Topics for Today

1. Purchasing Power Parity
   - Absolute PPP vs. Relative PPP
2. The Monetary Model of Exchange Rates
3. Interest Rates + Exchange Rates
4. Empirical Evidence on PPP
5. Problems with PPP

Purchasing Power Parity

The basic idea behind PPP is the "law of one price", which simply states that identical goods should cost the same in all countries (when expressed in common currency units).

$$\frac{\$}{\text{Toyota}} = \frac{\$}{€} \times \frac{€}{\text{Toyota}} \quad \text{or} \quad P_{Toy.} = E \times P^*_{Toy.}$$

The underlying logic here, of course, is commodity arbitrage. Suppose,

$P_{Toy.} > E \times P^*_{Toy}$ $\Longrightarrow$ People buy Toyotas in Europe, sell them in U.S.

$\Longrightarrow$ $P_{Toy} \downarrow$, $P^*_{Toy.} \uparrow$ until equality

(supply + demand!)

PPP extends this logic to the overall cost of living.

$$\text{Cost of Living} = \sum_{i=1}^{N} \alpha_i P_i$$

α_i = expenditure weights

P_i = prices of individual goods

In practice, statistical agencies report price indices, which measure the cost of living relative to some base period.

$$P = \frac{\sum_{i=1}^{N} \alpha_{i0} P_{i1}}{\sum_{i=1}^{N} \alpha_{i0} P_{i0}}$$

} Laspeyres Index (uses base period weights)

Two Comments

1.) PPP might hold even if law of one price doesn't, e.g., if deviations are random & average out.

2.) The equilibrating mechanism here is more likely to be the exchange rate, rather than the price levels (partial vs. general equil.)

"Absolute" PPP: $E = \frac{P}{P^*} = \frac{\text{dom. curr}}{\text{basket}} \times \frac{\text{basket}}{\text{for. curr}}$

$= \frac{\text{dom. curr}}{\text{for. curr.}}$

Problems with Absolute PPP:

1.) Baskets may not be identical across countries

2.) Base periods may not be the same across countries.

We can avoid these problems by using a weaker version of PPP called "Relative PPP".

For Relative PPP, just take % changes of both sides:

$$\dot{E}/E = \dot{P}/P - \dot{P}^*/P^* = \pi - \pi^*$$

Domestic rate of currency depreciation = Domestic Inflation − Foreign Inflation

Monetary Model of Ex. Rates

(1.) From PPP

$$E = \frac{P}{P^*}$$

(2.) From money mkt. equil.,

$$P = \frac{M^s}{L(Y, R)}$$

(3.) Combining,

$$E = \frac{M}{M^*} \cdot \frac{L(Y^*, R^*)}{L(Y, R)}$$

Let's Assume the following common specification for L

$$L = Y e^{-\alpha R}$$

Then

$$E = \frac{M}{M^*} \cdot \frac{Y^*}{Y} e^{\alpha(R-R^*)}$$

Take (natural) logs of both sides,

$$\ln(E) \quad e = (m - m^*) - (y - y^*) + \alpha(R - R^*)$$

Notice: $R\uparrow \Rightarrow e\uparrow$

Before we had $R\uparrow \Rightarrow e\downarrow$

Why the difference?

Interest Rates + Exchange Rates

1.) With sticky prices we had

$R\uparrow \Longrightarrow E\downarrow$ (higher interest rate leads to appreciation)

2.) With flexible prices we have

$R\uparrow \Longrightarrow E\uparrow$ (higher interest rate leads to depreciation)

The key to reconciling these apparently contradictory predictions is the Fisher Equation.

Fisher Equation

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

- R: nominal interest rate
- r^e: expected real interest rate
- π^e: expected inflation

The correlation between E and R depends on **why** R is changing.

