varepsilon} \Rightarrow$ U.S. goods become more _____ relative to foreign goods

 $\Rightarrow _EX, _IM$ $\Rightarrow _NX$

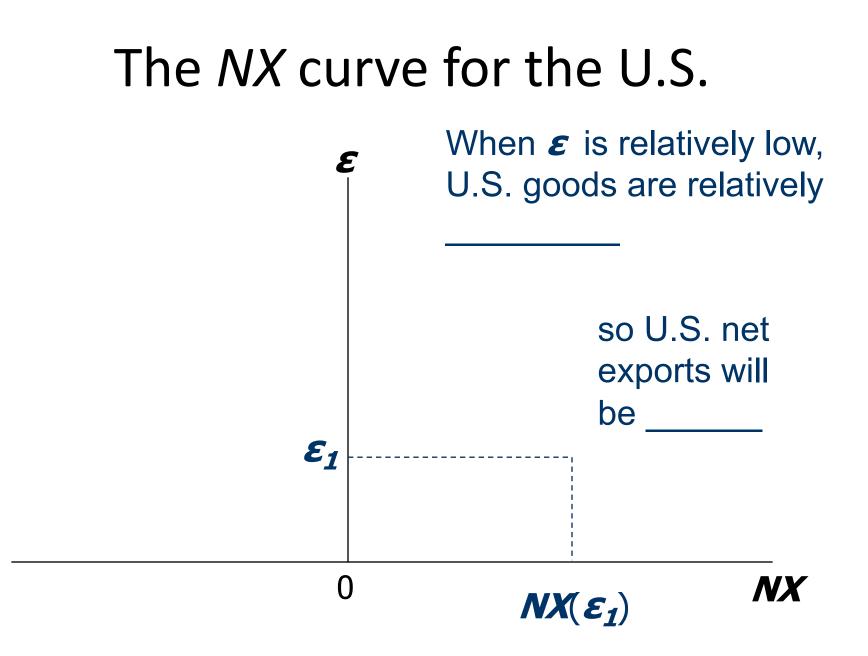
U.S. net exports and the real exchange rate, 1973-2014



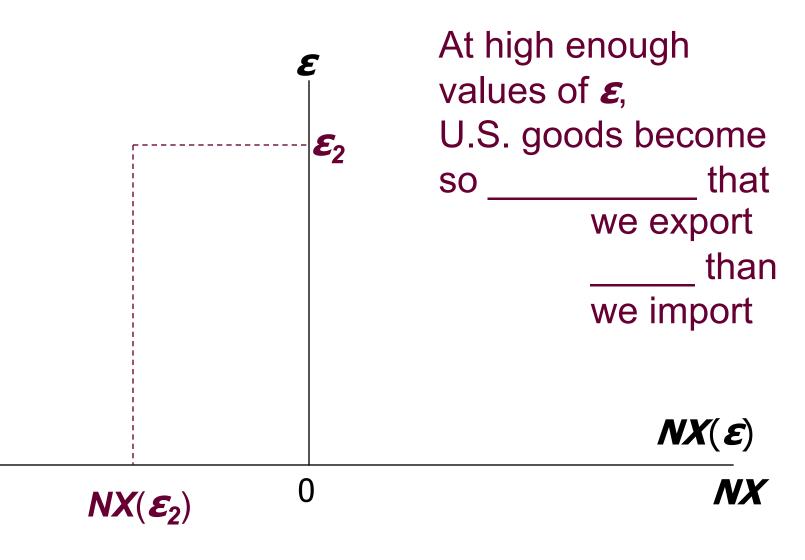
The net exports function

The net exports function reflects this
 _____ relationship between NX and ε:

 $NX = NX(\boldsymbol{\varepsilon})$



The NX curve for the U.S.



Foreign Exchange Market

- Demand side: Foreigners need U.S. dollars to buy U.S. net exports; i.e., NX
- Supply side: Net capital outflow (*S*-*I*) is the supply of dollars to be invested abroad.

