

Chapter 5: open economy

- accounting identities for the open economy
- small open economy model
 - what makes it "small"
 - how the trade balance and exchange rate are determined and affected by policy
- In an open economy, spending \neq output

CHAPTER 5 The Open Economy

slide 0

GDP = expenditure on domestically produced g & s

Domestic economy : $Y = C + I + G$

Open economy: $Y = C^D + I^D + G^D + EX$

$IM = C^F + I^F + G^F$

$EX - IM = NX = \text{net exports ("trade balance")}$

$C = C^D + C^F$ $I = I^D + I^F$ $G = G^D + G^F$

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

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slide 1

The income identity in an open economy and International capital flows

Goods markets

$Y = C + I + G + NX$

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

Financial markets

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

net outflow of goods = net purchases of foreign assets

$S > I$ international lender, $S < I$ international borrower

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slide 2

Saving and Investment in a Small Open Economy

- Open-economy version loanable funds model.
- Key elements:
 - production function: $Y = \bar{Y} = F(\bar{K}, \bar{L})$
 - consumption function: $C = C(Y - T)$
 - investment function: $I = I(r)$
 - exogenous policy variables: $G = \bar{G}, T = \bar{T}$

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slide 3

Assumptions about capital flows

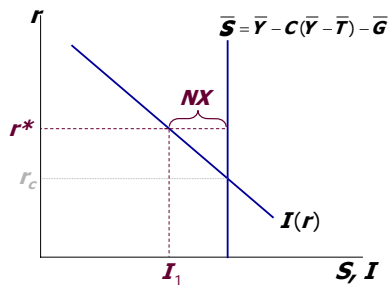
- a. domestic & foreign bonds are perfect substitutes (same risk, maturity, etc.)
- b. perfect capital mobility:**
no restrictions on international trade in assets
- c. economy is **small**:
cannot affect the world interest rate, denoted r^*

A and $B \rightarrow r = r^*$
 $C \rightarrow r^*$ exogenous

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slide 4

Investment and saving



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slide 5

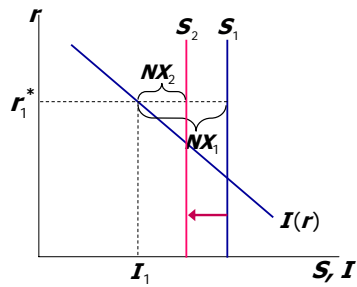
Experiment 1: Fiscal policy at home

An increase in G reduces saving.

Results:

$$\Delta I = 0$$

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



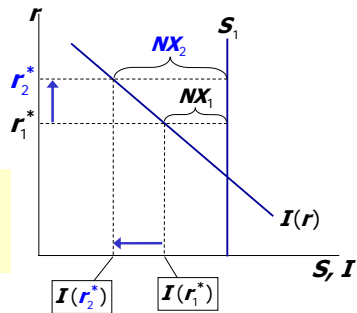
2. Fiscal policy abroad

Expansionary fiscal policy abroad raises the world interest rate.

Results:

$$\Delta I < 0$$

$$\Delta NX = -\Delta I > 0$$



The nominal exchange rate

e = nominal exchange rate, the relative price of one currency in terms of the other

country	exchange rates
Euro	1.41 \$/Euro (0.70 Euro/\$)
Japan	115 Yen/\$

Beware of the conventions!

Euro: we normally quote dollar vs euro

Yen: we normally quote yen vs dollar

The real exchange rate

ϵ = real exchange rate,
relative price of domestic goods in terms of foreign goods