1.) If $r^e \uparrow$ then $E \downarrow$

2.) If $\pi^e \uparrow$ then $E \uparrow$

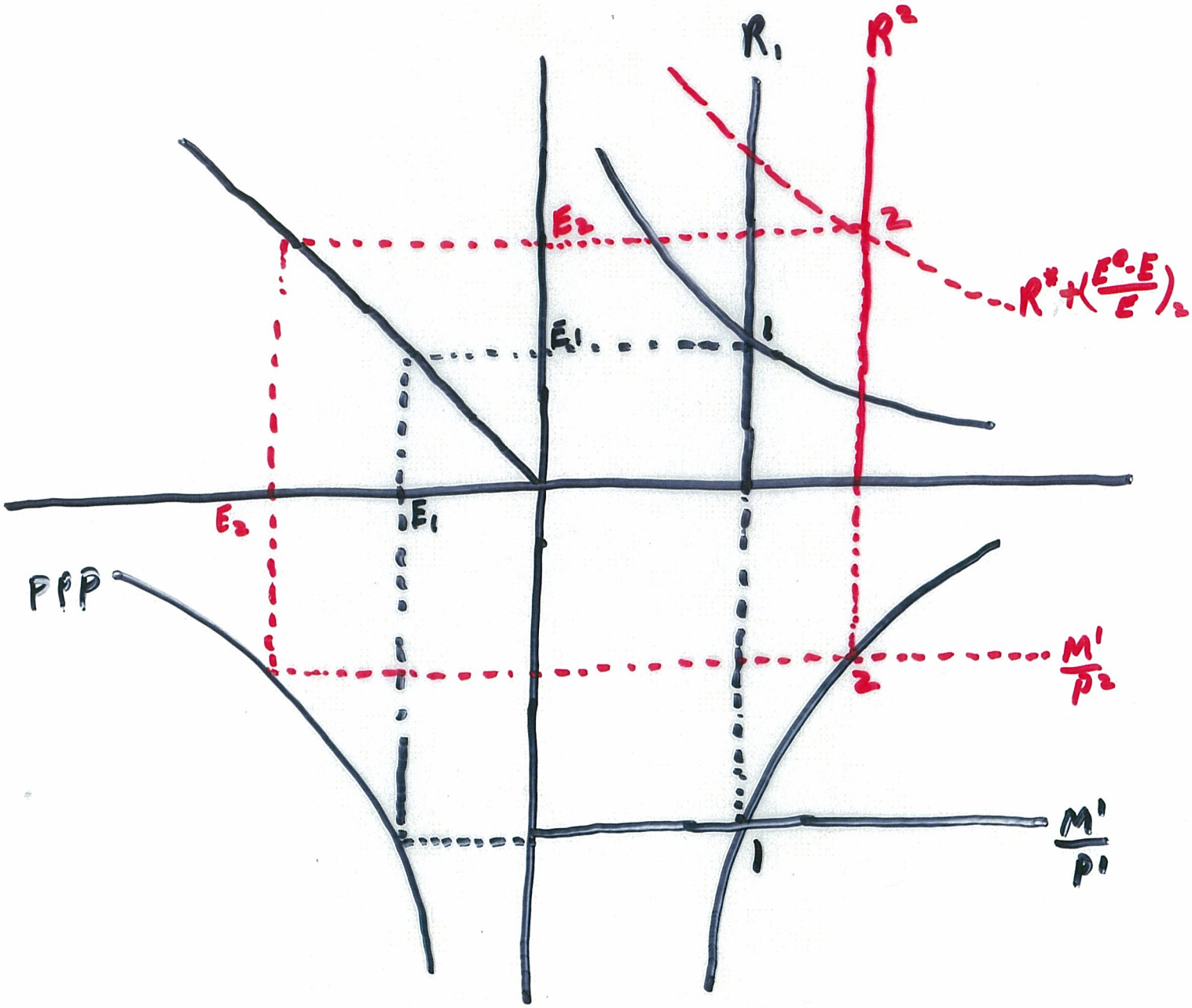
Also, with flexible prices (or in long-run) changes in M do not affect r^e.

1.) Level of M changes $\Rightarrow$ P & E adjust immediately no change in R

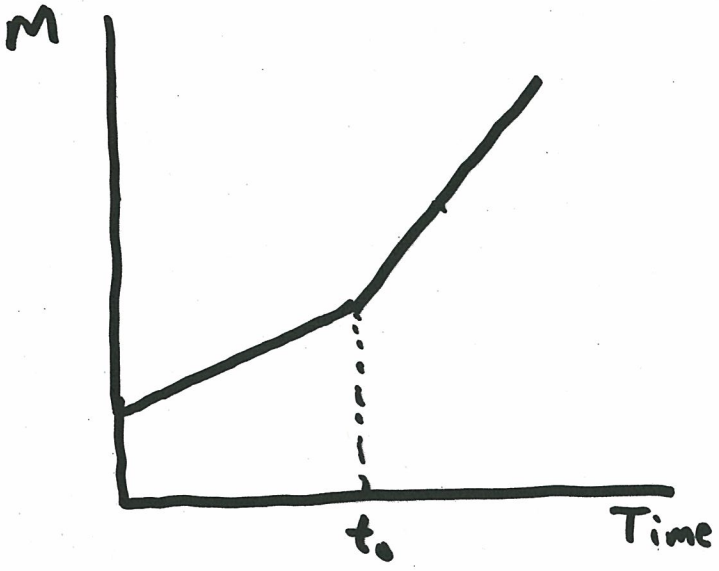
2.) Growth rate of M changes $\Rightarrow$ π^e & R change immediately.

