International Financial Markets
Prices and Policies

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Richard M. Levich

5

International Parity Conditions: Interest Rate and the Fisher Parities

Overview

- The Usefulness Parity Conditions in International Financial Markets: A Reprise
- Interest Rate Parity:
  - ➔ With and w/o PCM conditions, empirical evidence
- Int'l Fisher Effect (Uncovered Interest Parity):
  - ➔ With and w/o PCM conditions, empirical evidence
  - ➔ What do interest rates predict about current and future exchange rates?
- Forward Rate Unbiased:
  - ➔ Hold for class discussion

The Usefulness of the Parity Conditions in International Financial Markets: A Reprise

- Compared to PPP, violations in the other parity conditions may present more immediate profit opportunities because the cost of entering into financial transactions is typically less than in goods markets.
- If a financial parity condition is violated, an immediate profit opportunity may be present.
- Note however that financial markets are often subject to controls and taxes.

Interest Rate Parity: The Relationship between Interest Rates, Spot Rates, and Forward Rates

Interest Rate Parity (IRP)

The forward exchange rate premium equals (approximately) the U.S. interest rate minus the foreign interest rate.

$$(F - S)/S = i_{\$} - i_{£}$$

Driven by arbitrage between the spot and forward exchange rates, and money market interest rates.

Interest Rate Parity in a PCM

- IRP draws on the principle that in equilibrium, two investments exposed to the same risks must have the same returns.
- Suppose an investor puts \$1 in a US\$ security. At the end of one period, wealth = $\$1 \times (1 + i_{\$})$
- Alternatively, the investor can put the \$1 in a UK£ security and *cover* his or her exposure to UK£ exchange rate changes. At the end of one period, wealth = $\$1 \times \frac{1.0}{S_t} \times (1 + i_{£}) \times F_{t,1}$

Interest Rate Parity in a PCM

- Driven by *covered interest arbitrage*, the two investments should produce identical ending wealth. So,

$$\$1 \times \frac{1.0}{S_t} \times (1 + i_{£}) \times F_{t,1} = \$1 \times (1 + i_{\$})$$

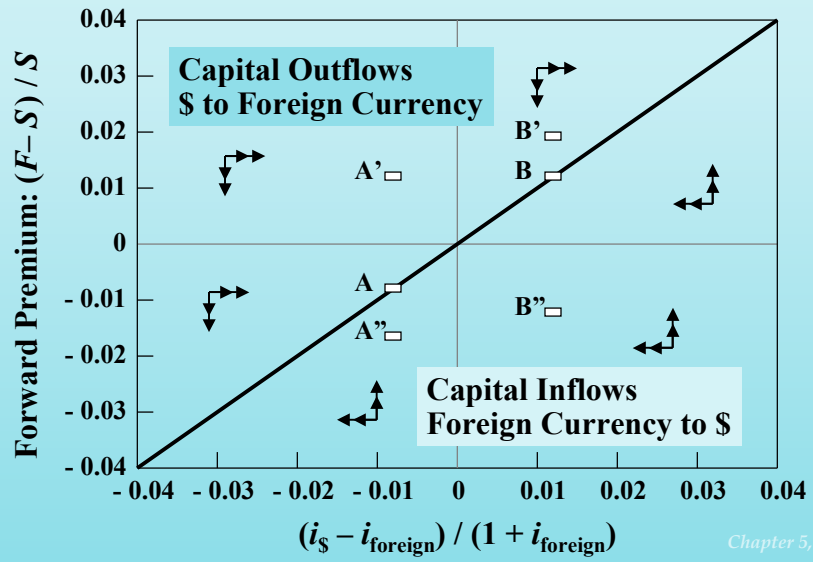
$$\Rightarrow \quad \frac{F_{t,1} - S_t}{S_t} = \frac{i_{\$} - i_{£}}{1 + i_{£}}$$

% forward premium = % interest differential

Interest Rate Parity in a PCM

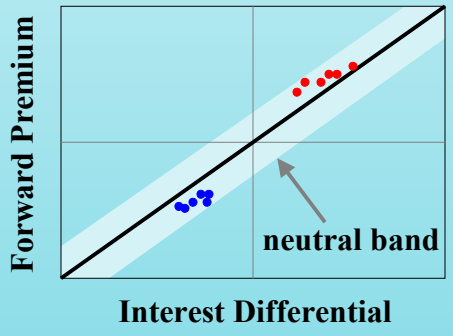
- The term (F–S)/S is called the ***forward premium***. When (F–S)/S < 0, the term ***forward discount*** is often used.
- When the forward premium or discount is plotted against the interest rate differential, the 45° line represents the ***interest rate parity line***.
- The IRP line represents the dividing line between investments in the domestic security and investments in the foreign security that have been covered against exchange risk.