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

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slide 9

~ example 1 ~

- one good: Big Mac
- price in Japan:
 $P^* = 280$ Yen
- price in USA:
 $P = \$3.22$
- nominal exchange rate
 $e = 115$ Yen/\$

$$\epsilon = 115 \times 3.22 / 280 = 1.32$$

This example:

$$\epsilon > 1$$

Goods in US are "more expensive" than in the Japan

Dollar is overvalued wrt yen

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slide 10

~ example 2 ~

- one good: Ipod Nano 8GB
- price in Italy/Euro Area:
 $P^* = 200$ euros
- price in USA:
 $P = 210$ dollars
- nominal exchange rate
 $e = 0.70$ Euro/\$

$$\epsilon = 0.70 \times 210 / 200 = 0.73$$

This example:

$$\epsilon < 1$$

Goods in US are "less expensive" than in the Euro area

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slide 11

How NX depends on ϵ

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

$\Rightarrow \downarrow EX, \uparrow IM$

$\Rightarrow \downarrow NX$

- The **net exports function** :

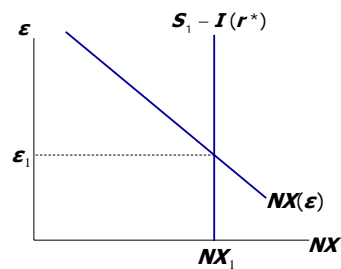
$$NX = NX(\epsilon)$$

How ϵ is determined

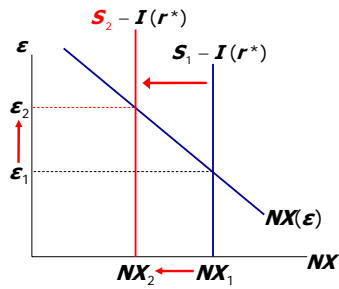
- $NX = S - I$
 - S depends on domestic factors (output, fiscal policy variables, etc)
 - I is determined by the world interest rate r^*
- ϵ must adjust to ensure

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

How ϵ is determined



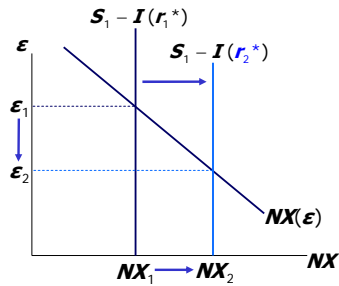
Exp 1. Fiscal policy at home



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slide 15

Exp 2. Fiscal policy abroad



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slide 16

From real to nominal variables: Nominal Exchange Rate determination

- Real exchange rate: $\varepsilon = e P / P^*$
- Solve for nominal exchange rate:

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

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

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

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

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slide 17

Inflation and nominal exchange rates



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slide 18

Purchasing Power Parity (PPP)

goods must sell at the same (currency adjusted) price in all countries.

▪ PPP: $e \times P = P^*$

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

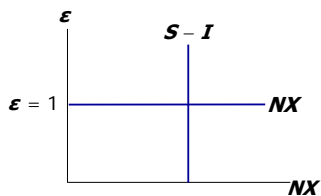
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slide 19

Purchasing Power Parity (PPP)

▪ If $e = P^*/P$,
then

and the NX curve is horizontal:



Under PPP, changes in $(S - I)$ have no impact on ε or e .

CHAPTER 5 The Open Economy

slide 20

Does PPP hold in the real world?

No, for two reasons:

1. International arbitrage not possible.
 - nontraded goods
 - transportation costs

2. Goods of different countries not perfect substitutes.

CASE STUDY The Reagan Deficits revisited

	1970s	1980s	actual change	closed economy	small open economy
<i>G - T</i>	2.2	3.9	↑	↑	↑
<i>S</i>	19.6	17.4	↓	↓	↓
<i>r</i>	1.1	6.3	↑	↑	no change
<i>I</i>	19.9	19.4	↓	↓	no change
<i>NX</i>	-0.3	-2.0	↓	no change	↓
<i>£</i>	115.1	129.4	↑	no change	↑

Data: decade averages; all except *r* and *£* are expressed as a percent of GDP; *£* is a trade-weighted index.

US: large open economy

A FISCAL EXPANSION causes national saving to fall. The effects of this depend on the degree of openness:

	<i>closed economy</i>	<i>large open economy</i>	<i>small open economy</i>
<i>r</i>	rises	rises, but not as much as in closed economy	no change
<i>I</i>	falls	falls, but not as much as in closed economy	no change
<i>NX</i>	no change	falls, but not as much as in small open economy	falls