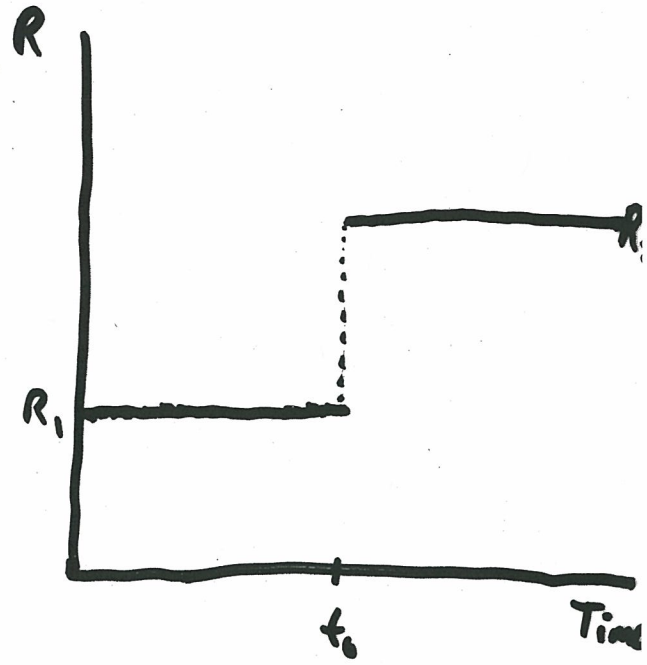
Money Growth & Ex. Rates with Flexible Prices

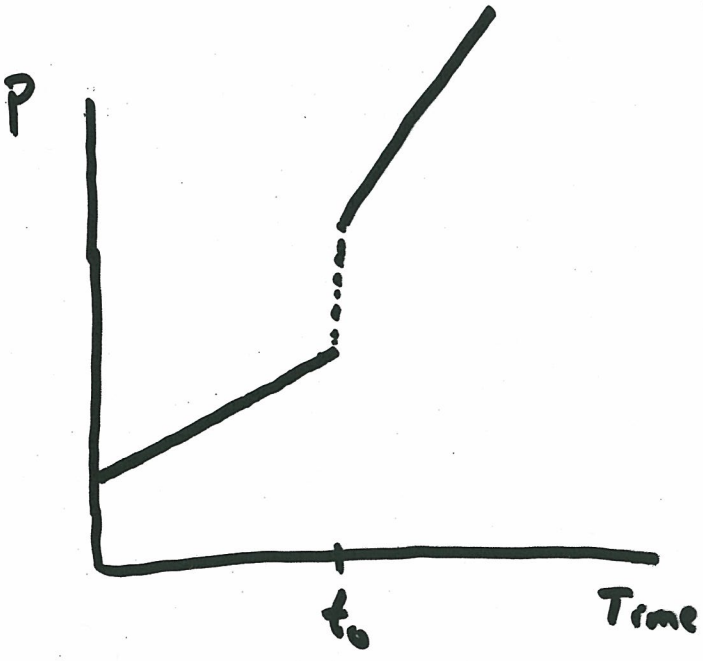
Suppose money growth rate rises by $\Delta\pi$

