

## 6. Open Economy (long run)

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## Outline

- ◆ National Accounting
  - + GDP versus GNP
  - + Balance of payments
  - + Capital account and current account
- ◆ Nominal Exchange Rate
- ◆ Real exchange rate
- ◆ The model: Small Open Economy in the long run

## National Accounting

### GDP versus GNP

GNP is the income earned by national factors of production

GDP is the value of the final goods and services produced inside the borders.

## National Accounting

### Balance of payments

- ◆ Balance of payments = recording of all transactions of a country that have a direct relation with the movement of funds between this country and other countries.
- ◆ Do not confuse trade deficit and public deficit.

## National Accounting

1 exports	
2 imports	
3 trade balance (net exports)	1 - 2
4 net investment income	
5 net unilateral transfers	
6 net transfers	4 + 5
7 current account	3 + 6
8 foreign investment in Canada	
9 Canadian investment abroad	
10 capital account balance	8 - 9
11 official settlements account	-(7 + 10)

## National Accounting

- ◆ Item 11 (official settlements account) only if CB intervenes in the foreign exchange market.
- ◆ Otherwise,  $7 + 10 = 0$ .

## Preliminaries

**X** = exports =  
foreign spending on domestic  
goods

**M** = imports = spending on foreign  
goods

**NX** = net exports (*a.k.a.* the “trade  
balance”)  
= **X - M**

## Preliminaries

superscripts:  
**d** = spending on domestic goods  
**f** = spending on foreign goods

## In an open economy,

- ♦ spending need not equal output
- ♦ saving need not equal investment

## National Accounting

### Capital account and current account

$$Y = C^d + I^d + G^d + X$$

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

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

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

$$M = C^f + I^f + G^f$$

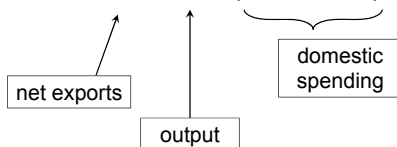
$$Y = (C - C^f) + (I - I^f) + (G - G^f) + X$$

$$= C + I + G + (X - M) = C + I + G + NX$$

## The national income identity in an open economy

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

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



## Trade surpluses and deficits

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

- ♦ **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 outflow**
  - =  $S - I$
  - = 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

## National Accounting

- $$Y - C - G = S = I + NX$$
- $$S - I = NX$$
- $$(I - S) + NX = 0$$
- CAPITAL ACCOUNT +  
CURRENT ACCOUNT = 0
- ♦ Is a trade deficit a bad thing?

## Nominal Exchange Rate

- ♦ Nominal exchange rate,  $e$  = price of a currency in terms of another.
- ♦ Two ways of expressing it: units of foreign currency per unit of domestic currency (e.g. Yen per Canadian Dollar)
- ♦ Historically (1944 - 1971): fixed exchange rate: evaluation and revaluation.
- ♦

## Nominal Exchange Rate

- ♦ Since 1971: floating or flexible: depreciation or appreciation.
- ♦ Dirty float or managed exchange rate: CB intervenes if price of currency fluctuates too much to discourage speculation: CN buys domestic currency when its price falls: needs reserves -- gold or foreign currency.

## Nominal Exchange Rate

### Determination of flexible Exchange

(NOT IN THE BOOK OR DIFFERENT)

### Long Run: Purchasing Power Parity (PPP) theory

## Purchasing Power Parity (PPP)

Two definitions:

- † A doctrine that states that goods must sell at the same (currency-adjusted) price in all countries.
- † The nominal exchange rate  $e$  adjusts to equalize the cost of a basket of goods across countries.

Reasoning:

- † (arbitrage) **law of one price**: same good should be sold at same price all over the world.

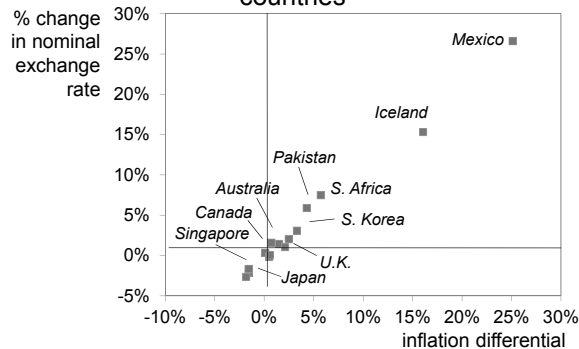
## Nominal Exchange Rate

- ♦ With one unit of domestic currency in domestic country:  $1/P_D$  goods ( $P_D$  = level of domestic prices).
- ♦ With one unit of domestic currency in foreign country:  $e/P_F$  ( $P_F$  = level of foreign prices).
- ♦ According PPP theory, these two things should be equal:  $e = P_F/P_D$

## Nominal Exchange Rate

- ♦ Important:  $\Delta e/e = \pi_F - \pi_D$ .
- ♦ Anything which affects relative price levels affect  $e$ .