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, *E* must adjust to ensure

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

What does S - I(r*) look like?

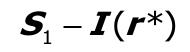
• Why?

How ε is determined

ε

Neither **S** nor **I** depends on **E**, so the net capital outflow curve is

e adjusts to
equate *NX*with net capital
outflow, *S*-*I*.



NX

Interpretation: supply and demand in the foreign exchange market

NX

Ε

demand:

Foreigners need dollars to buy U.S. net exports.

supply:

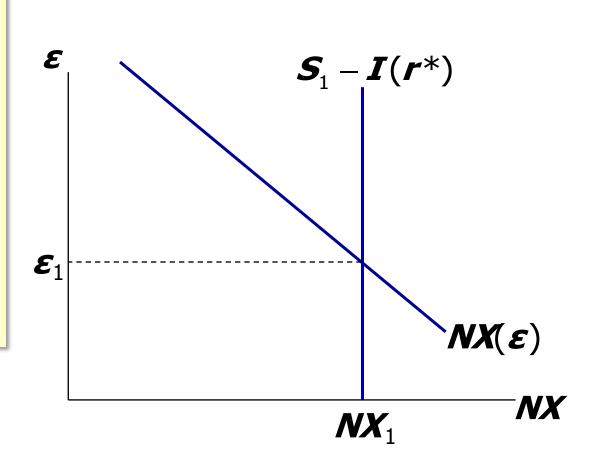
Net capital outflow (**S**-**I**) is the supply of dollars to be invested abroad.

Next, four experiments:

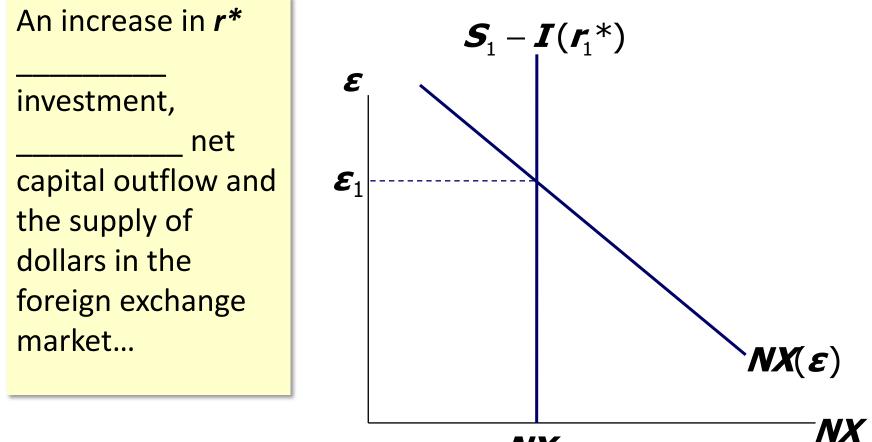
- **1.** Fiscal policy at home
- 2. Fiscal policy abroad
- An increase in investment demand (exercise)
- **4.** Trade policy to restrict imports

