International Economics

Unit 6

Monetary Approaches to Exchange Rate Determination

We are going to study three models:

- Flexible prices
- Sticky prices (Dornbusch model)
- Frankel model

Preliminary questions:

- The price of an asset depends on its expected return
- UIP condition
- Expectation formation mechanisms

The price of an asset depends on its expected return

Two assets (bonds), A y B; Pa = 100, E(Pa) = 120. Pb = 200, E(Pb) = 240. So both assets have an expected return of 20%:

Let's consider know that E(Pa) = 132, so its expected return is 32%:

Consequently, people are going to invest in asset A, so there will be an increase in its demand and, therefore, an increase in its current price. Conclusion: there is a direct relationship between the price of an asset and its expected return (expected price)

The UIP condition

r: $\quad (1+r)€$

r^*: $\quad 1€ \rightarrow (1/S)\ \$ \rightarrow (1/S)\cdot(1+r^*)\ \$ \rightarrow (1/S)\cdot(1+r^*)\cdot S^e\ €$

$$(1+r) = \frac{(1+r^*)\cdot S^e}{S} \rightarrow \text{Indifference}$$

$$(1+r) > \frac{(1+r^*)\cdot S^e}{S} \rightarrow \text{National asset}$$

$$(1+r) < \frac{(1+r^*)\cdot S^e}{S} \rightarrow \text{Foreign asset}$$

$$\frac{s^e}{s} = \frac{(1+r)}{(1+r^*)}$$

$$\frac{s^e - s}{s} = E\dot{s}$$

$$\frac{s^e}{s} = 1 + E\dot{s}$$

$$\frac{(1+r)}{(1+r^*)} = (1 + E\dot{s})$$

$$\not{1} + r = \not{1} + E\dot{s} + r^* + \cancel{r^* E\dot{s}}$$

$$E\dot{s} = r - r^*$$

$$r \simeq r^* + E\dot{s}$$

When the UIP condition holds, domestic and foreign bonds are **perfect substitutes**

Expectation formation mechanisms

a) Static expectations

$$Es_{t+1,t} = s_t$$

b) Adaptive expectations

$$Es_{t+1,t} = \alpha s_t + (1-\alpha)\cdot Es_{t,t-1} \qquad 0 \leq \alpha \leq 1$$

c) Extrapolative expectations

$$Es_{t+1,t} = s_t + m(s_t - s_{t-1})$$

d) Regressive expectations

$$Es_{t+1,t} = \alpha s_t + (1-\alpha)\cdot \overline{s} \qquad 0 \leq \alpha \leq 1$$

e) Rational expectations

$$Es_{t+1,t} = s_{t+1} + u_{t+1}$$

f) Expectations of perfect foresight

$$Es_{t+1,t} = s_{t+1}$$

The flexible-price monetary model

Aim: Explain the determination of the exchange rate.
Assumptions:

- PPP holds continuously
- UIP holds continuously
- All prices are completely flexible

Demand for money: $\frac{M^D}{P} = Y^{\eta} \exp(-\sigma r) = Y^{\eta} e^{-\sigma r}$ and taking logs:

$$m - p = \eta y - \sigma r \qquad m^* - p^* = \eta y^* - \sigma r^*$$

PPP in logs: $s = p - p^*$

UIP $E\dot{s} = r - r^*$

$$p = m - \eta y + \sigma r \qquad p^* = m^* - \eta y^* + \sigma r^*$$

$$s = (m - m^*) - \eta(y - y^*) + \sigma(r - r^*)$$

Alternative expression (Fisher equation) ➡ $s = (m - m^*) - \eta(y - y^*) + \sigma(E\dot{p} - E\dot{p}^*)$

