ECON 1550 International Finance

Price Levels and the Exchange Rate in the Long Run

Law of One Price (LOOP)

- The LOOP holds if for every good i with dollar price P^i_{US} and euro price P^i_E, we have

$$P^i_{US} = E_{\$/€} \times P^i_E$$

- This is a theory of exchange rate determination:

$$E_{\$/€} = \frac{P^i_{US}}{P^i_E}$$

Purchasing Power Parity (PPP)

- PPP holds if

$$P_{US} = E_{\$/€} \times P_E$$

  where P_{US} is the US price level and P_E is the euro area price level

- This is also a theory of exchange rate determination:

$$E_{\$/€} = \frac{P_{US}}{P_E}$$

Relative PPP

- Relative PPP holds if

$$\frac{E_{\$/€,t} - E_{\$/€,t-1}}{E_{\$/€,t-1}} = \pi_{US,t} - \pi_{E,t}$$

  where π_t is inflation $\pi_t = P_t/P_{t-1} - 1$

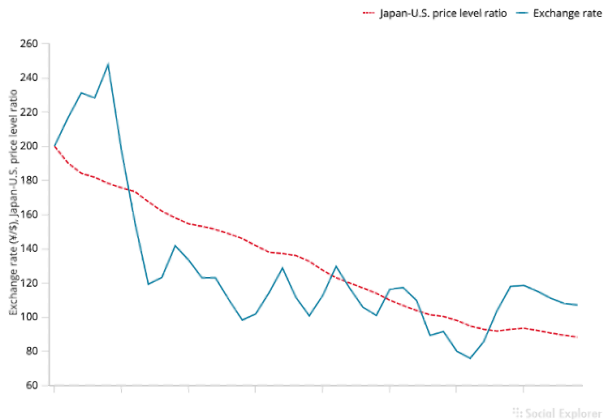
- This is also a theory of exchange rate determination

$$E_{\$/€,t} = (\pi_{US,t} - \pi_{E,t} + 1)E_{\$/€,t-1}$$

Relative PPP does not hold very well in the real world

Figure 16-2

The Yen/Dollar Exchange Rate and Relative Japan–U.S. Price Levels, 1980–2019



The graph shows that relative PPP does not track the yen/dollar exchange rate during 1980–2015.

Source: IMF, *International Financial Statistics*. Exchange rates and price levels are end-of-year data.

Problems With PPP

- Price levels of different countries report different baskets of goods
  - E.g. GDP deflator is the basket of goods in GDP for each country
- Deviations from perfectly competitive frictionless markets
  - Transport costs and trade barriers
  - Monopoly power

Expected Relative PPP

- Expected relative PPP (or relative PPP in expectations)

$$\frac{E^e_{\$/€} - E_{\$/€}}{E_{\$/€}} = \pi^e_{US} - \pi^e_E$$

  where π^e is *expected* inflation $\pi^e = P^e/P - 1$

- This is also a theory of exchange rate determination

$$E_{\$/€} = \frac{E^e_{\$/€}}{\pi^e_{US} - \pi^e_E + 1}$$

Relationships

- LOOP $\Rightarrow$ PPP $\Rightarrow$ Relative PPP $\Rightarrow$ Expected relative PPP
- Expected relative PPP + UIP $\Rightarrow$ Fisher effect

$$\frac{E^e_{\$/€} - E_{\$/€}}{E_{\$/€}} = \pi^e_{US} - \pi^e_E \quad \text{and} \quad R_\$ = R_€ + \frac{E^e_{\$/€} - E_{\$/€}}{E_{\$/€}}$$

imply

$$R_\$ - R_€ = \pi^e_{US} - \pi^e_E$$

Common variables across all models

Exogenous variables

Variable	Description
R^*	Foreign interest rate
$M^s,\ M^{s*}$	Money supply
$g_M,\ g_{M^*}$	Money supply growth rates

Endogenous variables

Variable	Description	Equation	Type of equation
P	Price level	$M^s/P = L(R, Y)$	Behavioral + eq. condition
P^*	Foreign price level	$M^{s*}/P^* = L(R^*, Y^*)$	Behavioral + eq. condition
π, π^*	Inflation	$\pi = g_M - g_L$	Definition
r^e, r^{e*}	Real interest rates	$r^e = R - \pi^e$	Definition