1. Fiscal policy at home

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



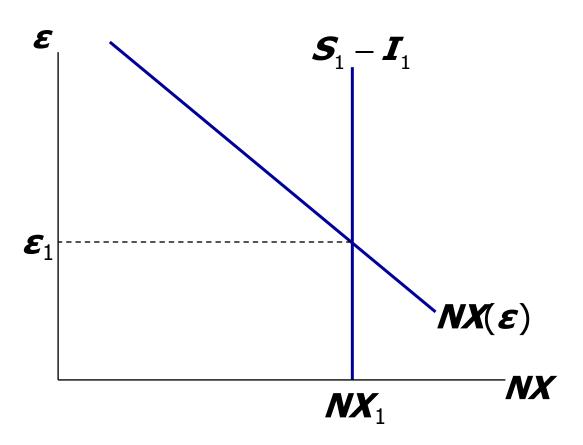
2. Fiscal policy abroad



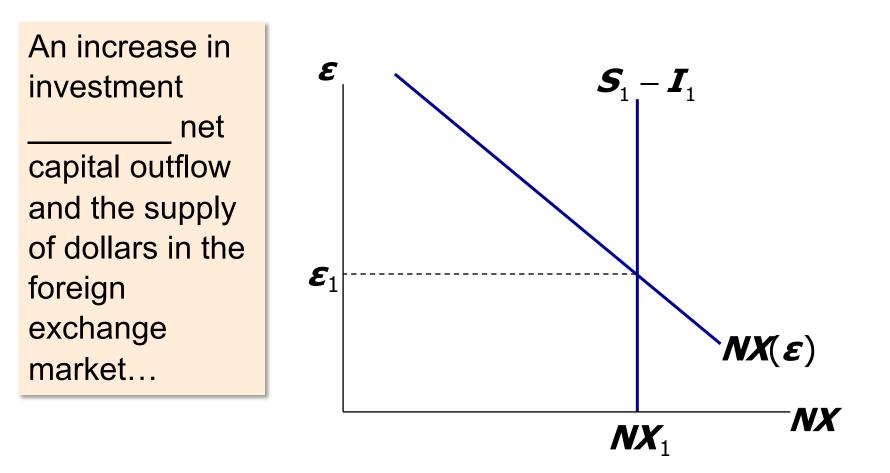
NX₁

NOW YOU TRY 3. Increase in investment demand

Determine the impact of an increase in investment demand on net exports, net capital outflow, and the real exchange rate.