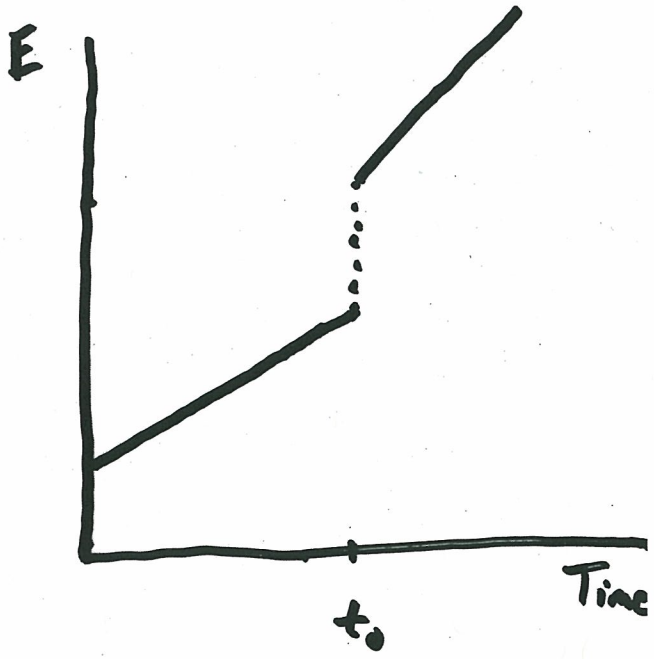


Dynamic Response to Increased Money Growth Rate









UK

Germany

Japan

Switzerland

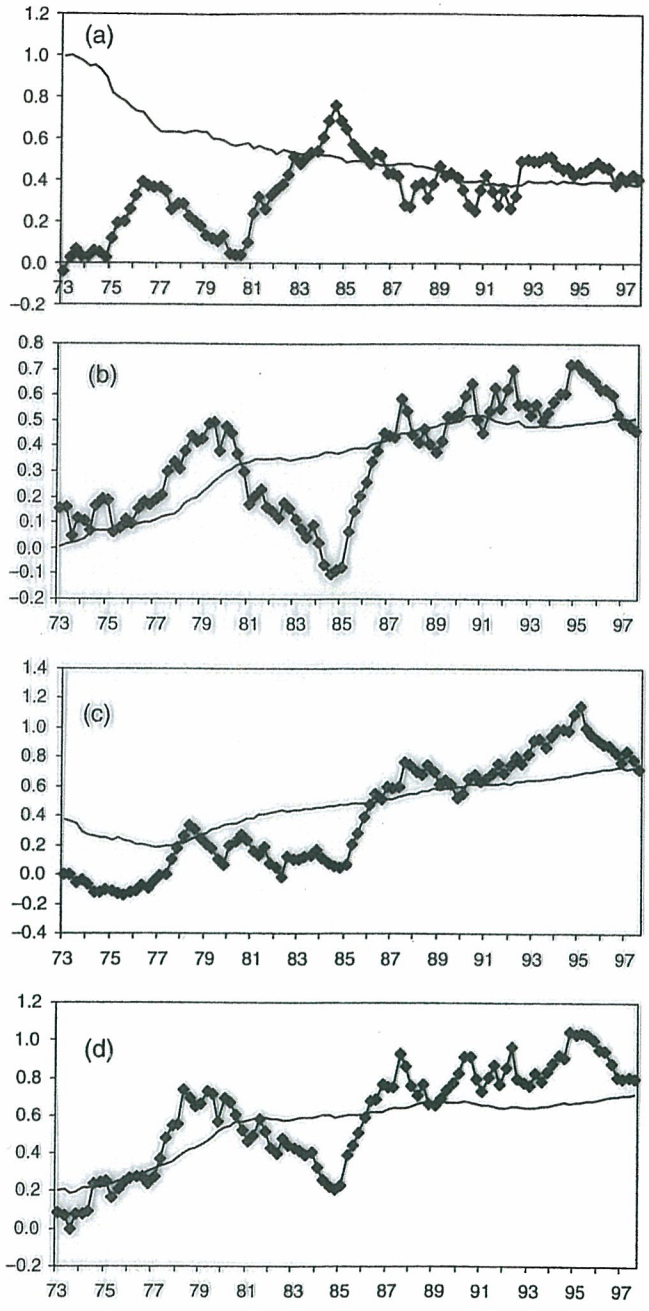


Figure 3.1 Log nominal exchange rates (boxes) and CPI-based PPPs (solid lines). (a) US–UK; (b) US–Germany; (c) US–Japan; (d) US–Switzerland.

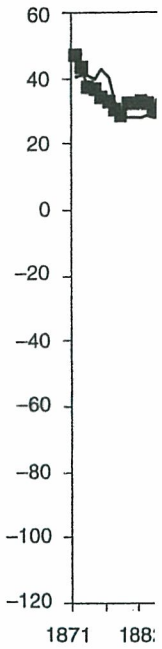


Figure 3.2

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Problems with PPP

1.) Sticky Prices
   - Only an issue in the Short-Run

2.) Transportation Costs + Trade Barriers
   $\Rightarrow$ "Non-traded Goods"

3.) Different consumption patterns across countries.
   $\Rightarrow$ Price levels computed using different weights.