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



## Even in the long run ...

1. International arbitrage not always possible.
  - ♦ Non-traded goods
2. Different countries' goods not perfect substitutes (differentiation)
3. Transportation costs

## Nominal Exchange Rate

### Short Run - Interest rate parity theory

**Problem:** Suppose that you have C\$1,000 to invest. The interest rate is 8% in Canada and is 5% in the US. US\$1 equals C\$1.25 now. The exchange rate is expected to be US\$1 = C\$1.5 next year. Where are you going to invest?

- ♦

## Nominal Exchange Rate

- ♦ Canada: C\$1000  $\times$  1.08 = C\$ 1080
- ♦ US: C\$1000/1.25  $\times$  1.05 = US\$ 840  
US\$ 840  $\times$  1.50 = C\$ 1260

## Nominal Exchange Rate

- ♦ Short run: capital account (demand and supply of domestic and foreign assets) more important
- ♦ Interest parity condition: same return on assets all over the world. Two alternatives:
  1. buy a domestic asset: return  $1 + r_D$
  2. buy a foreign asset: return  $e \cdot (1 + r_F) / e^e$   
( $e^e$  = expected exchange rate)
- 3. According to the interest parity condition, these two things should be equal:  $e = e^e \cdot (1 + r_D) / (1 + r_F)$ .

## Nominal Exchange Rate

- ♦ Holding expectations fixed, an increase in domestic interest rate, relative to foreign interest rate, increases  $e$
- ♦ Expectations affect  $e$ : anything that affects relative price level affects  $e$  in the short run through its effect on expectations.

## Real exchange rate

- ♦ Real exchange rate  $\varepsilon$  = relative price of the goods of two countries = rate at which we trade goods of one country for goods of another. (e.g. Japanese Big Macs per Canadian Big Mac)
- ♦ If nominal exchange rate behaved according to PPP theory (**law of one price**),  $\varepsilon = 1$

## Real exchange rate

- ♦ In the real world:  
We can think of  $\varepsilon$  as the relative price of a basket of domestic goods in terms of a basket of foreign goods

## Real exchange rate

- ♦ What is relative price of Canadian goods and Japanese goods?
  1. convert both of them to same currency: C\$.
  2. General level of prices in Japan =  $P_F$   
measured in yen =  $P_F / e$  measured in C\$;
  3. General level of prices in Canada:  $P_D$
  4. Relative price:  $\varepsilon = e \cdot P_D / P_F$ .

## Real exchange rate

- ♦ When  $\varepsilon$  increases, country loses competitiveness:

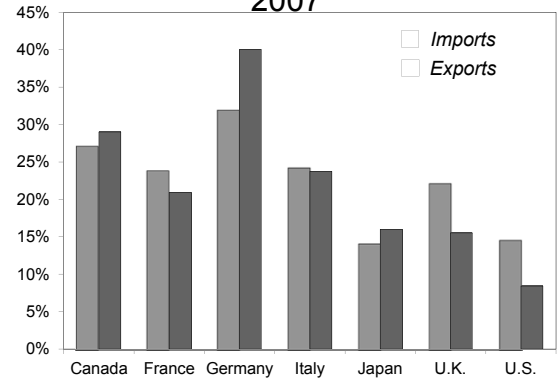
$$\Delta\varepsilon/\varepsilon = \Delta e/e + \pi_D - \pi_F.$$

### Small Open Economy in the long-run

- ◆ Assumes full employment.
- ◆ Small = no impact on global prices: takes prices as given (exogenous) = interest rate equals global interest rate
- ◆ Open = imports and exports and international borrowing and lending are free: no impediments from Gov. (No movement of labour: immigration is not free).

$$Y = C(Y - T) + G + I(r^*) + NX(\epsilon)$$

### Imports and exports (% of GDP), 2007



### $\epsilon$ in the real world & our model

- ◆ In the real world:  
We can think of  $\epsilon$  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  $\epsilon$  is the relative price of one country's output in terms of the other country's output