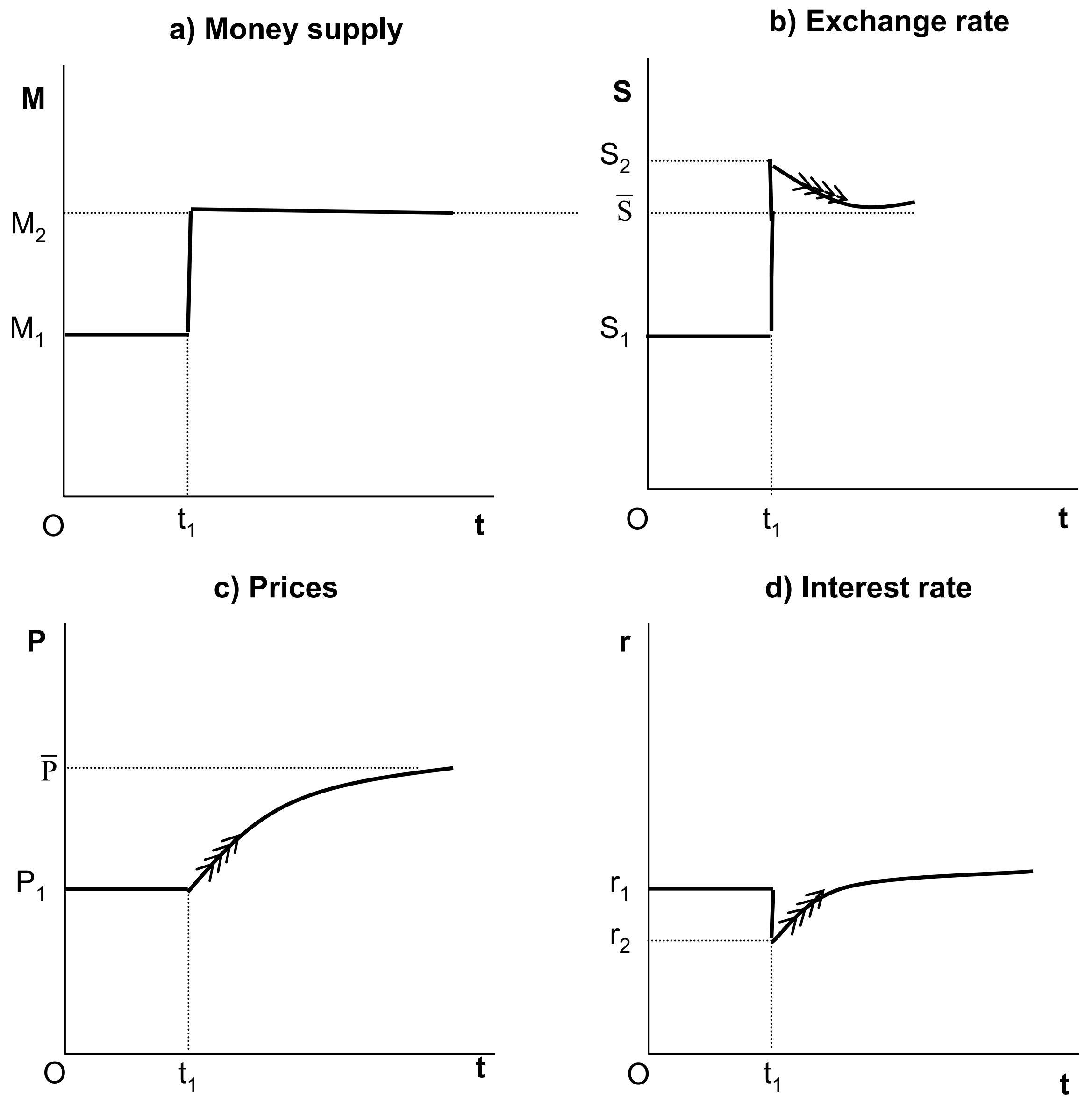
The sticky price monetary model (Dornbusch overshooting model)

Aim: Explain the determination of the exchange rate. In particular explain the large and prolonged departures of S from PPP.

Assumptions:

- PPP holds only in the long-run
- UIP holds continuously
- Goods prices and wages tend to change slowly over time (they are sticky). However, the exchange rate is completely flexible