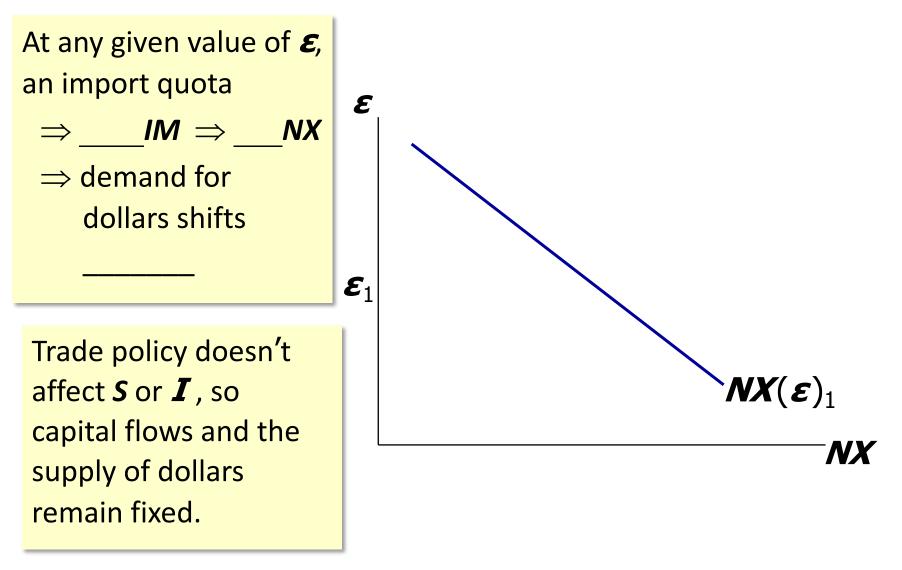


ANSWERS 3. Increase in investment demand

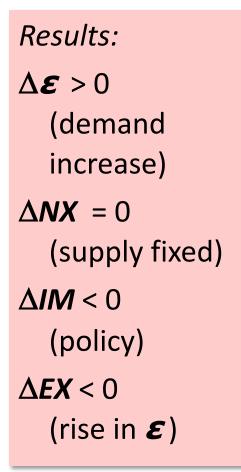


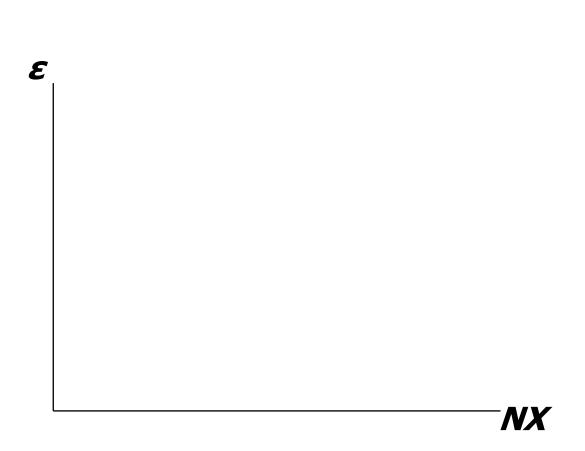


4. Trade policy to restrict imports



4. Trade policy to restrict imports





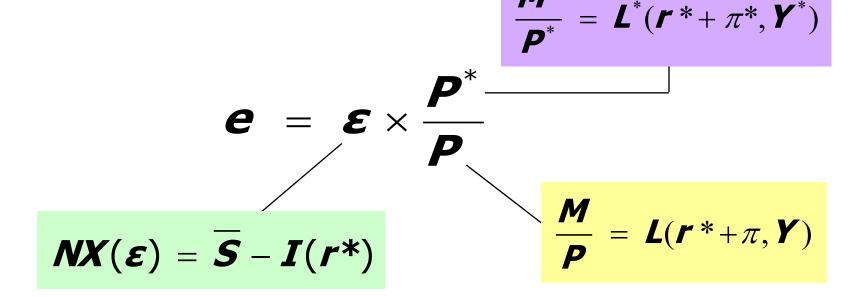
The determinants of the nominal exchange rate

- Start with the expression for the real exchange rate: $\boldsymbol{\varepsilon} = \frac{\boldsymbol{e} \times \boldsymbol{P}}{\boldsymbol{\rho}^*}$
- Solve 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:



The determinants of the nominal exchange rate

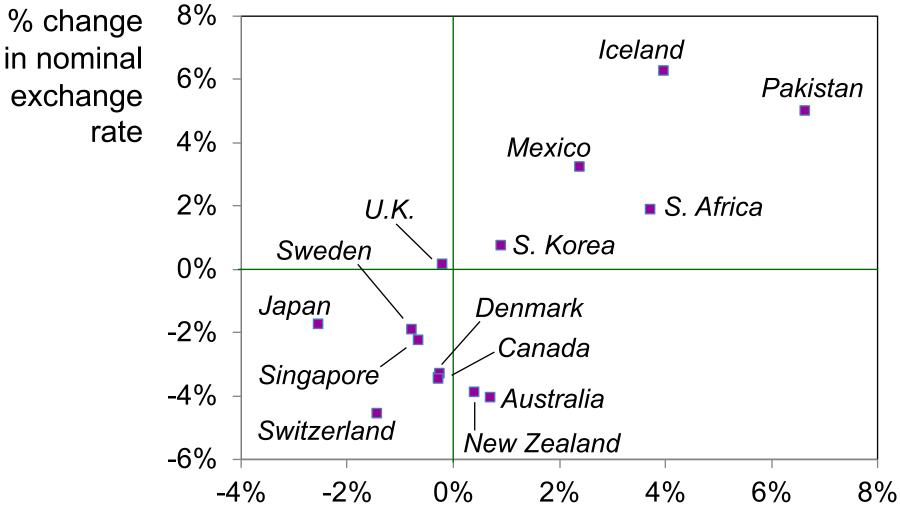
$$\boldsymbol{e} = \boldsymbol{\varepsilon} \times \frac{\boldsymbol{P}^*}{\boldsymbol{P}}$$

Rewrite this equation in growth rates

 (see "arithmetic tricks for working with percentage changes,"
 Chapter 2):

For a given value of *E*,
 the growth rate of *e* equals the difference
 between foreign and domestic inflation rates.

Inflation differentials and nominal exchange rates for a cross section of countries



inflation differential