The Interest Rate Parity Line
Equilibrium and Disequilibrium Points



Interest Rate Parity: Relaxing the PCM

- Transaction costs has the effect of creating a "neutral band" within which covered interest arbitrage transactions will not occur.



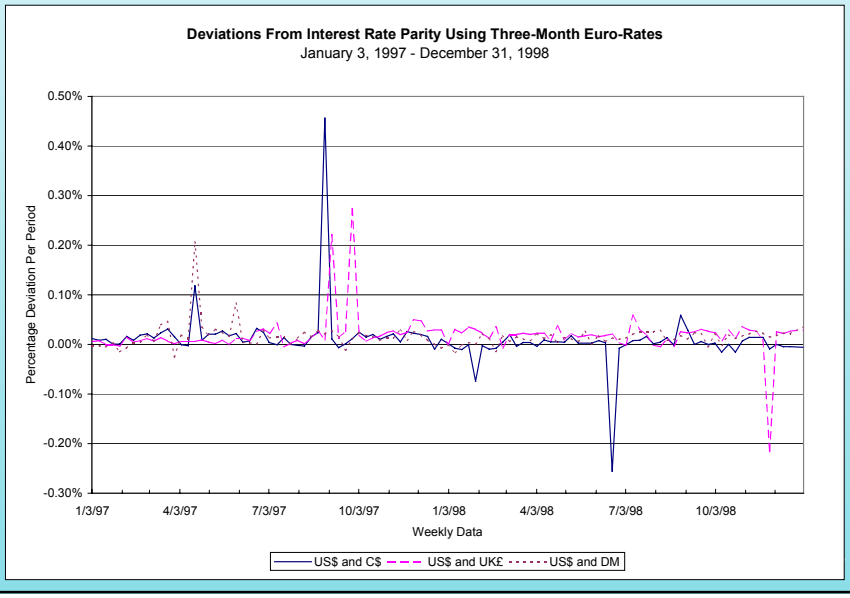
Interest Rate Parity: Relaxing the PCM

- Differential capital gains and ordinary income tax rates can tilt the 45° slope of the IRP line.
  - ➔ However, the actual impact depends on the exact tax rates, the number of people who are subject to those rates, and transactions costs which may dominate the role of taxes.
- There are also uncertainty risks.
  - ➔ Placing orders takes time and market prices may change.
  - ➔ The foreign investment may present country risks.

Empirical Evidence on Interest Rate Parity

- The Eurocurrency markets made it possible to examine two securities that differed only in terms of their currency of denomination.
- The general result is that IRP holds in the short-term Eurocurrency market after accounting for transaction costs.
- For longer-term securities, a study found significant deviations from parity that represent profit opportunities even after adjusting for transaction costs.

Interest Rate Parity: Empirical Evidence



The Fisher Parities

Fisher Effect (Fisher Closed)

For a single economy, the nominal interest rate equals the real interest rate plus the expected rate of inflation.

$$i_{\$} = r_{\$} + E\left(\Delta \tilde{P}_{\text{US}}\right)$$

Driven by desire to insulate the real interest against expected inflation,
and arbitrage between real and nominal assets.

The Fisher Effect

- The Fisher effect represents arbitrage between real assets and nominal (or financial) assets within a single economy.
- At the end of one period, a \$1 commodity holding can be liquidated for $\$1[1+E(\tilde{p})]$, where $E(\tilde{p})$ is the expected rate of inflation.
- To be indifferent, an interest-bearing security will need an end-of-period value of $\$1(1+r)[1+E(\tilde{p})]$, or $\$1(1+i)$.

The Fisher Effect

- So, $(1+i) = (1+r)[1+E(\tilde{p})]$

  $\Rightarrow \quad i = r + E(\tilde{p}) + r\,E(\tilde{p})$

- Where inflation and the real interest rate are low, the Fisher effect is usually approximated as:

$$i = r + E(\tilde{p})$$

% nominal interest rate	=	% real interest rate	+	% expected inflation

The Fisher Parities

International Fisher Effect (Fisher Open)

or uncovered interest parity

For two economies, the U.S. interest rate minus the foreign interest rate equals the expected percentage change in the exchange rate.

$$i_{\$} - i_{£} = E\left(\Delta \tilde{S}\text{pot}\right)$$

Driven by arbitrage in bonds denominated in two currencies.

The International Fisher Effect

- Interest rates across countries must also be set with an eye toward expected exchange rate changes.
- Suppose an investor puts \$1 in a US\$ security. At the end of one period, wealth = \$1 × (1 + $i_{\$}$)
- Alternatively, the investor can put the \$1 in a UK£ security. At the end of one period, wealth

$$= \$1 \times \frac{1.0}{S_t} \times (1 + i_{£}) \times E(\tilde{S}_{t+1})$$

The International Fisher Effect

- Under PCM assumptions, the ending wealth should be identical:

$$\$1 \times (1 + i_{\$}) = \$1 \times \frac{1.0}{S_t} \times (1 + i_{£}) \times E(\tilde{S}_{t+1})$$

$$\Rightarrow \quad \frac{E(\tilde{S}_{t+1}) - S_t}{S_t} = \frac{i_{\$} - i_{£}}{1 + i_{£}} \qquad (5.5)$$

% expected exchange rate change = % interest differential

What do Interest Rates Predict About Current and Future Exchange Rates?

- The International Fisher Effect tells us about the market's *implied future spot rate* :

$$E\left(\tilde{S}_{t+1}\right) = \frac{\left(1+i_{\$}\right)}{\left(1+i_{£}\right)} \times S_t \quad (5.6)$$

- So, the market expects the US$ to de*preciate* when US$ interest rates are higher than foreign interest rates, and vice versa.
- Note that the International Fisher Effect implicitly assumes that real interest rates are equal across countries.

What do Interest Rates Predict About Current and Future Exchange Rates?

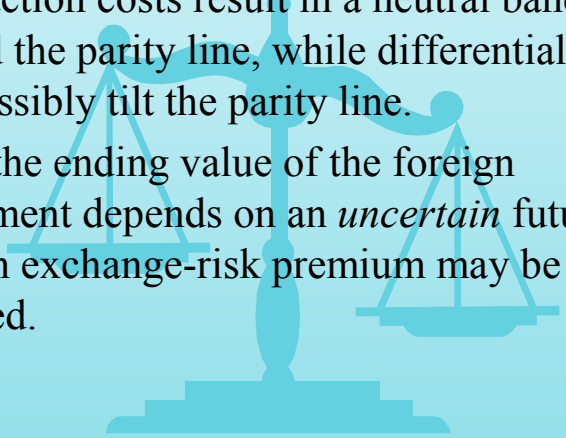
- By rearranging equation (5.6), we can see how the market sets the current spot exchange rate:

$$S_t = \frac{\left(1+i_{£}\right)}{\left(1+i_{\$}\right)} \times E\left(\tilde{S}_{t+1}\right) \approx \frac{E\left(\tilde{S}_{t+1}\right)}{1+\left(i_{\$}-i_{£}\right)} \quad (5.7, 5.7a)$$

- These equations imply that the current spot rate is the discounted, or net present value of the expected future spot rate, using ($i_{\$}$ - $i_{£}$) as the discount rate – The Asset Approach to FX Rates.
- These equations also imply that a higher $i_{\$}$ (keeping $i_{£}$ and $E(\tilde{S}_{t+1})$ fixed) leads to a $ appreciation.

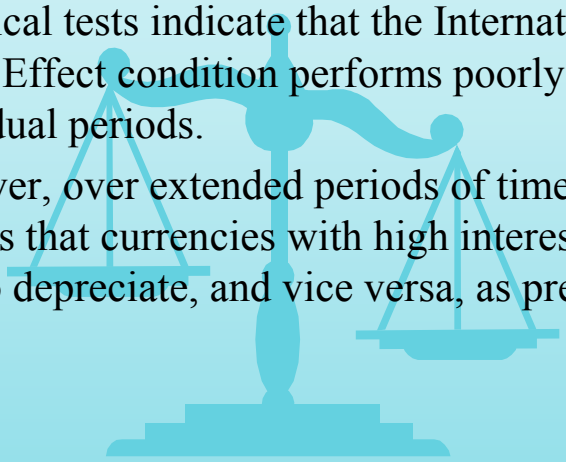
The International Fisher Effect: Relaxing the PCM Assumptions

- Transaction costs result in a neutral band around the parity line, while differential taxes can possibly tilt the parity line.
- Since the ending value of the foreign investment depends on an *uncertain* future spot rate, an exchange-risk premium may be required.

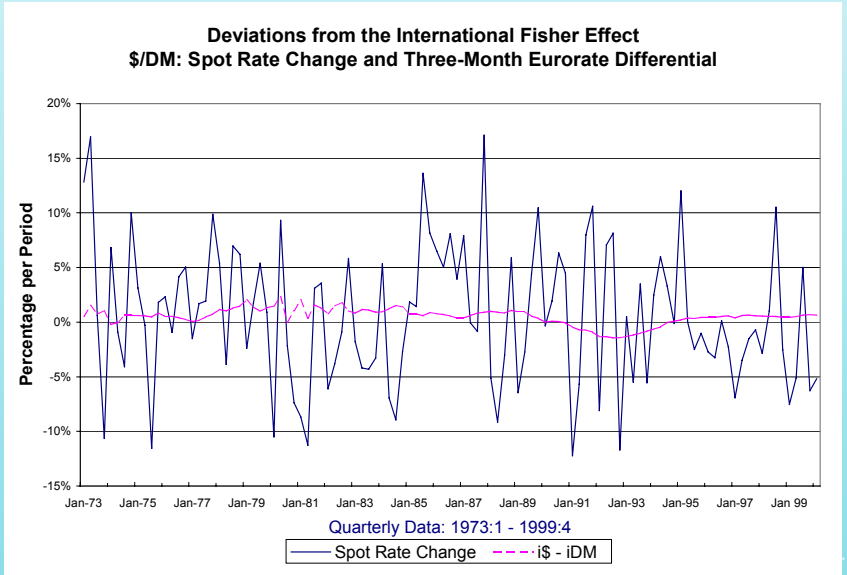


Empirical Evidence on the International Fisher Effect

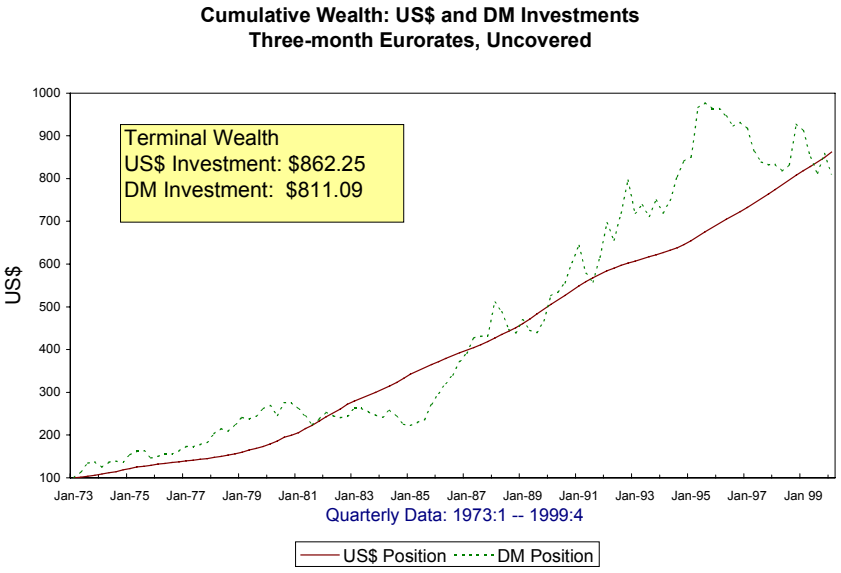
- Empirical tests indicate that the International Fisher Effect condition performs poorly in individual periods.
- However, over extended periods of time, it appears that currencies with high interest rates tend to depreciate, and vice versa, as predicted.



Empirical Evidence on the International Fisher Effect



Empirical Evidence on the International Fisher Effect



Summary

- The method of analyzing Interest Rate Parity and the International Fisher Effect (Uncovered Interest Parity) reveals different findings
  - ➔ Deviations from IRP using eurocurrency rates tend to be small ⇒ market efficiency
  - ➔ Deviations from IFE (UIP) tend to be large in the short-run ⇒ possible market inefficiency, or currency risk premium
- Both parity relationships offer useful information re: market expectations, and establish a benchmark for covered and uncovered financial strategies.