

The foreign exchange market

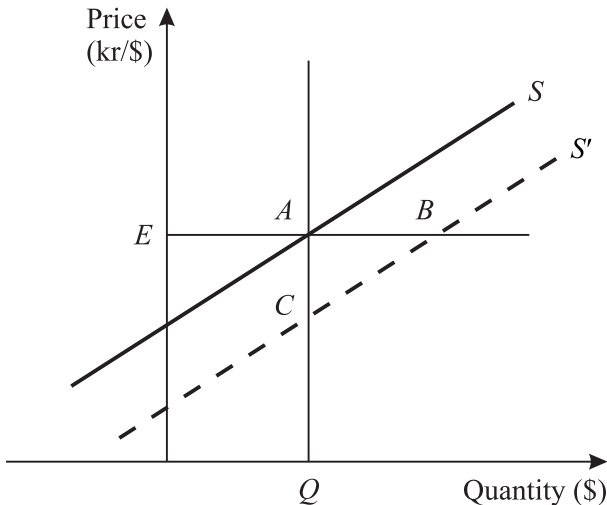
ECON4330 Lecture 4A

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6th February 2008

Equilibrium with fixed and floating exchange rates



Stock approach versus flow approach

Financial balance sheet

Assets	Govern.	Private	Foreign	Total
Kroner	B_g	B_p	B_*	0
Dollars	F_g	F_p	F_*	0
Total	$B_g + EF_g$	$B_p + EF_p$	$B_* + EF_*$	0

B_i = Net kroner assets of sector i

F_i = Net dollar assets of sector i

F_g = Foreign exchange reserves - Government foreign currency debt

$$B_i + EF_i = B_{i0} + EF_{i0}$$

Reallocation of a given portfolio within a short period

Factors determining portfolio choice

Rates of return:

i on domestic currency

$i_* + e$ on foreign currency:

$e = \dot{E}/E$ rate of depreciation, uncertain

Exchange rate expectations e_e (may differ between individuals)

Exchange rate risk and risk aversion

Capital controls, transaction costs

Liquidity needs

a) Perfect capital mobility

Investors care only about expected return

Risk neutrality, or no exchange rate risk

All have the same expected rate of depreciation, e_e

Only equilibrium:

$$i = i + e_e$$

Uncovered interest parity UIP

Investors are indifferent between B and F when UIP holds

b) Portfolio choice with imperfect capital mobility

Define the risk premium on kroner: $r = i - i_* - e_e$

$$\begin{aligned}W_p &= \frac{B_{p0} + EF_{p0}}{P} = \frac{B_p + EF_p}{P} \\ \frac{EF_p}{P} &= f(r, W_p) \\ \frac{B_p}{P} &= W_p - f(r, W_p)\end{aligned}$$

$f_r < 0$ Higher risk premium on the domestic currency \implies Portfolio shift from foreign to domestic currency

$0 < f_W < 1$ An increase in wealth will be invested in both currencies.
Diversification

Portfolio choice of the foreign sector

$$W_* = \frac{B_{*0}/E + F_{*0}}{P_*} = \frac{B_*/E + F_*}{P_*}$$

$$\frac{B_*}{EP_*} = b(r, W_*)$$

$$\frac{F_*}{P_*} = W_* - b(r, W_*)$$

$$b_r > 0, 0 < b_W < 1$$

The supply of foreign currency

$$F_g = -F_p - F_*$$

$$F_g = -\frac{P}{E}f(r, W_p) - P_*[W_* - b(r, W_*)]$$

$$\begin{aligned} F^S(E, i - i_*) &= -\frac{P}{E}f(i - i_* - e_e(E), \frac{B_{p0} + EF_{p0}}{P}) \\ &\quad - P_*[\frac{B_{*0}/E + F_{*0}}{P_*} - b(i - i_* - e_e(E), \frac{B_{*0}/E + F_{*0}}{P_*})] \end{aligned}$$

E has 1) A *portfolio composition effect* and 2) An *expectations effect*
Equilibrium condition determines F_g under fixed rates, E under floating.

1) The portfolio composition effect

$$E \uparrow \implies \frac{EF_{p0}}{P} \uparrow \quad \text{Wealth goes up}$$

Investors want to keep only a fraction f_W of the capital gain in foreign currency.

The remainder $1 - f_W$ is invested in domestic currency.

Investors sell an amount of foreign currency equal to $1 - f_W$ times the capital gain.

Supply of foreign currency to CB goes up.

Assumptions made:

$F_{p0} > 0$ There is a capital gain.

$f_W < 1$ Not all capital gains are invested in foreign currency.

Rebalancing of the portfolio

2.The expectations effect

Assume regressive expectations $e'_e < 0$

Example:

$$e_e = \alpha \frac{E_e - E}{E} \quad \alpha > 0$$

E_e expected future exchange rate, constant

α speed of convergence

$$E \uparrow \implies e_e \downarrow \implies r \uparrow$$

Lower expected return on foreign currency

Sell foreign currency, buy domestic currency ($f_r < 0$)

Supply of foreign currency to CB goes up

The slope of the supply curve

$$\frac{\partial F^S}{\partial E} = \frac{P}{E^2} \gamma - \frac{P}{E} \kappa e'_e$$

where

$$\gamma = (1 - f_W) \frac{EF_{p0}}{P} + (1 - b_W) \frac{B_{*0}}{P}$$

and

$$\kappa = -f_r + \frac{EP^*}{P} b_r > 0$$

κ measures *the degree of capital mobility* between the two currencies

γ measures the product of the exposure that each country has to the other currency and the share of capital gains that they will bring home.

