The Assets Approach to Exchange Rates Determination

Sticky price and portfolio models of exchange rate determination

Sticky price monetary model of exchange rate

- Assumptions:
  - Prices in the good market react slowly to disequilibria
  - Assets prices react quickly to disequilibria
  - PPP holds in the long run
  - UIP condition holds
  - Agents have perfect forecast (no uncertainty)
- Main features:
  - Increases in money supply cause exchange rate *overshooting*"
  - Exchange rate temporarily exceeds the new long run equilibrium
  - In the short run real money supply changes
  - Money supply movements have *real effects*

Sticky price monetary model of exchange rate

- Model equations:

LM equation	$m_t - p_t = \phi y_t - \eta i_t$
UIP condition	$i_t = i_t^* + s_{t+1} - s_t$
Aggregate demand function	$y_t^d = \mu + \delta q_t - \sigma i_t + \gamma g_t + \tau y_t^*$
Inflation equation	$\Delta p = p_{t+1} - p_t = \psi\left(y_t^d - \overline{y}\right)$
Real exchange rate	$q_t = s_t - p_t + p_t^*$

Sticky price monetary model of exchange rate

- Model equations:

LM equation $$m_t - p_t = \phi y_t - \eta i_t$$

UIP condition $$i_t = i_t^* + s_{t+1} - s_t$$

Aggregate demand function $$y_t^d = \mu + \delta q_t - \sigma i_t + \gamma g_t + \tau y_t^*$$

Inflation equation $$\Delta p = p_{t+1} - p_t = \psi\left(y_t^d - \bar{y}\right)$$

Real exchange rate $$q_t = s_t - p_t + p_t^*$$

Sticky price monetary model of exchange rate

- According to the model:
  - Because of sticky prices, an increase in domestic money supply reduces interest rate
  - UIP requires that agents expect an appreciation of exchange rate
  - Appreciation expectations may arise *only if initially the exchange rate depreciates in excess over the new long run equilibrium level*
  - The initial excess depreciation is known as exchange rate *overshooting*

Sticky price monetary model of exchange rate

- Model solution:
  - Long run stationary equilibrium implies

$$\Delta p = \Delta s = 0 \quad \text{and} \quad i = i^*$$

therefore, using the long run values of the variables, the first three equation of the model may be written as follows:

$$\bar{m} - \bar{p} = \phi\bar{y} - \eta i^*$$

$$\bar{y} = \mu + \delta\bar{q} - \sigma i^* + \gamma\bar{g} + \tau\bar{y}^*$$

$$\bar{q} = \bar{s} - \bar{p} + \bar{p}^*$$

Sticky price monetary model of exchange rate

- Subtracting the long run equations from the corresponding short run equation we may write the model in deviation form as it follows:

$$i_t - i^* = \frac{i}{\eta}\left(p_t - \overline{p}\right)$$

$$q - \overline{q} = \left(s - \overline{s}\right) - \left(p - \overline{p}\right)$$

$$y_t^d - \overline{y} = -\sigma\left(i_t - i^*\right) + \delta\left(s_t - \overline{s}\right) - \delta\left(p_t - \overline{p}\right)$$

Recall that the following variables are constant: m, y^*, y, p^*

Sticky price monetary model of exchange rate

- From $i_t = i_t^* + s_{t+1} - s_t$ $\quad i_t - i^* = \frac{i}{\eta}(p_t - \bar{p})$

We get $\Delta s = s_{t+i} - s_t = \frac{1}{\eta}(p_t - \bar{p})$

From $\Delta p = p_{t+1} - p_t = \psi\left(y_t^d - \bar{y}\right)$ $\quad i_t - i^* = \frac{i}{\eta}(p_t - \bar{p})$

$$y_t^d - \bar{y} = -\sigma\left(i_t - i^*\right) + \delta\left(s_t - \bar{s}\right) - \delta\left(p_t - \bar{p}\right)$$

We get

$$\Delta p = -\psi\left(\frac{\sigma}{\eta} + \delta\right)(p_t - \bar{p}) + \psi\delta\left(s_t - \bar{s}\right)$$

Sticky price monetary model of exchange rate

- We are now able to analyze the exchange rate dynamics with the help of the following differential equations:

$$\Delta s = s_{t+i} - s_t = \frac{1}{\eta}\left(p_t - \overline{p}\right)$$

$$\Delta p = -\psi\left(\frac{\sigma}{\eta} + \delta\right)\left(p_t - \overline{p}\right) + \psi\delta\left(s_t - \overline{s}\right)$$

Sticky price monetary model of exchange rate

- Phase diagram
  - In steady state: $\Delta s = 0, \Delta p = 0$

$$\Delta s = 0 = \frac{1}{\eta}\left(p_t - \overline{p}\right) \rightarrow p_t = \overline{p}$$

(a flat line)

$$\Delta p = 0 = -\psi\left(\frac{\sigma}{\eta} + \delta\right)\left(p_t - \overline{p}\right) + \psi\delta\left(s_t - \overline{s}\right)$$

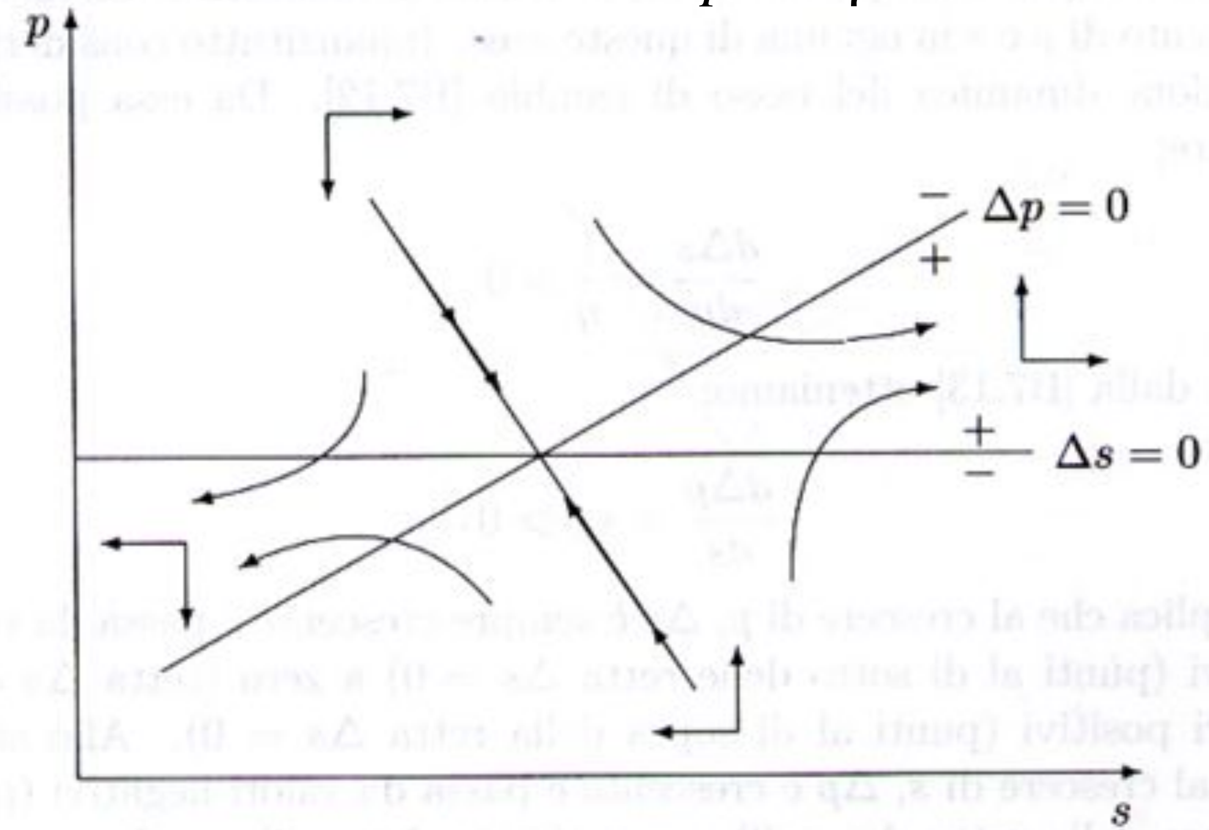
$$p = \frac{\eta\delta}{\sigma + \delta\eta} s + \overline{p} - \frac{\eta\delta}{\sigma + \delta\eta}\overline{s} \quad \left(\frac{dp}{ds} = \frac{\eta\delta}{\sigma + \delta\eta} > 0, < 1\right)$$

(a line increasing in *s*)

Sticky price monetary model of exchange rate

FIGURA 7.6
Dinamica del modello di Dornbusch

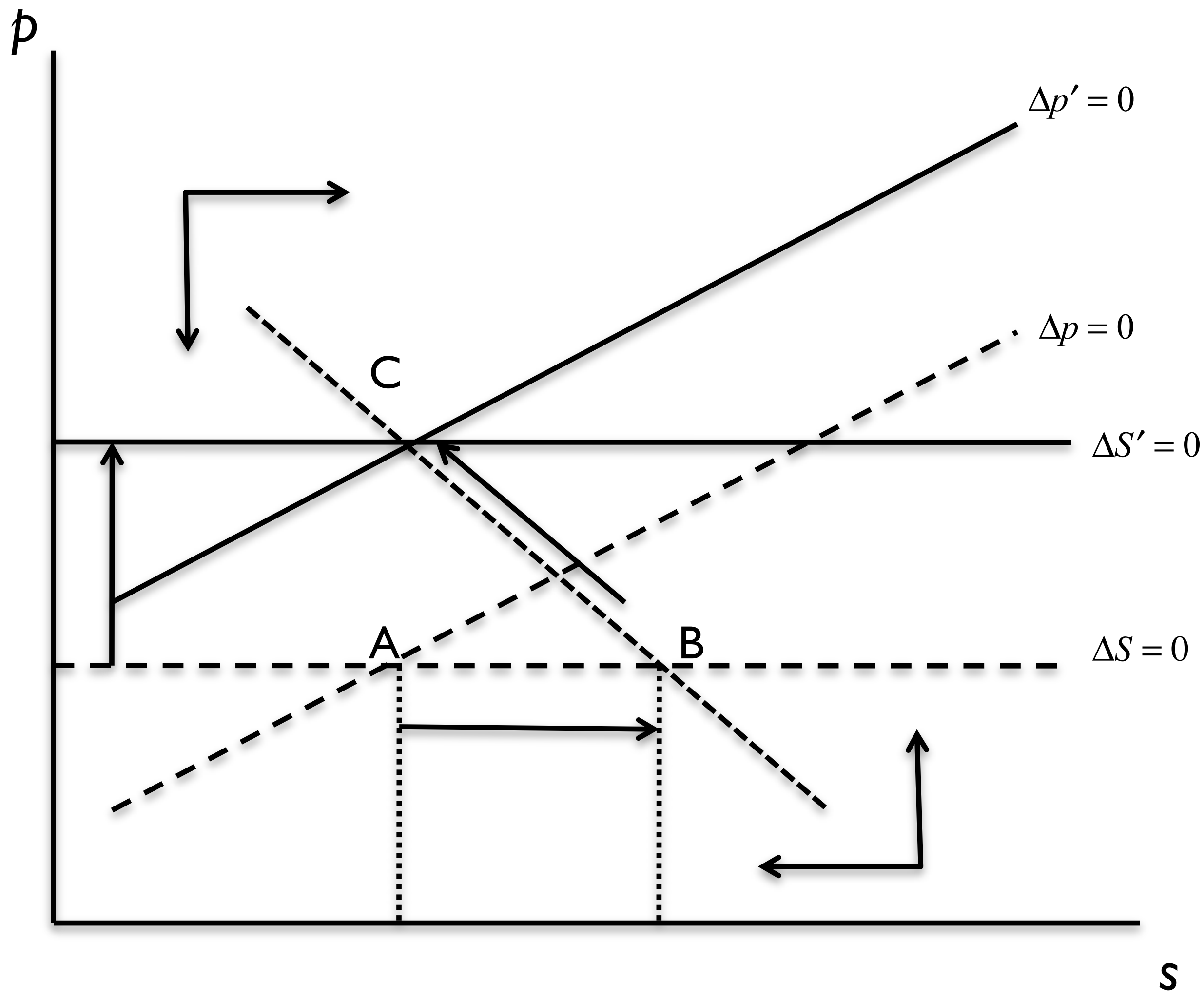
$$\frac{d\Delta s}{dp} = \frac{1}{\eta} > 0 \qquad \frac{d\Delta p}{ds} = \psi\delta$$



Sticky price monetary model of exchange rate

- If domestic money supply increases, because of sticky prices equilibrium is restored thanks to
  - A jump of the exchange rate that instantly depreciates
  - A subsequent slow increase in price level followed by a gradual exchange rate appreciation

Sticky price monetary model of exchange rate



Portfolio models of exchange rate determination

- Assumptions:
  - UIP does not hold
  - Agents include foreign assets B^* in their financial portfolio
  - Changes in the domestically hold stock of foreign assets depend on current account surpluses or deficits

Portfolio models of exchange rate determination

- The model:

$$i - i^* - \Delta S^e = \mu \qquad \mu = \mu\left(\frac{B}{B^*}\right)$$

•UIP does not hold, so domestic interest rate differential contains a risk premium that is an increasing function of domestic debt stock *B*

•The higher *B* the riskier domestic bonds are and a risk premium has to be offered

$$i = i^* + \Delta S^e + \mu$$

Portfolio models of exchange rate determination

- Domestic wealth is the sum of stocks of money, domestic and foreign bonds

$$W = M + B + B^{*}$$

Demand for bonds is a function of wealth, interest rates and expected exchange rate depreciation

$$B = B\left(i, i^{*}, \Delta S^{e}\right)W$$

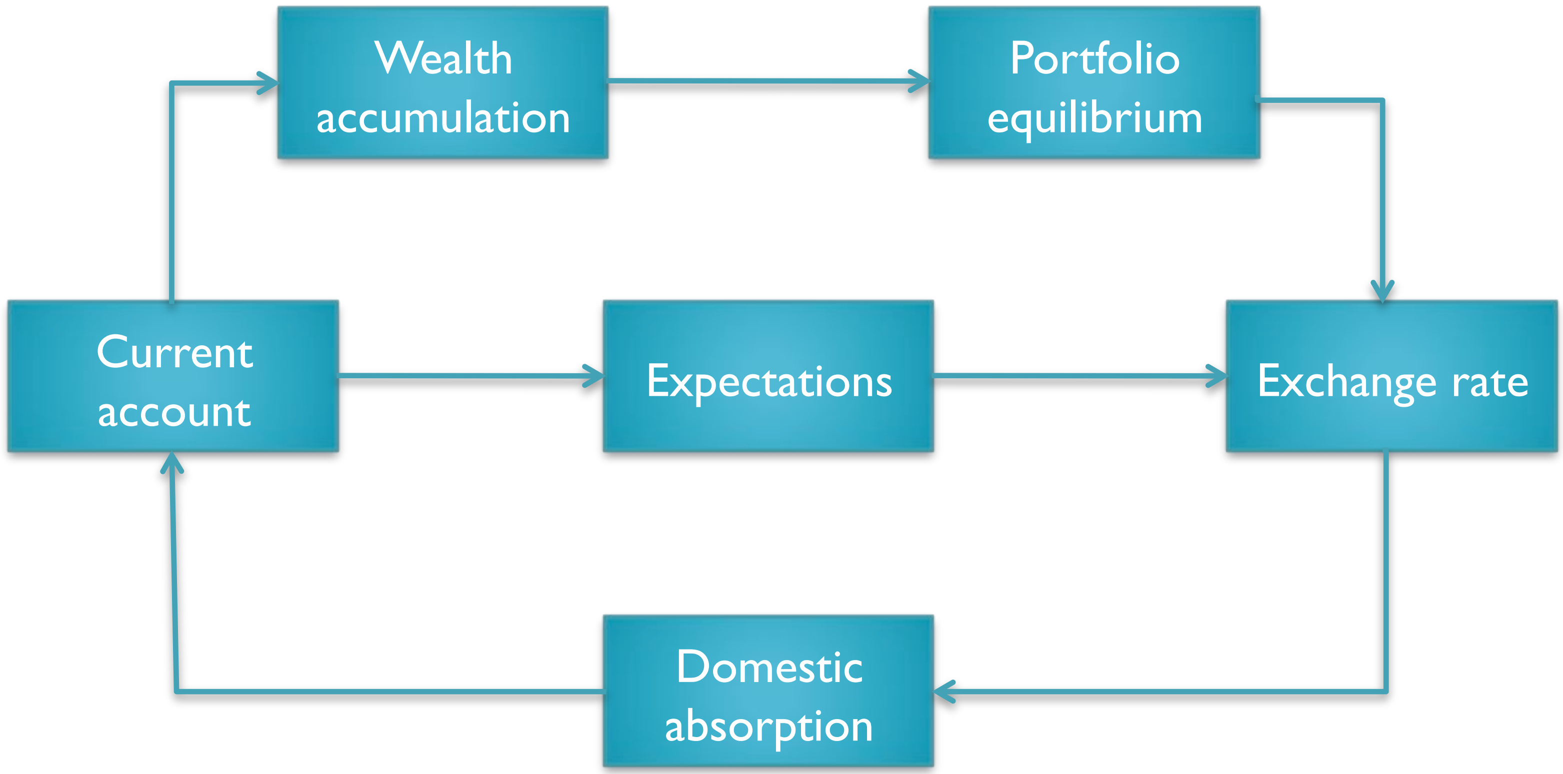
$$SB^{*} = B^{*}\left(i, i^{*}, \Delta S^{e}\right)W$$

Portfolio models of exchange rate determination

- Current account surplus or deficit determines foreign bond accumulation or decumulation
  - A surplus increases domestic claims on foreign assets
  - A deficit increases home foreign liabilities

$$\Delta B^{*} = TB(Q) + i^{*} B^{*}$$

Portfolio models of exchange rate determination



Portfolio models of exchange rate determination

$$i - i^* - \Delta S^e = \mu \qquad \mu = \mu\left(\frac{B}{B^*}\right) \qquad W = M + B + B^*$$

$$B = B\left(i, i^*, \Delta S^e\right)W \qquad SB^* = B^*\left(i, i^*, \Delta S^e\right)W \qquad \Delta B^* = TB(Q) + i^* B^*$$