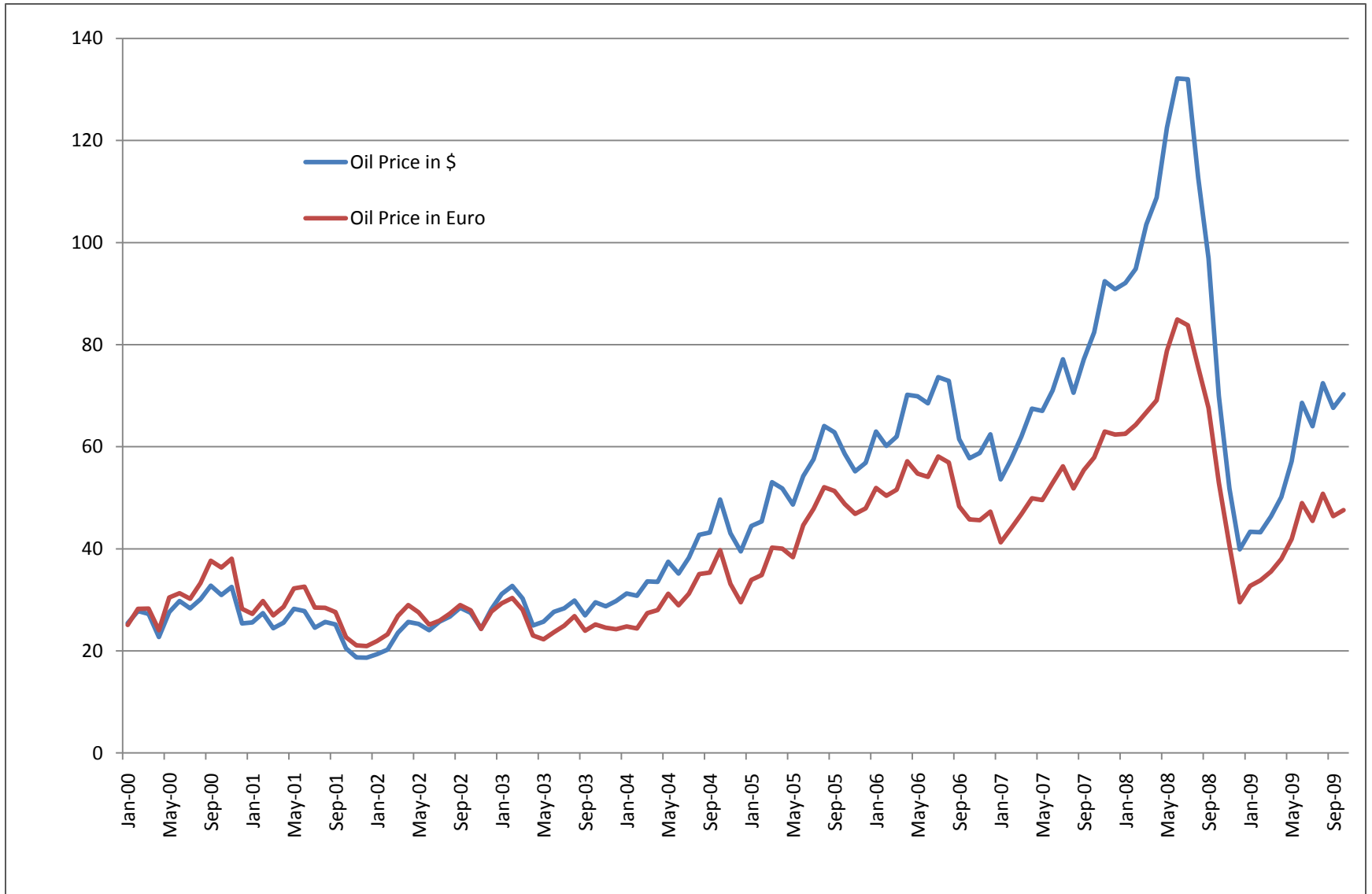


LOOP: Law of One Price



Long Run Exchange Rates

Law of One Price (LOOP)

LOOP states that if

- There is free trade (no tariffs, quotas, etc)
- Transportation costs are low relative to the value of the product (diamonds, oil, wheat, but not Big Macs)
- Competition

Then identical products sold in different locations will sell for the same price (when expressed in a common currency)

Law of One Price (LOOP)

If a diamond of high quality sells for

- 1000 € in Amsterdam
- \$4000 in New York
- The exchange rate is \$1.50/€

Then trader could buy the diamond for \$1500 in Amsterdam and sell it for \$4000 in New York. Traders would continue doing this, driving up the price in Amsterdam, and driving down the price in New York until the price is (for example) 2000€ in Amsterdam and \$3000 in New York.