Model 1: PPP

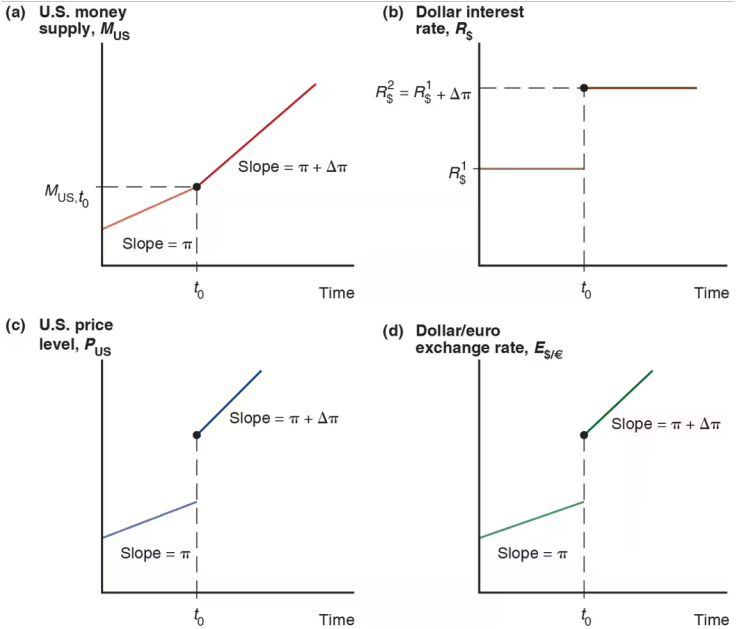
Exogenous variables

Variable	Description
R	Domestic interest rate
$Y,\ Y^*$	Real incomes

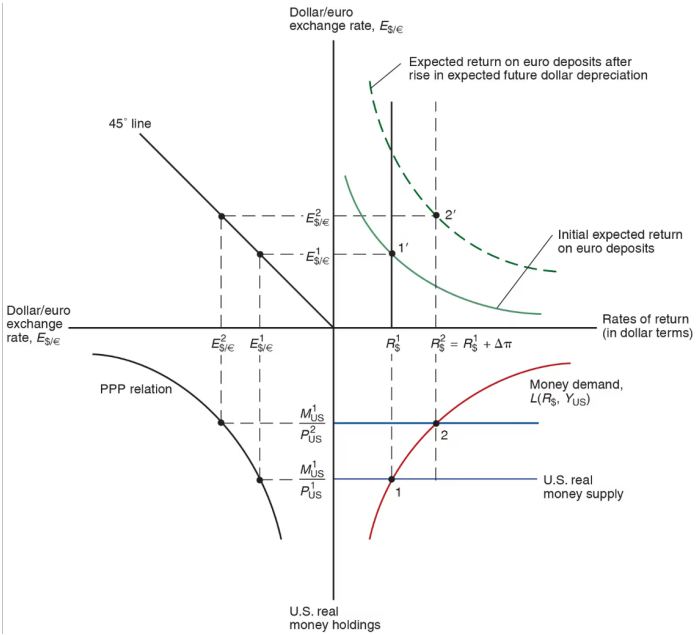
Endogenous variables

Variable	Description	Equation	Type of equation
E	Exchange rate	$E = P/P^*$	Behavioral

Changes in growth rate of money supply



Changes in growth rate of money supply



Model 2: PPP^e + UIP

Exogenous variables

Variable	Description
$Y,\ Y^*$	Real incomes

Endogenous variables

Variable	Description	Equation	Type of equation
$E^e/E-1$	Expected depreciation	$E^e/E-1=\pi^e-\pi^{e*}$	Behavioral
R	Interest rate	$R=R^*+E^e/E-1$	Eq. condition

Model 3: real E + relative output

- The real exchange rate

Model 3: real E + relative output

- Real exchange rate calculation

Model 3: real E + relative output

Exogenous variables

Variable	Description
RS	Relative output supply
q	Real exchange rate

Endogenous variables

Variable	Description	Equation	Type of equation
Y/Y^*	Relative output	$RD(q) = RS$	Eq. cond.
E	Nominal exchange rate	$E = qP/P^*$	Definition

Model 3 equilibrium