### Saving and investment in a small open economy

- ◆ Open-economy version of the loanable funds model (chapter 3)
- ◆ Same elements:
  - + production function
  - + consumption function
  - + investment function
  - + exogenous policy variables

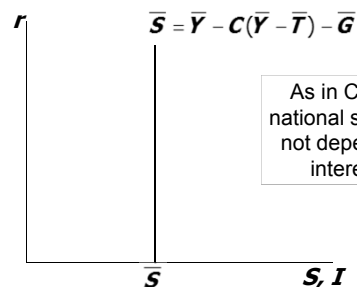
### Small Open Economy in the long-run

- ◆ On which variable does the adjustment fall?

$$[Y - C(Y - T) - G] - I(r^*) = S - I(r^*) = NX(\epsilon)$$

- ◆ Current account and capital account determined by the difference between savings and investment at the global interest rate.
- ◆  $NX =$  inverse function of  $\epsilon \rightarrow \epsilon$  needs to adjust -- plays the role that  $r$  plays in a closed economy.

### National saving: The supply of loanable funds



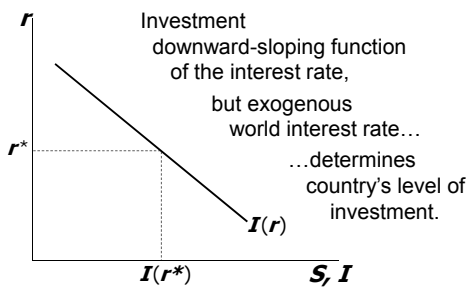
## Assumptions about capital flows

- 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:**  
cannot affect the world interest rate, denoted  $r^*$

## Assumptions about capital flows

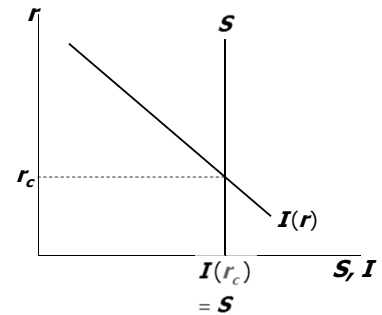
a & b imply  $r = r^*$   
c implies  $r^*$  is exogenous

### Investment: The demand for loanable funds



### If the economy were closed...

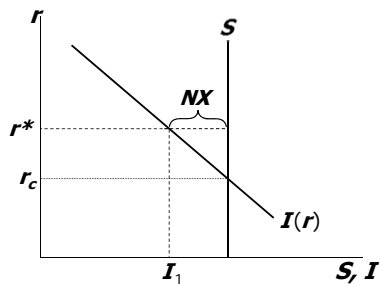
...the interest rate would adjust to equate investment and saving:



### But in a small open economy...

the exogenous world interest rate determines investment...

...and difference between saving and investment determines net capital outflow (net exports)



### What if? (comparative statics)

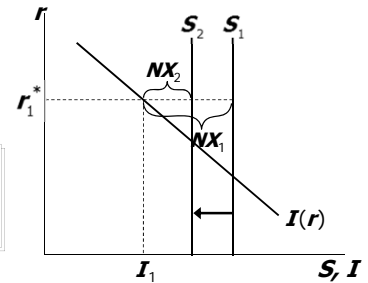
1. Fiscal policy at home
2. Increase in global interest rates
3. Increase in investment demand

## Fiscal policy

1. government spending ↑? Current account worsens: surplus ↓, or deficit ↑, or moves from surplus to deficit. (Do not mix up public deficit and external deficit).
2. Taxes ↓? Same effect. Twin deficits: public and trade deficit move together

## 1. Fiscal policy at home

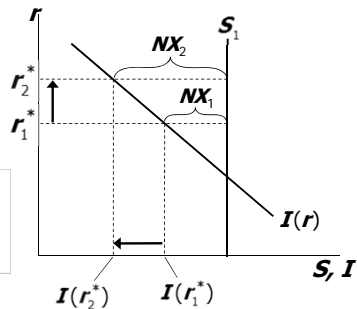
Results:  
 $\Delta I = 0$   
 $\Delta NX = \Delta S < 0$



## 2. Global interest rates

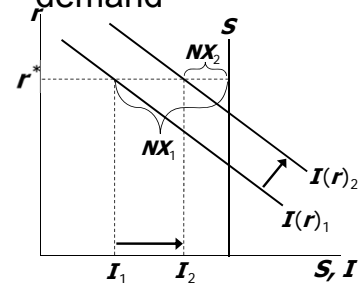
Increase in the world interest rate.

