Chapter 16 : The Long Run Price Levels + Exchange Rates

PPP : Follows from the 'law of one price'
If all goods traded + no 'transport' costs (or taxes, etc.) then their prices should be the same.

(1) Absolute : levels
(2) Relative : differences

(1) $P_A^i = P_B^i \cdot E$ Law of One price for each good i.

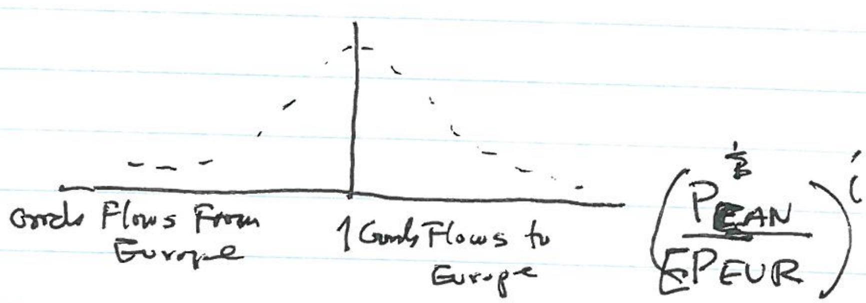
$$E_{\$/€} = \frac{P^i_{CAN}}{P^i_{EUR}}$$

* This is a little more subtle than it may appear. It is an equilibrium statement. That is, if $P^i_{EUR} \cdot E > P^i_{CAN}$, then goods flow from Europe to Canada (if they are traded.)

PPP asserts that we can use the Price Indexes of countries as if they were single commodities.

$$P_{EUR} E_{\$/€} = P_{CAN}$$

< Get a distribution of goods + flows. >



(2) Relative PPP

$$EP_{EUR} \cong P_{CAN}$$

* Aside

$$\frac{E_t - E_{t-1}}{E_{t-1}} = \Pi_C - \Pi_E \qquad \Pi = \text{rate of inflation}$$

or $\ln E + \ln P_{EUR} = \ln P_{CAN}$

$$d\ln E + d\ln P_E = d\ln P_C$$

$$\frac{E_t - E_{t-1}}{E_{t-1}} = \Pi_C - \Pi_E \quad \text{when} \quad \Pi_i \equiv \frac{P^i_{\cancel{t}} - P^i_{t-1}}{P_{t-1}}$$

for country i.

Relative PPP suggests that changes in price levels are consistent w/ changing exchange rates. Useful since Price indexes always have different baskets in different countries.

Algebraic Aside: Show that the change in $xy = z$ in percentage form is $\frac{x - x_{-1}}{x_{-1}} + \frac{y - y_{-1}}{y_{-1}} = \frac{z - z_{-1}}{z_{-1}}$

(1) $y = e^x$ (1)' $y = e^x$

(2) $dy = e^x dx$ (2)' $\ln y = x$

(3) $dy = y\,dx$ (3)' $d\ln y = dx$

(4) $\boxed{\frac{dy}{y} = dx}$ $\therefore$ from 4 $\Rightarrow$ $\frac{dy}{y} = d\ln y$

Long-Run Monetary Model + PPP

(1) $$E_{\$/€} = \frac{P_{\$}}{P_{€}}$$

$$= \frac{M_{\$}}{L(R_{\$}, Y_{\$})} \bigg/ \frac{M_{€}}{L(R_{€}, Y_{€})}$$

(2) $$= \left(\frac{M_{\$}}{M_{€}}\right) \cdot \frac{L(R_{€}, Y_{€})}{L(R_{\$}, Y_{\$})}$$

interest rate puzzle, but all else straightforward.
Need to motivate the interest rate!