Sufficient conditions for a positive slope are:

$$F_{p0} > 0, \quad B_{*0} > 0, \quad f_W < 1, \quad b_W < 1, \quad e'_e < 0$$

Floating: The effect of i on E

Equilibrium condition:

$$F_g = F^S(E, i - i_*)$$

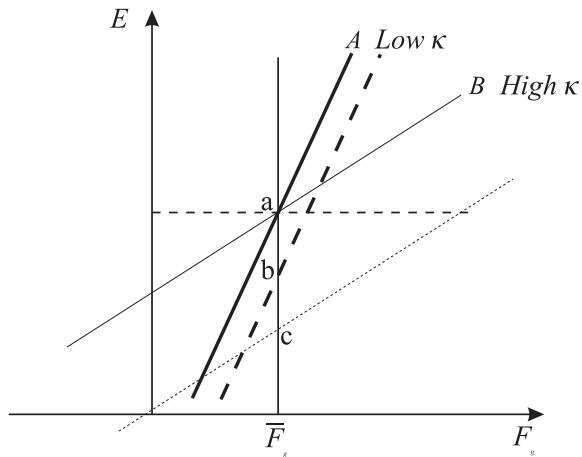
Differentiate:

$$dF_g = \frac{\partial F^S}{\partial E} dE + \frac{\partial F^S}{\partial i} di = 0$$

or

$$\frac{dE}{di} = -\frac{\frac{\partial F^S}{\partial i}}{\frac{\partial F^S}{\partial E}} = -\frac{\kappa}{\gamma/E - \kappa e'_e} < 0$$

$$\kappa \rightarrow \infty \implies \frac{dE}{di} \rightarrow \frac{1}{e'_e}$$



High capital mobility increases the effect of i on E

The effect need not be great though

$i = i_* + e_e(E)$ and $e_e(E) = \alpha \frac{E_e - E}{E}$ implies:

$$E = \frac{E_e}{\alpha + i - i_*}$$

Expectations are crucial when capital mobility is high

Floating: The effect of an intervention

$$F_g = F^S(E, i - i_*)$$

$$dF_g = \frac{\partial F^S}{\partial E} dE$$

$$\frac{dE}{dF_g} = \frac{1}{\frac{\partial F^S}{\partial E}} = \frac{1}{(P/E^2)\gamma - (P/E)\kappa e'_e} > 0$$

CB buys foreign currency, the price of foreign currency goes up



CB sells domestic currency, domestic currency depreciates

$$\kappa \rightarrow \infty \implies \frac{dE}{dF_g} \rightarrow 0$$

Signalling effects

Fixed rate: The cost of keeping $i \neq i_*$

Assume $e_e = 0$ (credible fix)

CB's balance sheet:

$$B_g + EF_g = B_{g0} + EF_{g0}$$

High capital mobility

$i \gg i_* \implies F_g$ large positive, B_g large negative.

$i \ll i_* \implies F_g$ large negative, B_g large positive.

CB borrows at high rate, lends at low rate in both cases

Large deviations from interest rate parity in both directions have a cost

Reserves may run out if i is set too low

$\kappa \rightarrow \infty$ The cost of even small deviations from $i = i_*$ becomes enormous

High confidence in a fixed rate

→ Little exchange rate risk

→ $e_e = 0$ and κ large

→ Must have $i \approx i_*$

Defence of a fixed rate against $e_e \neq 0$

Assume $e_e > 0$ Devaluation expected

$e_e \uparrow, \kappa$ large \rightarrow large loss of reserves

Loss of reserves can be prevented if r is kept constant

$$di = de_e$$

Problem: Extremely high short term rates may be required

Usual strategy:

$$i_* < i < i_* + e_e, \quad dF_g < 0, \quad dB > 0$$

CB profits if $e < i - i_*$

Speculators profit if $e > i - i_*$

Defence difficult because

- Reserves may run out.

- Defence with extremely high i is not credible. Fear of debt crisis.

- Fear of losses if CB must give in.

$e_e < 0$ Revaluation expected

- Reserves cannot run out

- Impossible to have negative i

Perfect capital mobility:

- Interventions ineffective

- Interest rate the only instrument which can keep the exchange rate fixed

Responses:

- Mutual fixing

- Currency boards

- Wide margins

The current account

$$F_g = -\frac{P}{E}f(r, W_p) - P_*[W_* - b(r, W_*)]$$

Assume P , P_* , E , i , i_* constant over time

$$\dot{F}_g = -\frac{P}{E}f_W \dot{W}_p - P_*(1 - b_W)\dot{W}_* \quad (1)$$

$$\begin{aligned} W_p + W_g + \frac{EP_*}{P}W_* &= 0 \\ \dot{W}_p &= -\dot{W}_g - \frac{EP_*}{P}\dot{W}_* \end{aligned}$$

Inserted in (1):

$$\dot{F}_g = \frac{P}{E}[1 - f_W - b_W](-\dot{W}_*) + \frac{P}{E}f_W \dot{W}_g \quad (2)$$

Condition for a current account surplus to increase reserves: