

Topics for Today

- 1.) Purchasing Power Parity (PPP)
 - Real vs. Nominal Ex. Rates
 - The "Law of One Price"
 - Absolute vs. Relative PPP
- 2.) The Monetary Model of Ex. Rates
- 3.) Empirical Evidence
- 4.) Problems with PPP

Purchasing Power Parity

- So far our analysis has made 2 important assumptions:
 - 1.) Only 1 good \Rightarrow Only intertemporal gains from trade
 - 2.) No money
- In the 2nd half of the course we relax both these assumptions.
- With money + many goods, it is important to remember that there are actually two kinds of exchange rates:
 - 1.) Nominal Ex. Rate : The price of one country's money in terms of another country's money
 - 2.) Real Ex. Rate : The price of one country's goods in terms of another country's goods
- PPP is our first theory about the relationship between real + nominal exchange rates.

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).

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

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

$P_{\text{Toyota}} > E \times P_{\text{Toyota}}^* \implies$ People buy Toyotas in Europe, sell them in U.S.

$\implies P_{\text{Toyota}} \downarrow, P_{\text{Toyota}}^* \uparrow$ 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,

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

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The Hamburger Standard (based on July, 2007 BigMac Prices)

Country	BigMac Price in Local Currency	in US dollars	Actual Exchange Rate 1 USD =	Over(+) / Under(-) Valuation against the dollar, %	Purchasing Power Price
United States	\$ 3.41	3.41	1	—	—
Argentina	Peso 8.25	2.6021	3.1705	-19.2556	2.56
Australia	A\$ 3.45	3.1106	1.1091	-3.5254	1.07
Brazil	Real 6.9	3.9034	1.7677	12.5757	1.99
Britain	£ 1.99	3.8746	0.5136	20.1908	0.6173
Canada	C\$ 3.88	3.8796	1.0001	12.9887	1.13
Chile	Peso 1565	3.3164	471.9	9.9809	519
China	Tuan 11	1.5274	7.202	-52.5132	3.42
Colombia	Peso 6900	3.5313	1953.97	9.6742	2143
Costa Rica	Colon 1130	2.2365	505.25	-30.5294	351
Czech Republic	Koruna 52.9	2.9865	17.713	-8.5417	16.2
Denmark	Dkr 27.75	5.4062	5.133	67.933	8.62
Estonia	Kroon 30	2.7863	10.767	-13.4392	9.32
Egypt	Pound 9.54	1.7171	5.5558	-49.2422	2.82
Euro area	€ 3.06	4.4464	0.6882	32.0982	0.9091
Hong Kong	HK\$ 12	1.5387	7.7987	-52.1715	3.73
Hungary	Forint 600	3.2799	182.931	0.0377	183
Iceland	Kronur 469	6.8604	68.3633	131.1182	158
Indonesia	Rupiah 15900	1.7136	9278.8	-46.7819	4938
Japan	¥ 280	2.6159	107.038	-18.7205	87
Latvia	Lats 1.39	2.8683	0.4846	-13.3306	0.42
Lithuania	Litas 6.6	2.7772	2.3765	-15.0011	2.02
Malaysia	Ringgit 5.5	1.697	3.241	-47.2385	1.71
Mexico	Peso 29	2.6929	10.769	-16.3339	9.01
New Zealand	NZ\$ 4.6	3.6275	1.2681	12.7671	1.43
Norway	Kroner 40	7.2375	5.5268	133.4081	12.9
Pakistan	Rupee 140	2.2148	63.2112	-31.1831	43.5
Paraguay	Guarani 10500	2.2097	4751.73	-34.6343	3106
Peru	New Sol 9.5	3.2061	2.9631	-0.4421	2.95
Philippines	Peso 85	2.0741	40.9815	-35.5807	26.4
Poland	Zloty 6.9	2.7729	2.4884	-14.001	2.14
Russia	Rouble 52	2.1058	24.6936	-38.4456	15.2
Saudi Arabia	Riyal 9	2.3975	3.7539	-25.4109	2.80
Singapore	S\$ 3.95	2.7844	1.4186	-21.0489	1.12
Slovakia	Koruna 61.3	2.6646	23.005	-21.7561	18.0
South Africa	Rand 15.5	1.9854	7.8068	-38.387	4.81
South Korea	Won 2900	3.0684	945.13	-4.6692	901
Sri Lanka	Rupee 210	1.9449	107.976	-45.3582	59.0
Sweden	Skr 33	5.0847	6.49	53.1587	9.94
Switzerland	SFr 6.3	5.7226	1.1009	78.0362	1.96
Taiwan	NT\$ 75	2.3403	32.0477	-27.2959	23.3
Thailand	Baht 62	1.9377	31.9969	-39.6817	19.3
Turkey	Lire 4.75	3.8671	1.2283	14.7928	1.41
UAE	Dirhams 10	2.7221	3.6736	-15.3419	3.11