(3) $$R_{\$} = R_{€} + \frac{E^e_{\$/€} - E_{\$/€}}{E_{\$/€}}$$

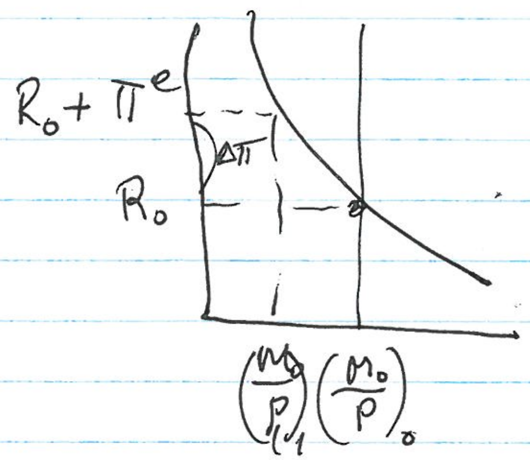
$$\pi^e \equiv \frac{P^e - P}{P}$$

(4) $$\ln E = \ln P_{\$} - \ln P_{€}$$

$$\frac{E^e - E_{-1}}{E_{-1}} = \pi^e_{\$} - \pi^e_{€}$$

(5) $$R_{\$} - R_{€} = \pi^e - \pi^e_{€}$$

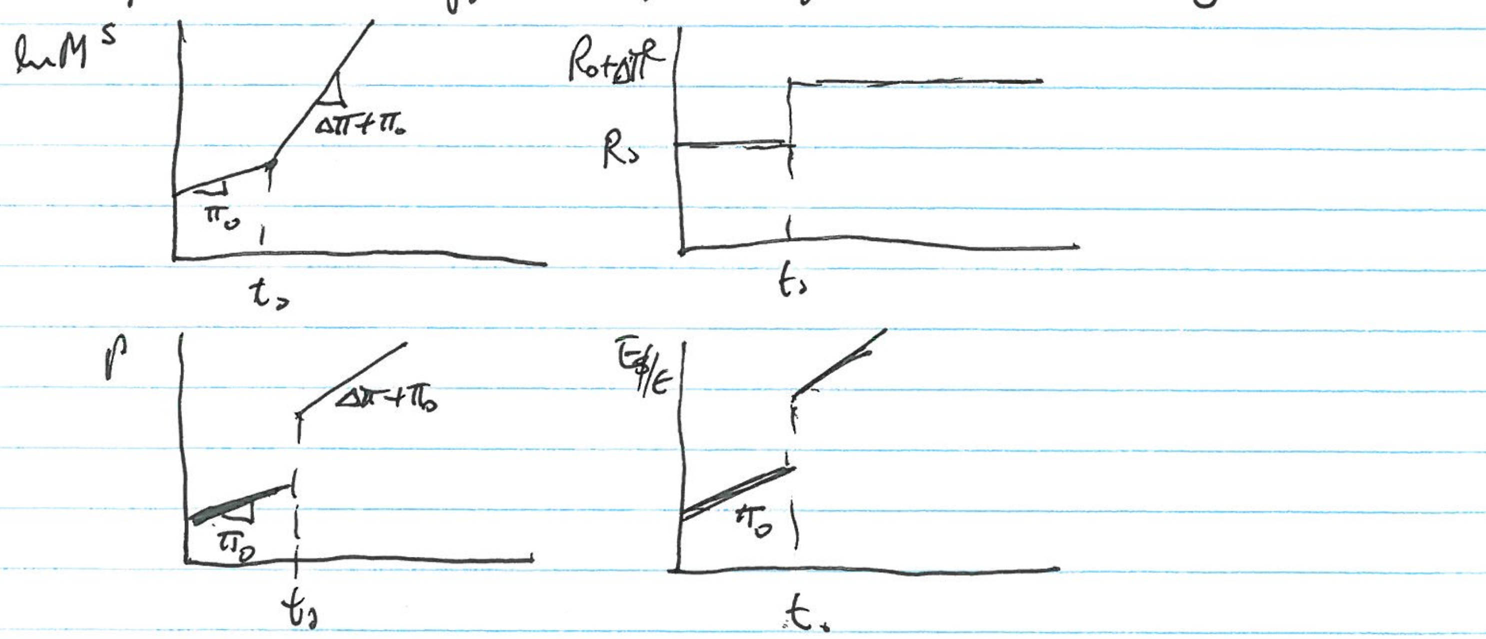
$$R_{\$} - \pi^e = R_{€} - \pi^e_{€}$$



The effect of pure expectations on the rate of interest.

~~Since~~ With the change in the rate of growth of the money supply, expectations change.

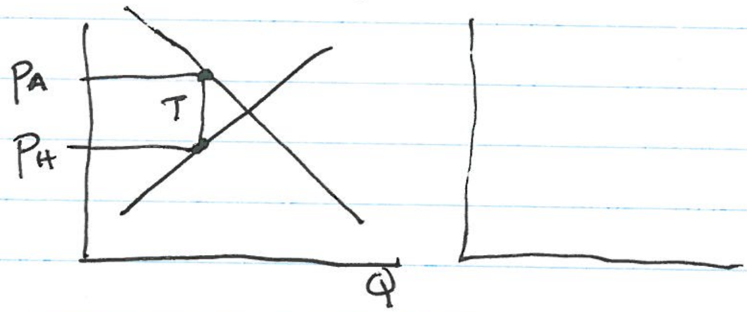
Thus, there is a long run in which the rate of inflation equals the rate of growth of the money supply, and a depreciation of the dollar, but in addition there is a jump in prices and the exchange rate as a consequence of the higher opportunity cost of holding money.



PPP & Empirical Evidence: what helps acct for dev. from PPP

Tends to be OK, but not annually - decadally?
Why?
(1) Transport costs that change systematically
(2) Market practices especially by govts. ~~Also~~ Δ tariffs, etc.
(3) Basket of goods differs among countries.

(1) Transport costs or tariffs & Δ



Extreme: non-traded result from transport costs; services

(2) Non-tradables

$$P_H = \theta_H P_T^* + (1-\theta_H) P_{NT}^H$$

$*$ = world prices

If $P_{NT}\uparrow$ reduces purchasing power of a country's currency

$$P_F = \theta_F P_T^* + (1-\theta_F) P_{NT}^F$$

So even if P_T^* is the same for both countries, still

P_H and P_F can differ both because of θ, and changes in P_{NT}

$$\hat{P}_H = \theta_H \hat{P}_T^* + (1-\theta_H) \hat{P}_{NT}^H$$

$$\hat{P}_F = \theta_F \hat{P}_T^* + (1-\theta_F) \hat{P}_{NT}^F$$

$$\hat{P}_H - \hat{P}_F = (\theta_H - \theta_F) \hat{P}_T^* + \cancel{(\theta_H - \theta_{NT})} (1-\theta_H) \hat{P}_{NT}^H - (1-\theta_F) \hat{P}_{NT}^F$$

$$\frac{P^*}{P} = \frac{\theta_H \bar{P}_T + (1-\theta_H) P_{NH}}{\theta_F \bar{P}_T + (1-\theta_F) P_{NF}}$$

θ - tends to be weighted to home products.
∴ will differ significantly

(1) if W_F low relative to W_H will have relatively less expensive non-traded services which rely on more labour. — Balassa - Samuelson

(2) $\frac{P_{NT}}{P_T} \uparrow$ as a fn of income — Lipsey - Bhagwati

So if PPP is at best a LR theory, but can we talk about what accts for deviations from the LR?

The Real Exchange Rate

$$q_{\$/€} = E \cdot \frac{P_E}{P_C}$$

characterizes the trade-off between purchasing baskets.
Conceptually $P \sim \$/\text{bkt}C$
$P_E \sim €/\text{bkt}E$

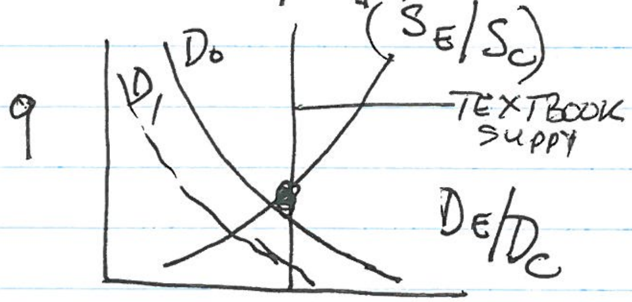
$$= \left(\frac{\$}{€}\right) \frac{€/\text{bkt}E}{\$/\text{bkt}C}$$

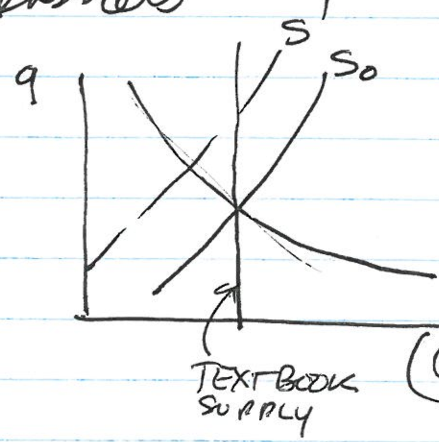
$$= \frac{\text{bkt}C}{\text{bkt}E}$$

Canadian baskets per basket of Europe

∴ if $q \uparrow \Rightarrow$ more Canadian bkts per European which is a real depreciation.

