(Exchange Rates)



► Real exchange rate:

$$\epsilon = \frac{P}{P^*/E} = \frac{EP}{P^*} = \frac{\text{Price domestic goods}}{\text{Price foreign goods}}$$

► Real exchange rate:

$$\epsilon = \frac{P}{P^*/E} = \frac{EP}{P^*} = \frac{\text{Price domestic goods}}{\text{Price foreign goods}}$$

Uncovered interest rate parity:

$$\underbrace{\left(1+i_{t}\right)}_{\text{return on domestic bonds}} = \underbrace{\left(1+i_{t}^{*}\right) \cdot \frac{E_{t}}{E_{t+1}^{e}}}_{\text{return on foreign bonds}}$$

► Real exchange rate:

$$\epsilon = \frac{P}{P^*/E} = \frac{EP}{P^*} = \frac{\text{Price domestic goods}}{\text{Price foreign goods}}$$

► Uncovered interest rate parity:

$$\underbrace{\left(1+i_{t}\right)}_{\text{return on domestic bonds}} = \underbrace{\left(1+i_{t}^{*}\right)\cdot\frac{E_{t}}{E_{t+1}^{e}}}_{\text{return on foreign bonds}} \qquad \qquad i_{t}\approx i_{t}^{*} - \underbrace{\frac{E_{t+1}^{e}-E_{t}}{E_{t}}}_{\text{expected domestic currency appreciation}}$$

Exchange Rates

► Real exchange rate:

$$\epsilon = \frac{P}{P^*/E} = \frac{EP}{P^*} = \frac{\text{Price domestic goods}}{\text{Price foreign goods}}$$

► Uncovered interest rate parity:

$$\underbrace{\left(1+i_{t}\right)}_{\text{return on domestic bonds}} = \underbrace{\left(1+i_{t}^{*}\right)\cdot\frac{E_{t}}{E_{t+1}^{e}}}_{\text{return on foreign bonds}} \qquad \qquad i_{t}\approx i_{t}^{*} - \underbrace{\frac{E_{t+1}^{e}-E_{t}}{E_{t}}}_{\text{expected domestic currency appreciation}}$$

▶ Demand for goods in an open economy:

$$Z \equiv C + I + G + X - IM/\epsilon$$

Lecture Recap (Marshall-Lerner Condition)

► Marshall-Lerner condition:

$$NX(\epsilon) \equiv X(Y^*, \epsilon) - IM(Y, \epsilon)/\epsilon$$
 $NX \downarrow \text{ as } \epsilon \uparrow$

Marshall-Lerner Condition

► Marshall-Lerner condition:

$$NX(\epsilon) \equiv X(Y^*, \epsilon) - IM(Y, \epsilon)/\epsilon$$
 $NX \downarrow \text{ as } \epsilon \uparrow$

▶ As $\epsilon \uparrow$, $X(Y^*, \epsilon) \downarrow$ and $IM(Y, \epsilon) \uparrow$ (substitution effect).

Marshall-Lerner Condition

► Marshall-Lerner condition:

$$NX(\epsilon) \equiv X(Y^*, \epsilon) - IM(Y, \epsilon)/\epsilon$$
 $NX \downarrow \text{ as } \epsilon \uparrow$

- ▶ As $\epsilon \uparrow$, $X(Y^*, \epsilon) \downarrow$ and $IM(Y, \epsilon) \uparrow$ (substitution effect).
- ▶ As $\epsilon \uparrow$, denominator $IM(Y, \epsilon)/\epsilon \uparrow$ (valuation effect).

► Marshall-Lerner condition:

$$NX(\epsilon) \equiv X(Y^*, \epsilon) - IM(Y, \epsilon)/\epsilon$$
 $NX \downarrow \text{ as } \epsilon \uparrow$

- ▶ As $\epsilon \uparrow$, $X(Y^*, \epsilon) \downarrow$ and $IM(Y, \epsilon) \uparrow$ (substitution effect).
- ▶ As $\epsilon \uparrow$, denominator $IM(Y, \epsilon)/\epsilon \uparrow$ (valuation effect).
- ▶ Net exports (NX) satisfy the Marshall-Lerner condition if $NX(\epsilon)$ is decreasing in ϵ .

▶ Marshall-Lerner condition:

$$NX(\epsilon) \equiv X(Y^*, \epsilon) - IM(Y, \epsilon)/\epsilon$$
 $NX \downarrow \text{ as } \epsilon \uparrow$

- ▶ As $\epsilon \uparrow$, $X(Y^*, \epsilon) \downarrow$ and $IM(Y, \epsilon) \uparrow$ (substitution effect).
- ▶ As $\epsilon \uparrow$, denominator $IM(Y, \epsilon)/\epsilon \uparrow$ (valuation effect).
- ▶ Net exports (NX) satisfy the Marshall-Lerner condition if $NX(\epsilon)$ is decreasing in ϵ .
- ▶ This condition implies that the substitution effect dominates the valuation effect.

(Mundell-Fleming Model)

Mundell-Fleming Model

▶ Under zero inflation and equal domestic and foreign price levels $P = P^* \leftrightarrow E = \epsilon$,

$$Y = C(Y, T) + I(Y, i) + G + NX(Y, Y^*, E)$$

Mundell-Fleming Model

▶ Under zero inflation and equal domestic and foreign price levels $P = P^* \leftrightarrow E = \epsilon$.

$$Y = C(Y, T) + I(Y, i) + G + NX(Y, Y^*, E)$$

▶ If future exchange rate is \bar{E}^e , then

$$i=rac{\left(1+i^*
ight)}{ar{\mathcal{E}}^e}E-1 \hspace{1cm} E=rac{1+i}{1+i^*}ar{\mathcal{E}}^e$$

Mundell-Fleming Model

▶ Under zero inflation and equal domestic and foreign price levels $P = P^* \leftrightarrow E = \epsilon$,

$$Y = C(Y, T) + I(Y, i) + G + NX(Y, Y^*, E)$$

▶ If future exchange rate is \bar{E}^e , then

$$i=rac{\left(1+i^*
ight)}{ar{\mathcal{F}}^e}E-1 \hspace{1cm} E=rac{1+i}{1+i^*}ar{\mathcal{E}}^e$$

► Open-economy IS curve:

$$Y = C(Y,T) + I(Y,i) + G + NX\left(Y,Y^*, \frac{1+i}{1+i^*}\bar{E}^e\right)$$

lacktriangle Under zero inflation and equal domestic and foreign price levels $P=P^*\leftrightarrow E=\epsilon,$

$$Y = C(Y, T) + I(Y, i) + G + NX(Y, Y^*, E)$$

▶ If future exchange rate is \bar{E}^e , then

$$i = \frac{(1+i^*)}{\bar{E}^e}E - 1$$
 $E = \frac{1+i}{1+i^*}\bar{E}^e$

► Open-economy IS curve:

$$Y = C(Y, T) + I(Y, i) + G + NX \left(Y, Y^*, \frac{1+i}{1+i^*}\bar{E}^e\right)$$

▶ LM curve: $i = \overline{i}$ (real money supply adjust to clear money market M/P = YL(i)).