Results:  
 $\Delta I < 0$   
 $\Delta NX = -\Delta I > 0$



## 3. An increase in investment demand

$\Delta I > 0$ ,  
 $\Delta S = 0$ ,  
 net capital outflow and  $NX$  fall by the amount  $\Delta I$



## Small Open Economy in the long-run

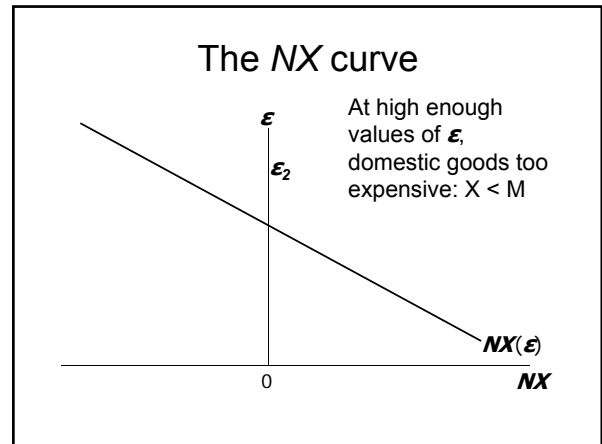
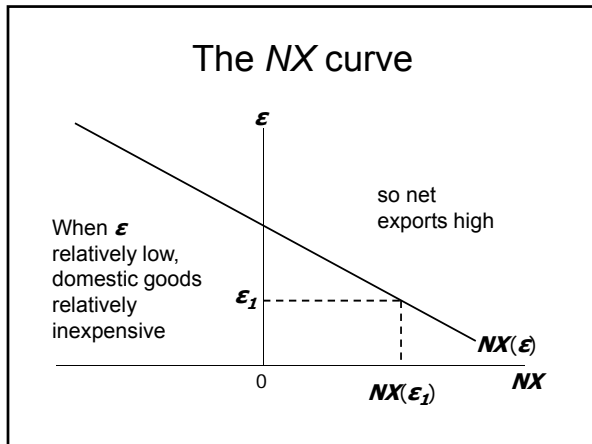
- What happens to  $\epsilon$ ?

Market for Canadian products.

- Supply:  
 $NX^S = \text{output} - \text{spending} = Y - (C + I + G)$ ;  
 (not used inside the economy): does not depend on  $\epsilon$ .

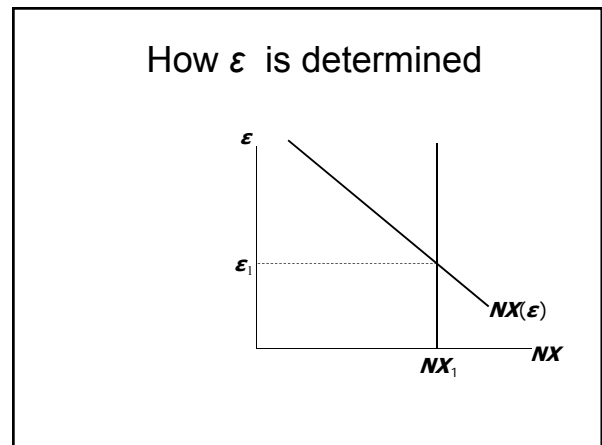
## Small Open Economy in the long-run

- Demand: inverse function of  $\epsilon$ ,  $NX^d(\epsilon)$ :  
 + if  $\epsilon \uparrow$ , Canadian goods more expensive:  $NX \downarrow$ 
  - foreign demand (exports) ↓
  - Canadians substitute domestic goods: imports ↑



### How $\epsilon$ is determined

- ◆ Since supply inelastic, supply determines quantity traded, demand determines price ( $\epsilon$ )



### Comparative statics

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

### Small Open Economy in the long-run

- ◆  $\uparrow G, \downarrow T$  or  $\uparrow I \rightarrow$  supply  $\downarrow = NX \downarrow$  and  $\epsilon \uparrow$ .
- ◆  $\uparrow r^* \rightarrow \uparrow$  supply: opposite effect.
- ◆ Changes in preferences: higher preference for Canadian goods shifts  $NX^d$  curve outwards: quantity exchanged,  $NX$ , does not change but  $\epsilon \uparrow$ .
- ◆ Protectionist policies (tariffs) have the same effects.