Demand + Supply for (real) baskets (Δq)





increase in demand (relative) for Canadian goods $\left(\frac{Q_E}{Q_C}\right)$

increase in relative supply of Canadian goods

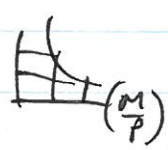
$$E_{\$/€} = q_{\$/€} \frac{P_C}{P_E}$$ permits (describes) deviations from PPP.

(1) $\frac{M_C}{M_E}\uparrow \Rightarrow E\uparrow \quad \bar{q} \quad$ as $P_C\uparrow \quad \bar{P_E}$

(2) <u>Change in $\boxed{\text{rates of growth}}^{\varphi \equiv}$ of M^S</u>

$\varphi_C\uparrow \Rightarrow \pi_C\uparrow \quad \therefore \Delta R_\$\uparrow = \Delta\pi_C\uparrow$

Further $P_C\uparrow$



which causes a jump in $E\uparrow = \bar{q}_{\$/€} \frac{P_C}{P_E}\uparrow$
<all pure monetary>

(3) <u>Δ Relative Output Demands</u>

$\left[\frac{D_C}{D_E}\right]\uparrow \rightarrow q\downarrow$ $\qquad E\downarrow \Leftarrow q\downarrow\overline{\left(\frac{P_C}{P_E}\right)}$

careful as diagram shows D_E/D_C

(4) Δ Relative Output Supply: more complex

Δ Rel Output Supplies

$Q_c \uparrow \Rightarrow q \uparrow$, but $\frac{M_c}{P_c} = L(Y_c \uparrow, R_c) \Rightarrow P_c \downarrow$

$$E_{\$/€} = q \uparrow \frac{P_c \downarrow}{P_E} \quad \therefore \text{ ambiguous}$$

- So the PPP effects flow primarily when the disturbances are monetary in nature.
- Real disturbances leave the exchange rate to find a new equilibrium.

Long-run often invoked when discussing the short run because of changes in expectations.

How Does the "Real Side" affect interest Parity?

$$R_\$ = R_€ + \pi_c - \pi_€ \quad \text{or} \quad R_\$ - R_€ = \pi_c^e - \pi_€^e$$

(1) Since $q_{\$/€}$ is deviation from relative PPP

$$q = E\frac{P_c}{P_E} \Rightarrow \frac{q^e - q}{q} = \frac{E^e - E}{E} - (\pi_c^e - \pi_E^e)$$

(2) Our interest parity is: $R_\$ = R_€ + \left(\frac{E^e - E}{E}\right)$

(3) $\therefore R_\$ - R_€ = \left(\frac{q^e - q}{q}\right) + (\pi_c^e - \pi_€^e)$

If PPP (relative) holds, then $q^e = q$ so that

$$R_{\$} - R_{€} = \pi_C - \pi_{€}$$

Nominal & Real Interest Rates

$$r^e = R - \pi^e$$

$$r^e_C - r^e_E = (R_{\$} - \pi^e_C) - (R_{€} - \pi_{€})$$

$$r^e_C - r^e_E = (R_{\$} - R_{€}) + (\pi^e_{€} - \pi^e_C)$$

$$= \left[\left(\frac{q^e - q}{q}\right) + \pi^e_C - \pi^e_{€}\right] + \pi^e_{€} - \pi^e_C$$

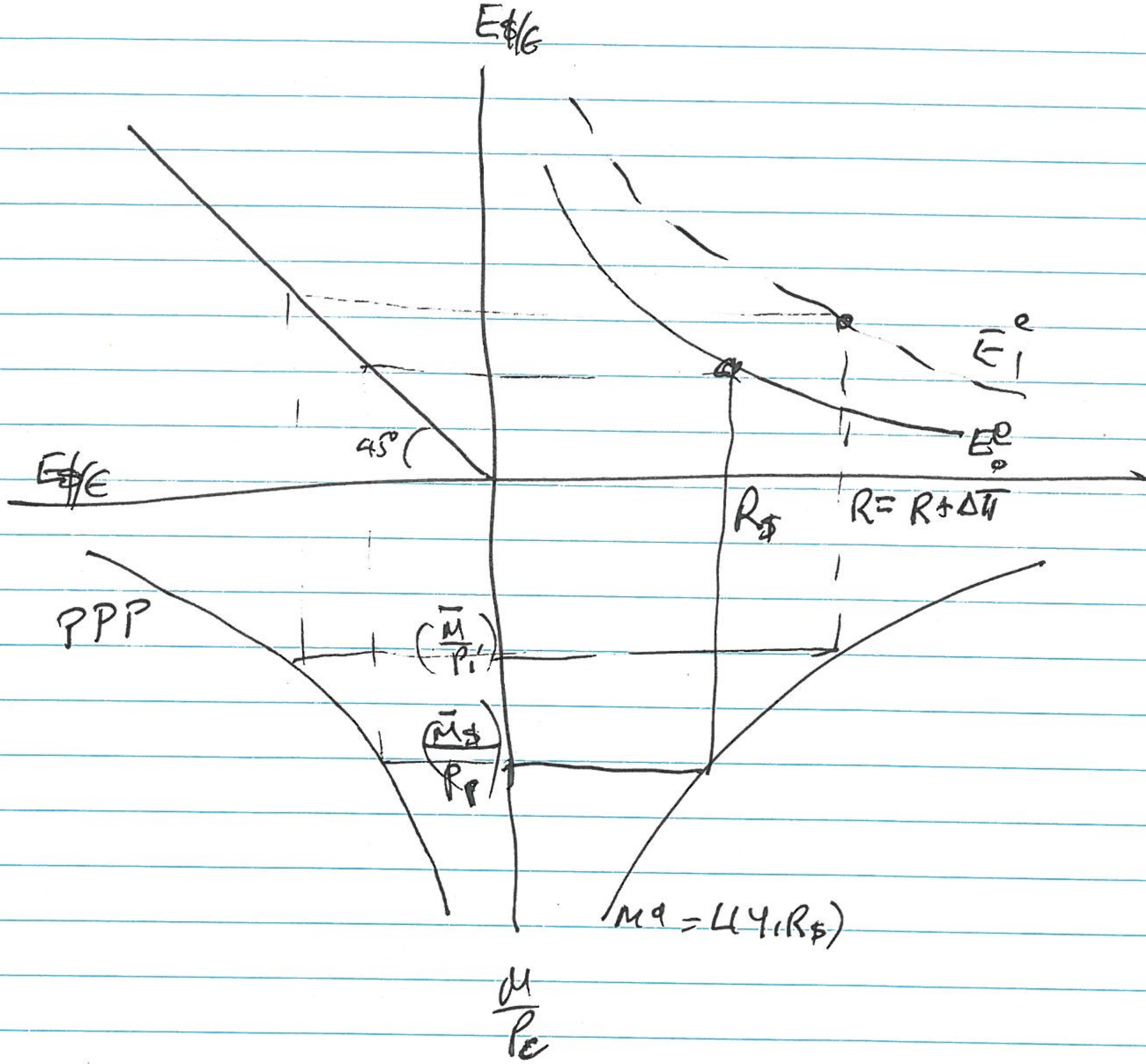
$$r^e_C - r^e_E = \left(\frac{q^e - q}{q}\right)$$

(*) If PPP holds (relative PPP), then $r_C^e = r_E^e$

a) Do we expect $r_C^e = r_E^e$, possibly but differences again would reflect flows of resources.

b) Our original Nominal Parity tells us how an investor in one place perceives returns at home & abroad.
Two different residents, each in a different country may see things differently if rel. PPP doesn't hold for their consumption <u>basket</u>.

Integrating Inflation and Exchange Rate Levels



$$E = \frac{P_C}{P_E} = \frac{M\$/P_E}{M\$/P_C}$$