Law of One Price (LOOP)

The Big Mac Index is a (partly tongue in cheek) applications of LOOP. The Big Mac Index has been published for over 20 years by the Economist as an indicator of short term under or over valuations of currencies.

[Link to July/09 Big Mac Index](#)

Now there is a LOOP index derived from the price of IPODS in different countries. Unlike Big Macs, IPODS are traded internationally.

[Link to 2009 IPOD Index](#)

Law of One Price - Big Mac Index

By LOOP, when expressed in a common currency (say US\$) the price of a Big Mac should be the same every

In Beijing: Big Mac Price = 12.5 RMB

In New York: Big Mac Price = \$3.57

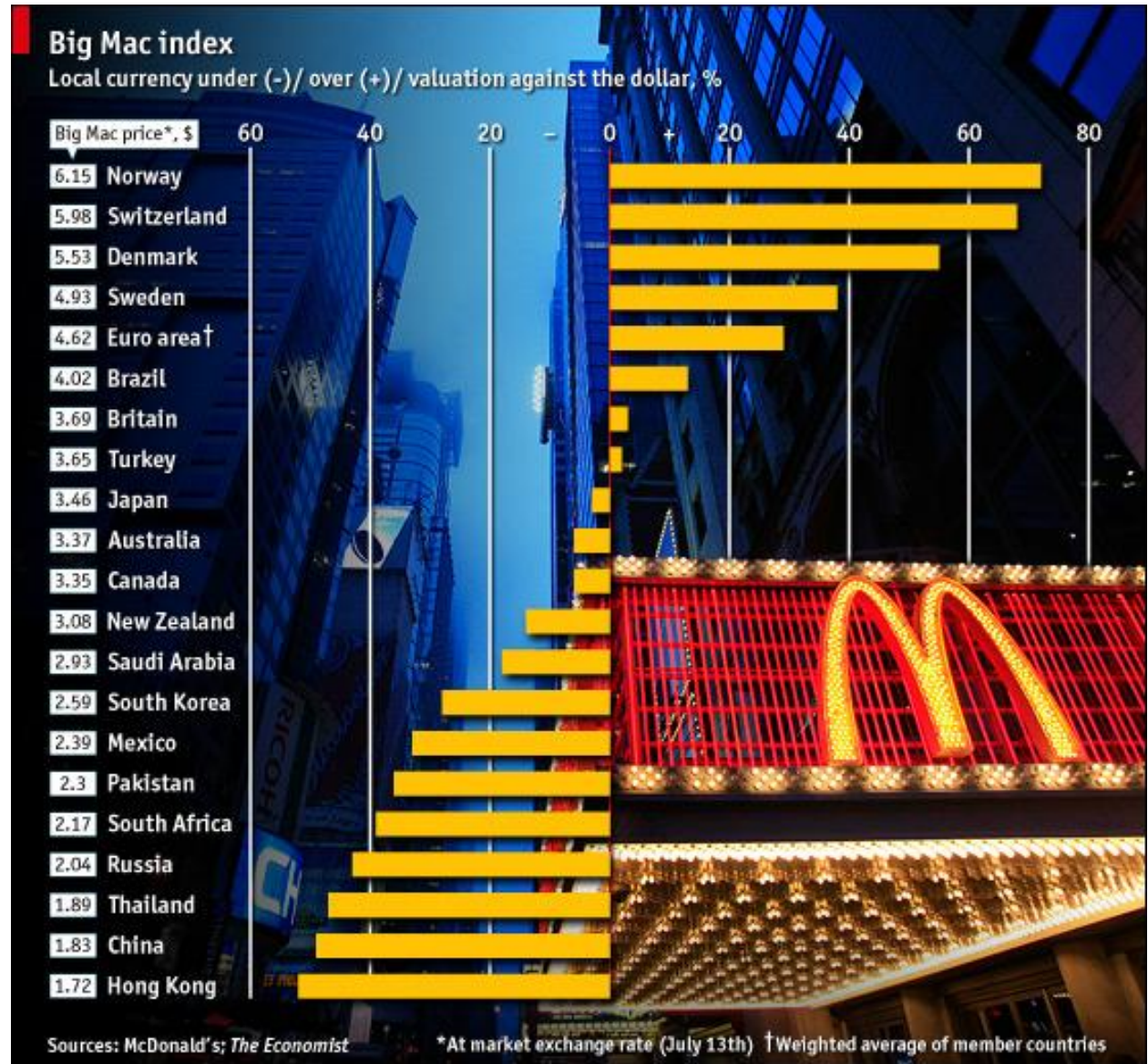
In Zurich: Big Mac Price = 6.50SF

Exchange Rates (Oct. 08): 6.84RMB/\$ and 1SF/\$

So the Beijing Big Mac is cheap $12.5/6.83=\$1.83$.

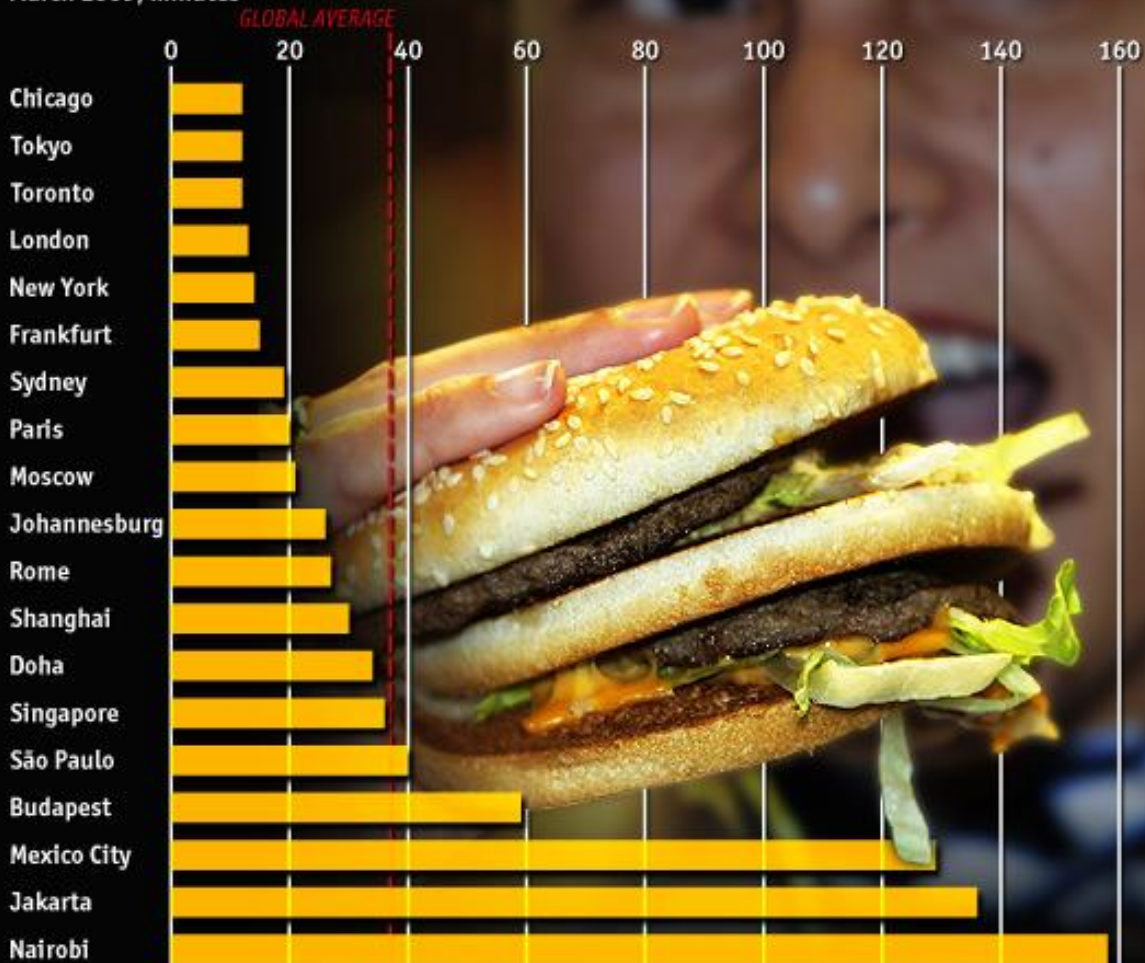
The Zurich Big Mac is pricey $6.50/1.02= \$6.37$

Law of One Price (LOOP) The Big Mac Index



Working time needed to buy a Big Mac*

March 2009, minutes



Source: UBS

*For worker earning average net wage weighted across 14 professions

Law of One Price (LOOP)

Ipod Index

By LOOP, when expressed in a common currency (say US\$) the price of an Ipod should be the same every location. The Ipod may be a better product to use for this than the Big Mac because Ipods are traded internationally (Big Macs typically don't get imported or exported).

[Link to the Ipod Index](#)

Law of One Price (LOOP) The IPOD Index

CommSec iPod nano index

8 gigabytes, October 2008

	\$US		\$US
Argentina	\$353.20	France	\$189.81
Brazil	\$271.54	China	\$189.51
Russia	\$255.41	Denmark	\$187.97
Uruguay	\$249.00	Chile	\$186.28
Ukraine	\$248.00	Azerbaijan	\$184.06
Iceland	\$246.86	Philippines	\$183.57
Egypt	\$243.75	Peru	\$183.42
South Africa	\$240.45	Japan	\$181.64
Hungary	\$225.53	Sweden	\$179.78
Poland	\$223.66	Norway	\$177.24
Serbia	\$219.92	Ireland	\$177.07
El salvador	\$219.00	Portugal	\$177.07
Guatamela	\$217.21	Spain	\$177.07
Turkey	\$214.20	Italy	\$177.07
Croatia	\$212.87	Netherlands	\$177.07
Israel	\$211.27	Belgium	\$177.07
Czech	\$210.05	UAE	\$176.64
Romania	\$209.72	UK	\$176.32
Slovakia	\$208.43	Greece	\$171.06
Bulgaria	\$204.49	Luxembourg	\$168.29
Estonia	\$203.20	Malaysia	\$167.79
Finland	\$202.55	Singapore	\$167.17
Sri lanka	\$199.23	Taiwan	\$160.62
Switzerland	\$198.46	India	\$156.62
Mexico	\$196.14	US	\$149.00
Pakistan	\$196.04	Hong Kong	\$148.36
Thailand	\$193.00	NZ	\$145.06
Malta	\$191.07	Korea	\$139.72
Cyprus	\$191.07	Canada	\$138.73
Austria	\$189.81	Indonesia	\$138.47
Germany	\$189.81	Australia	\$131.95

Source: CommSec, Apple

Purchasing Power Parity (PPP)

Purchasing Power Parity is the macroeconomic equivalent of the Law of One Price.

Rather than looking at one good (LOOP), purchasing power parity examines a representative market basket of goods.

[Link to OECD PPPs](#)

Law of One Price

- identical good should cost same in all nations
- Big Mac Index – used to determine extent to which market exchange rate differs from equilibrium exchange rate

Country/Currency	BIG MAC PRICES		Local Currency Overvaluation (+), Undervaluation (–) (percent)
	In Local Currency	In U.S. Dollars*	
United States (dollar)	\$3.41	\$3.41	—
Switzerland (franc)	6.30	5.20	+53%
Denmark (krone)	27.75	5.08	+49
Euro area (euro)	3.06	4.17	+22
United Kingdom (pound)	1.99	4.01	+18
Venezuela (bolivar)	7,400	3.45	+1
Mexico (peso)	29.0	2.69	–21
Japan (yen)	280	2.29	–33
Russia (ruble)	52.0	2.03	–41
China (yuan)	11.0	1.45	–58

Purchasing Power Parity (PPP)

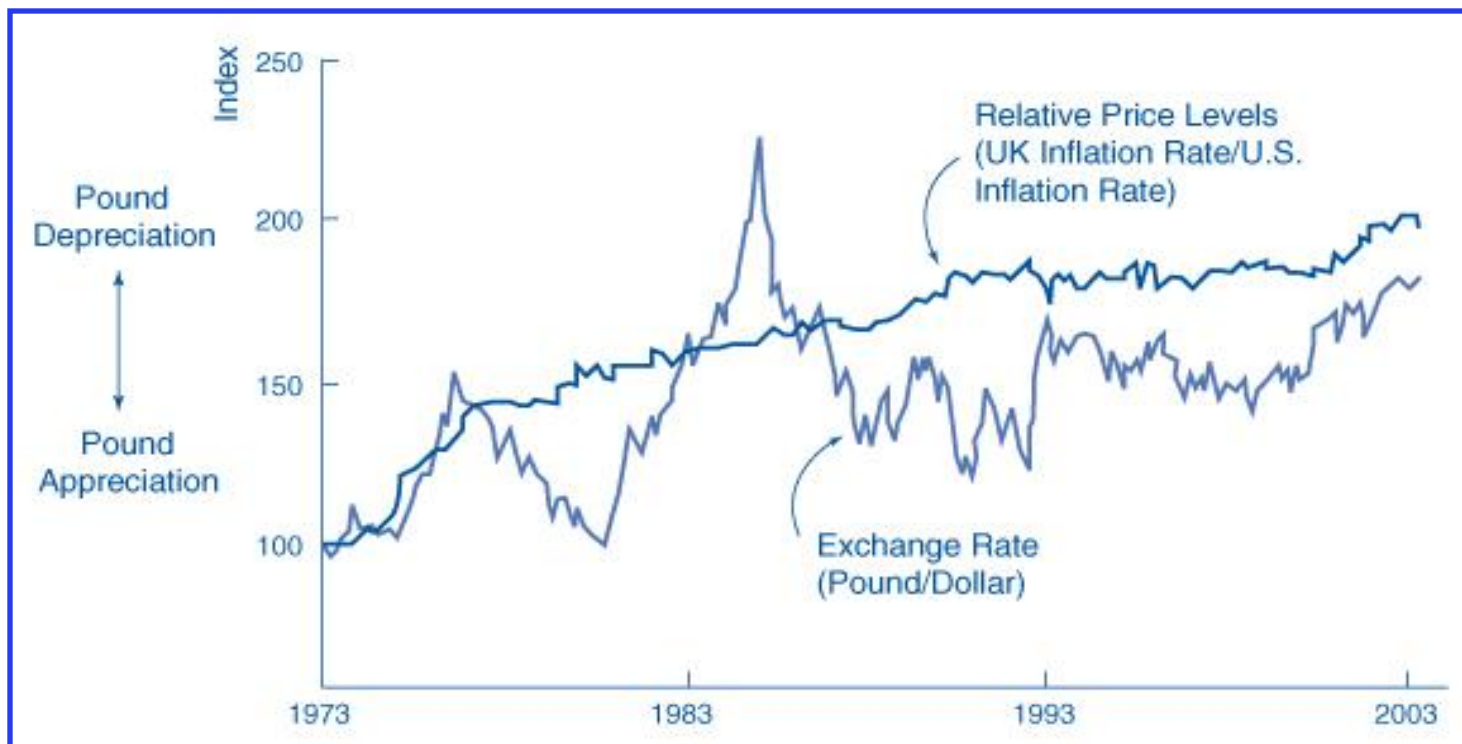
- purchasing power parity theory – application of law of one price to national price levels
- implies currency prices adjust to make goods & services cost the same everywhere
- changes in relative national price levels determine changes in exchange rates over long run
- in theory:

$$\text{exchange rate}_1 = \text{exchange rate}_0 \times \frac{P_{US1}/P_{US0}}{P_{F1}/P_{F0}}$$

1 = current year; 0 = base year

Example of PPP

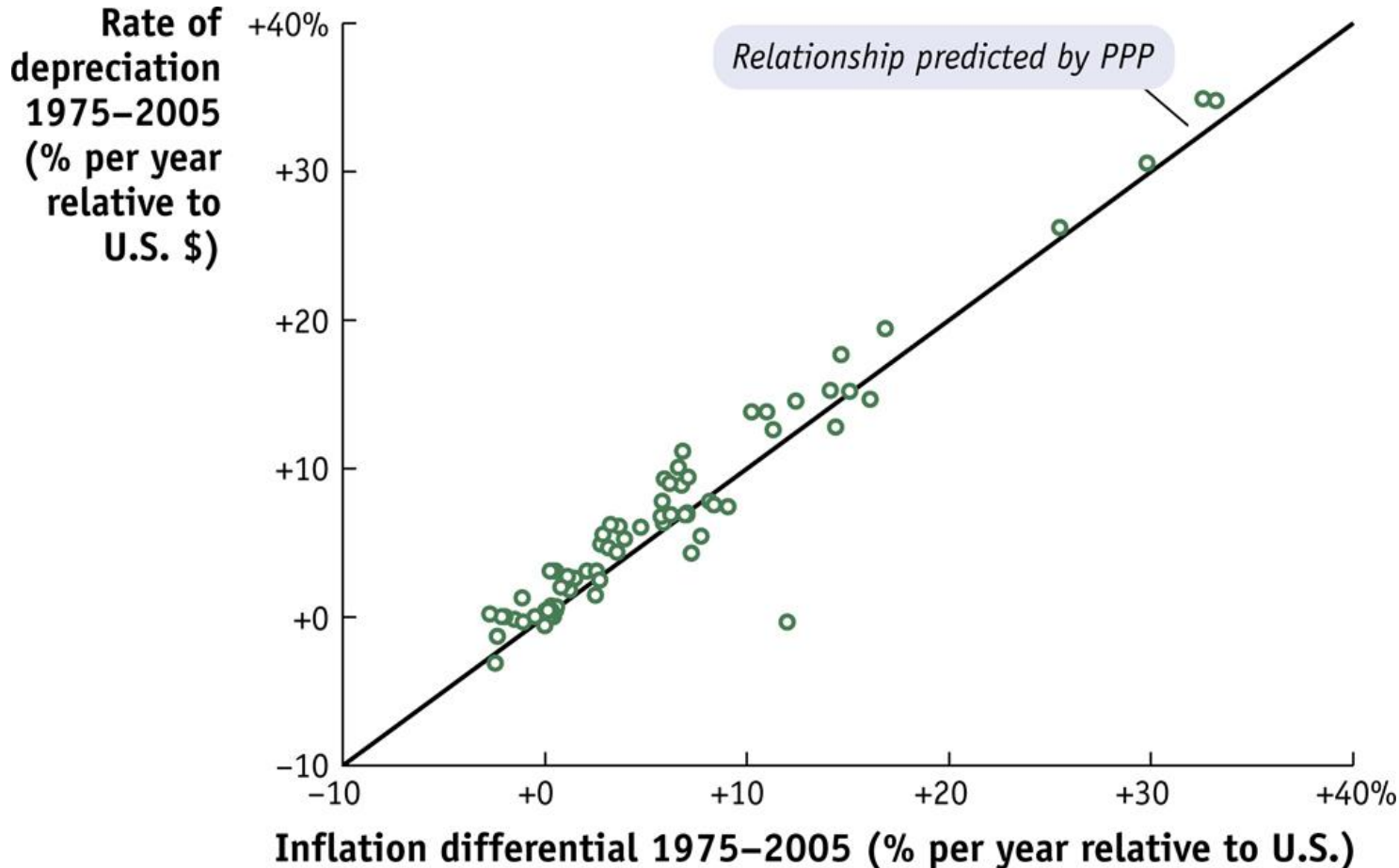
- U.S. and UK 1973 to 2003 indicates PPP is relatively good predictor in the long run



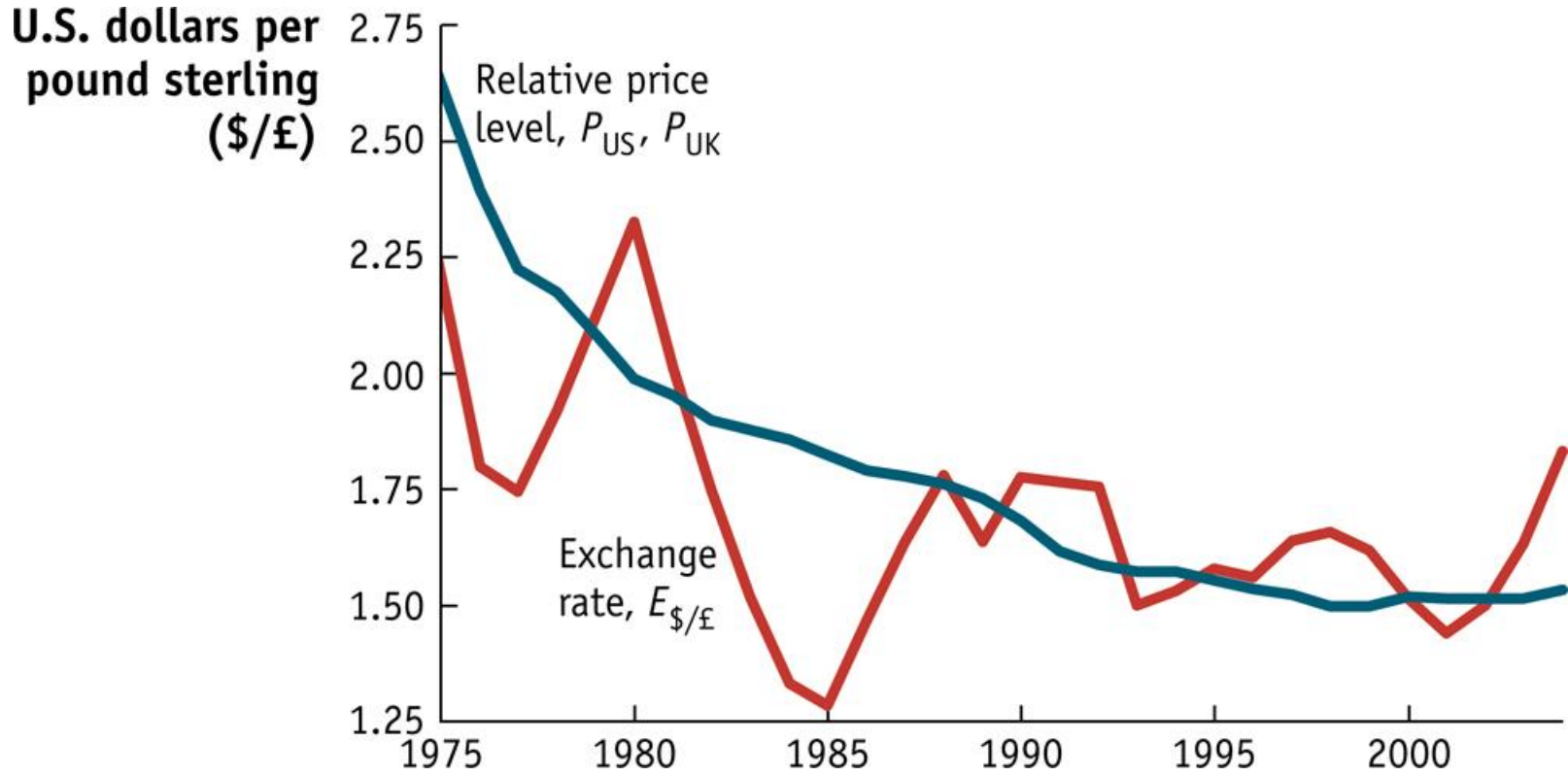
- negligible predictive power in the short run

Empirical Evidence on PPP

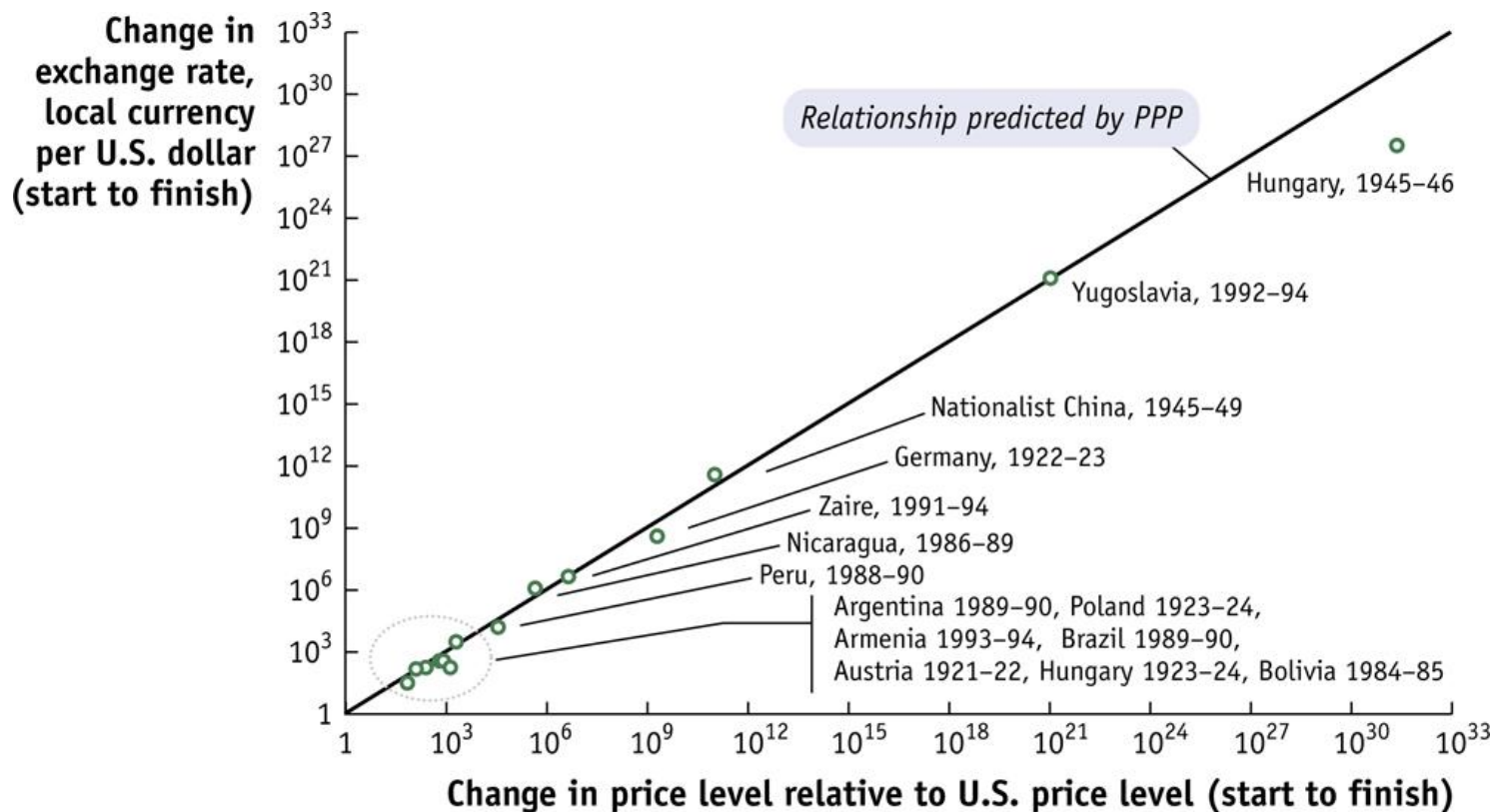
According to relative PPP, the percentage change in the exchange rate should equal the inflation differential.



- According to absolute PPP, over time relative prices should converge.



- Hyperinflation occurs when the monthly inflation rate equals 50% or more over a sustained period.
 - Relative PPP predicts the large inflation differentials should lead to equally large depreciations in the currency.



How Slow is Convergence to PPP?

- Two measures:
 - Speed of convergence: how quickly deviations from PPP disappear over time (estimated to be 15% per year).
 - Half-life: how long it takes for half of the deviations from PPP to disappear (estimated to be about four years).
- These estimates are useful for forecasting how long exchange rate adjustments will take.