The dynamics of Dornbusch's overshooting model



Eq. in the money market $m - p = \eta y - \sigma r$

UIP condition $E\dot{s} = r - r^*$

PPP in the long term $\bar{s} = \bar{p} - \bar{p}^*$

Regressive expectations

$$E\dot{s} = \Theta(\bar{s} - s) \text{ where } \Theta > 0$$

Goods market $\dot{p} = \pi(d - y)$

Aggregate demand $d = \beta + \alpha(s - p + p^*) + \varphi y - \lambda r$

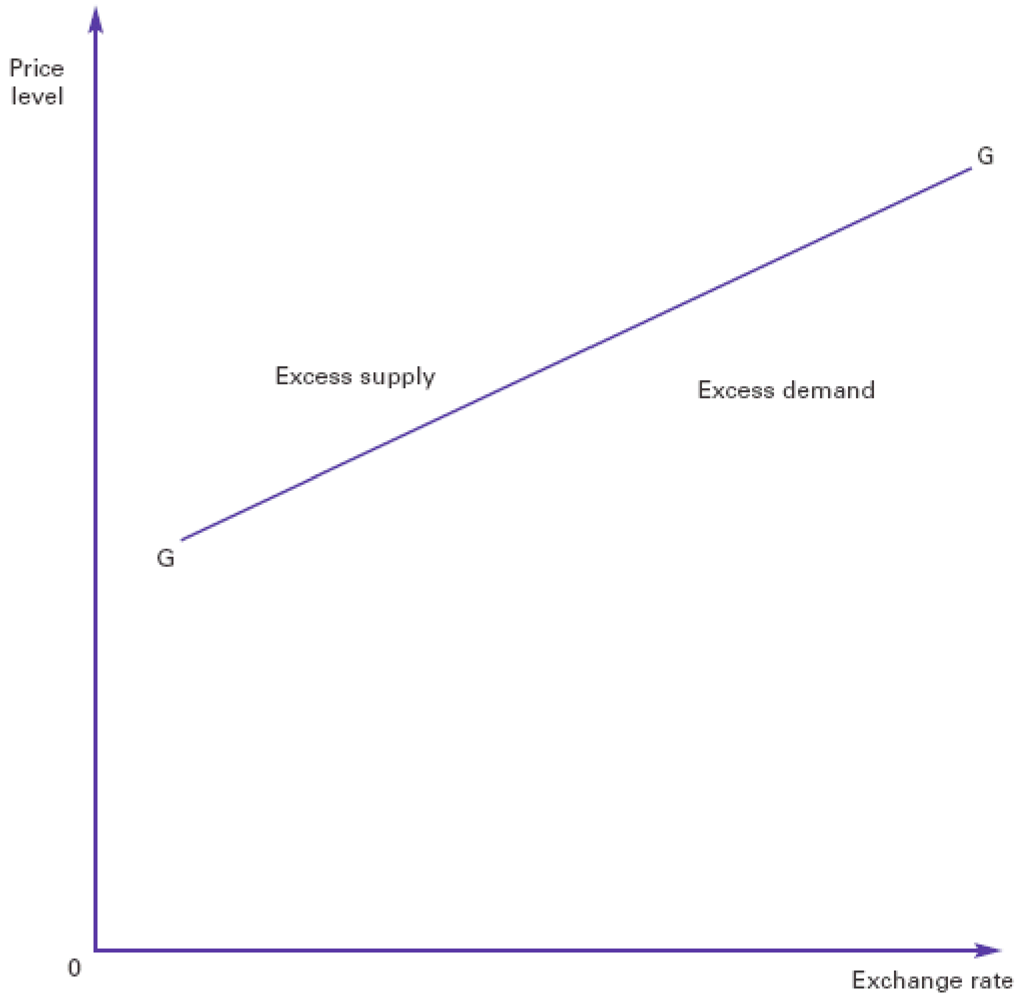
$$\dot{p} = \pi[\beta + \alpha(s - p + p^*) + (\varphi - 1)y - \lambda r]$$

Solving for r in the money market equilibrium and substituting

$$\dot{p} = \pi[\beta + \alpha(s - p + p^*) + (\varphi - 1)y - \lambda/\sigma(p - m + \eta y)]$$

$$\left.\frac{dp}{ds}\right|_{\dot{p} = 0} = \frac{\alpha}{\alpha + \lambda/\sigma}$$

The goods-market equilibrium schedule



From the money market equilibrium we have:

$$r = \frac{p - m + \eta y}{\sigma}$$

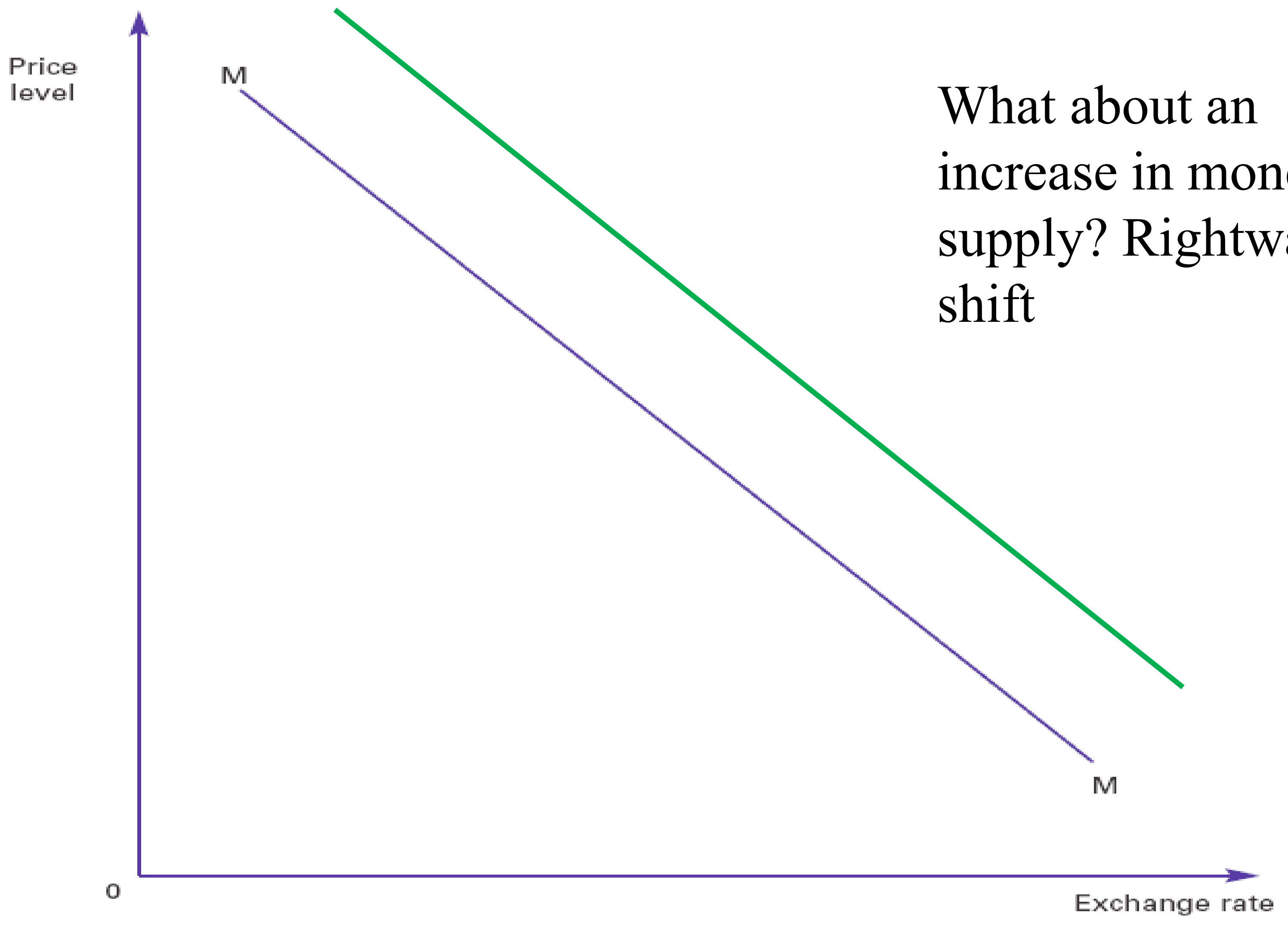
From the previous equations we have:

$$s = \bar{s} - \frac{1}{\sigma\Theta}\,[p - m + \eta y - \sigma r^*]$$

And this equation is representing equilibrium situations in the money market

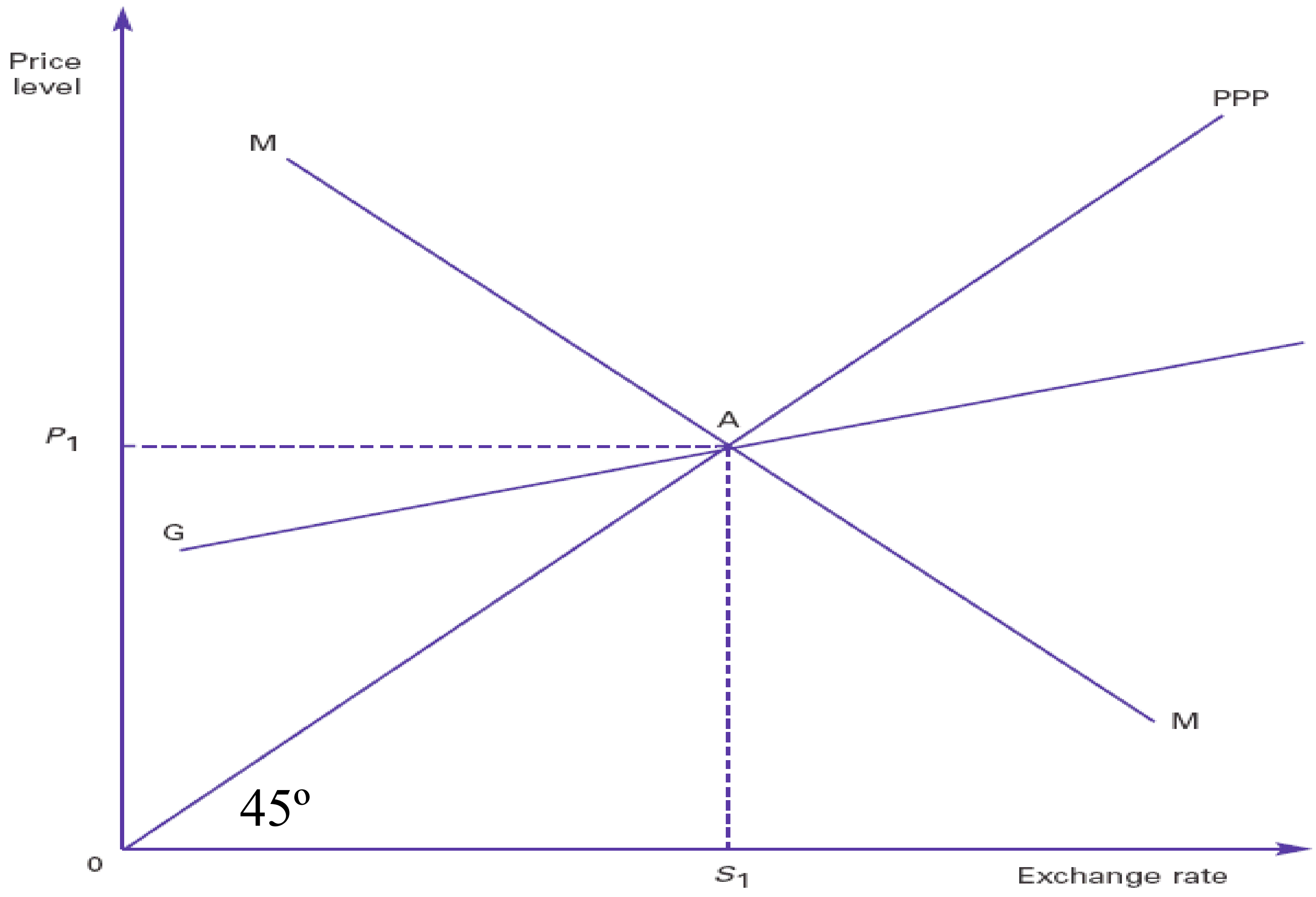
$$\frac{dp}{ds} = -\,\sigma\Theta$$

The money-market equilibrium schedule

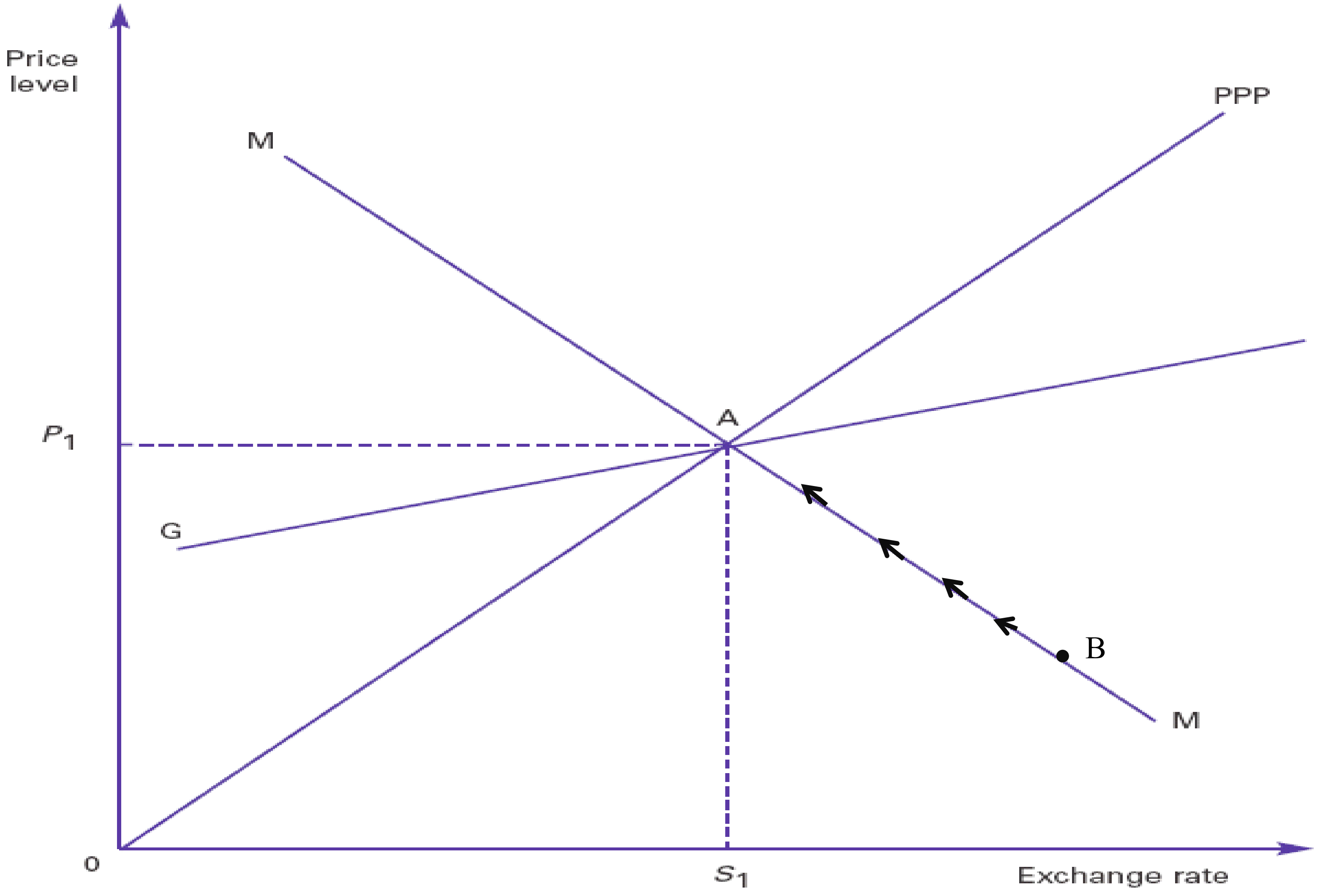


What about an increase in money supply? Rightward shift

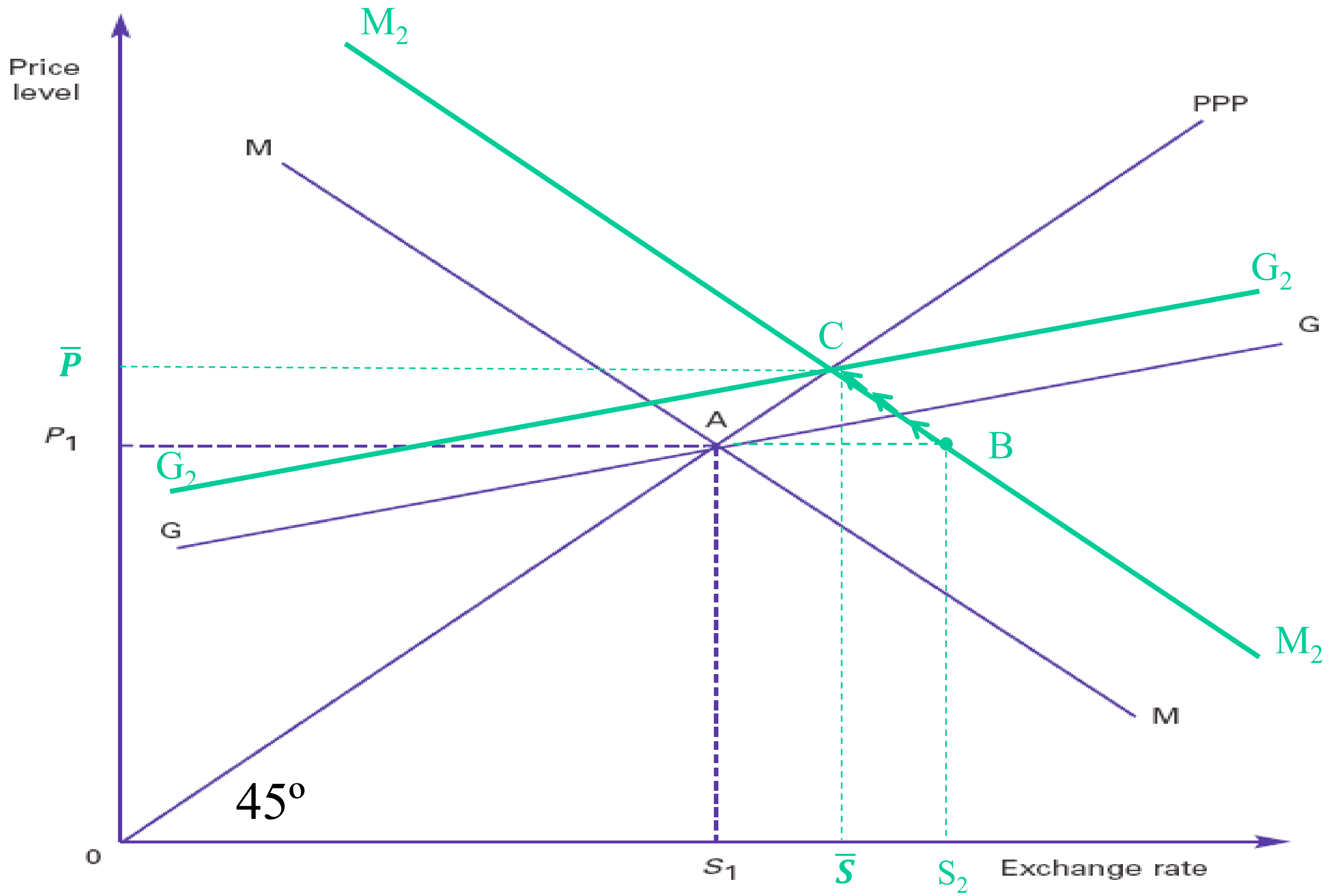
Long-term equilibrium in the Dornbusch model



If you are not in equilibrium…..



Exchange rate overshooting



The real interest rate differential (Frankel) model

Equilibrium in the money market → $m - p = \eta y - \sigma r$

$m^* - p^* = \eta y^* - \sigma r^*$

$$(m - m^*) = (p - p^*) + \eta(y - y^*) - \sigma(r - r^*)$$

UIP $E\dot{s} = r - r^*$

Expectations mechanism $\mathrm{E}\dot{s} = -\theta \cdot (s - \overline{s}) + (\mathrm{E}\dot{p} - \mathrm{E}\dot{p}^*)$

So

Short-term $\mathrm{E}\dot{s} = -\theta \cdot (s - \overline{s})$

Long-term $\mathrm{E}\dot{s} = \mathrm{E}\dot{p} - \mathrm{E}\dot{p}^*$

Substituting we obtain

$$s - \bar{s} = -\frac{1}{\theta}\cdot\left[\underbrace{\left(r - E\dot{p}\right)}_{i} - \underbrace{\left(r^{*} - E\dot{p}^{*}\right)}_{i^{*}}\right]$$

Long-term PPP $\bar{s} = \bar{p} - \bar{p}^{*}$

As in the long-term i=i*, we have

$$r - r^{*} = E\dot{p} - E\dot{p}^{*}$$

Doing some calculus we can get the equation for the long-term:

$$\bar{s} = \left(m - m^{*}\right) - \eta\left(y - y^{*}\right) + \sigma\left(E\dot{p} - E\dot{p}^{*}\right)$$

In the short-term we know

$$s = \overline{s} - \frac{1}{\theta}\left[\left(r - E\dot{p}\right) - \left(r^{*} - E\dot{p}^{*}\right)\right]$$

So we get

$$s = \left(m - m^{*}\right) - \eta\left(y - y^{*}\right) + \sigma\left(E\dot{p} - E\dot{p}^{*}\right) - \frac{1}{\theta}\left[\left(r - E\dot{p}\right) - \left(r^{*} - E\dot{p}^{*}\right)\right]$$

Conclusion: everything depends on θ

If $\theta \to \infty, \frac{1}{\theta} = 0$ ⟹ flexible-price model

If $\theta \neq \infty, \frac{1}{\theta} \neq 0$ ⟹ Dornbush model