UK
 Germany
 Japan
 Switzerland

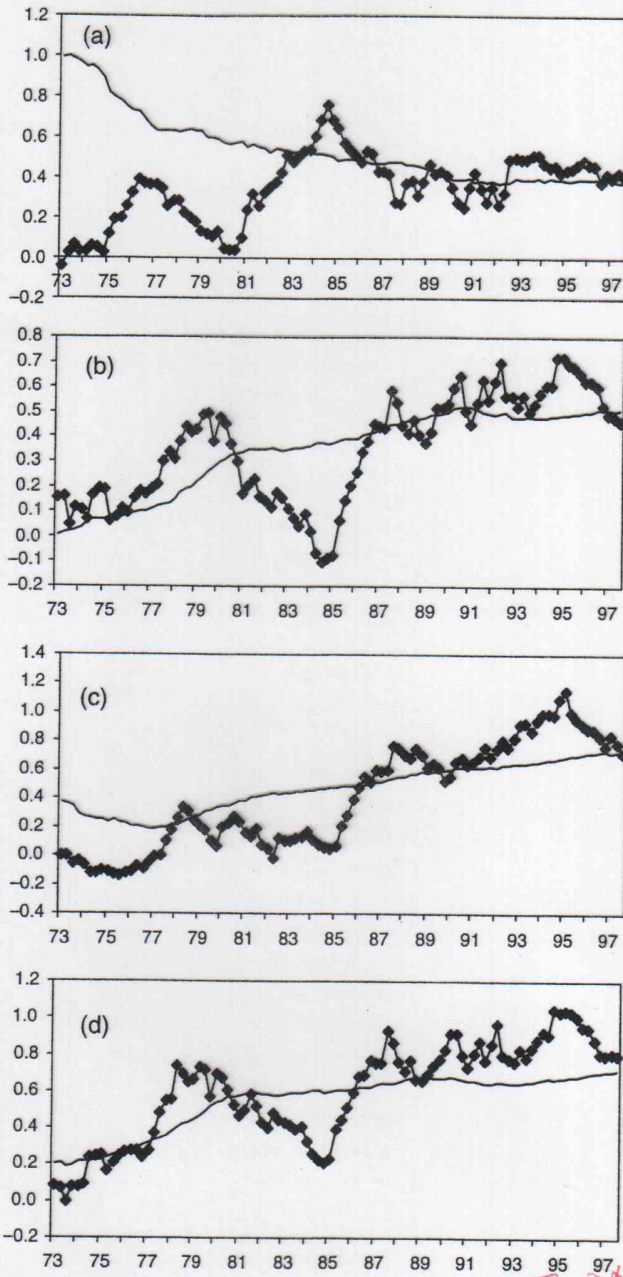


Figure 3.1 Log nominal exchange rates (boxes) and CPI-based PPPs (solid lines). (a) US-UK; (b) US-Germany; (c) US-Japan; (d) US-Switzerland.

$$F/P^* = (P/P^*)^\alpha$$

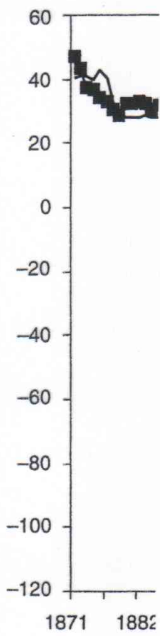
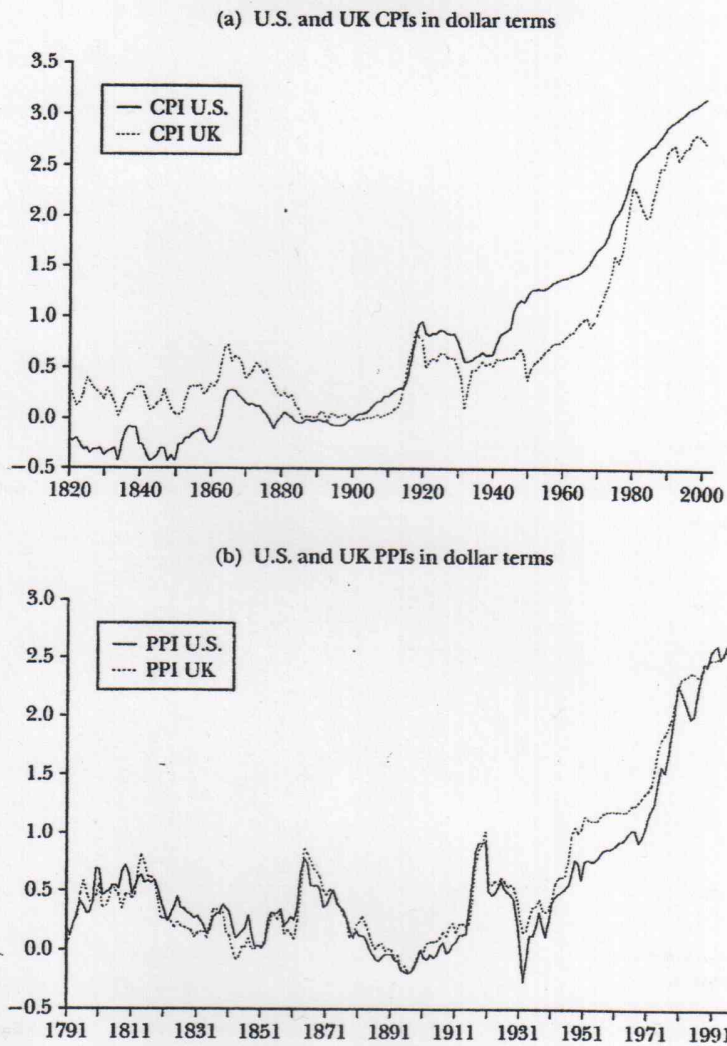


Figure 3.2

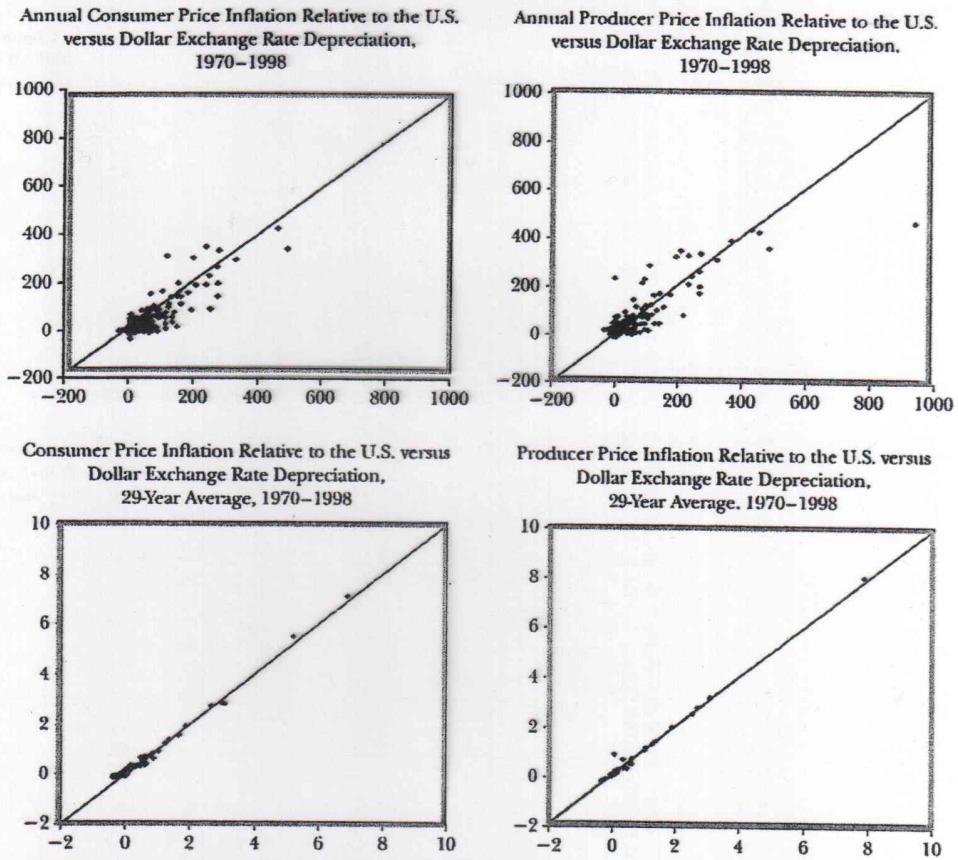
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Figure 1
Dollar-Sterling PPP Over Two Centuries



Notes: This figure shows U.S. and UK consumer and producer price indices expressed in U.S. dollar terms over roughly the last two centuries using a log scale with a base of 1900 = 0.

Figure 2
PPP at Various Time Horizons



Notes: This figure shows countries' cumulative inflation rate differentials against the United States in percent (vertical axis) plotted against their cumulative depreciation rates against the U.S. dollar in percent (horizontal axis). The charts on the left show CPI inflation, those on the right PPI inflation. The charts in the top row show annual rates, those in the bottom row 29-year average rates from 1970 to 1998.

Problems with PPP

1.) Sticky Prices

- Only an issue in the short-run

2.) Transportation Costs + Trade Barriers

⇒ "Non-traded Goods"

3.) Different consumption patterns across countries.

⇒ Price levels computed using different weights.