

IFM: Lecture 8

Foreign Exchange Risk

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The foreign exchange markets

- One currency is exchanged for another, at a rate usually determined by market supply and demand
- FX trading takes place round the globe 24 hours a day
- Largely OTC trading
- Of the global \$3.98 trillion estimated in 2010 over one-third is through London.

Exchange rates

- An exchange rate is the price of one currency (the base currency) expressed in terms of another (the secondary, counter or quote currency)
- Exchange rates are expressed in terms of the number of units of the first currency per single unit of the second currency, The standardised forms of expression are

$\$/\pounds$ or USD/GBP

- If the exchange rate between the US dollar and the pound is $\$/\pounds = 1.60$ this means that $\pounds 1.00$ will cost US\$1.60
- GBP/USD or $\pounds/\$ = 1/1.6 = 0.6250$, which means that US\$1.00 will cost 62.50 pence

Cross exchange rates

- The Philippines peso and the United Arab Emirates dirham would see little trade
- The traditional way of dealing with this was to exchange the dirhams into one of the major currencies, usually the US dollar, and then to exchange the dollars for pesos
- A cross-rate is the exchange rate of two currencies that are normally expressed in terms of a third currency, usually the US dollar.

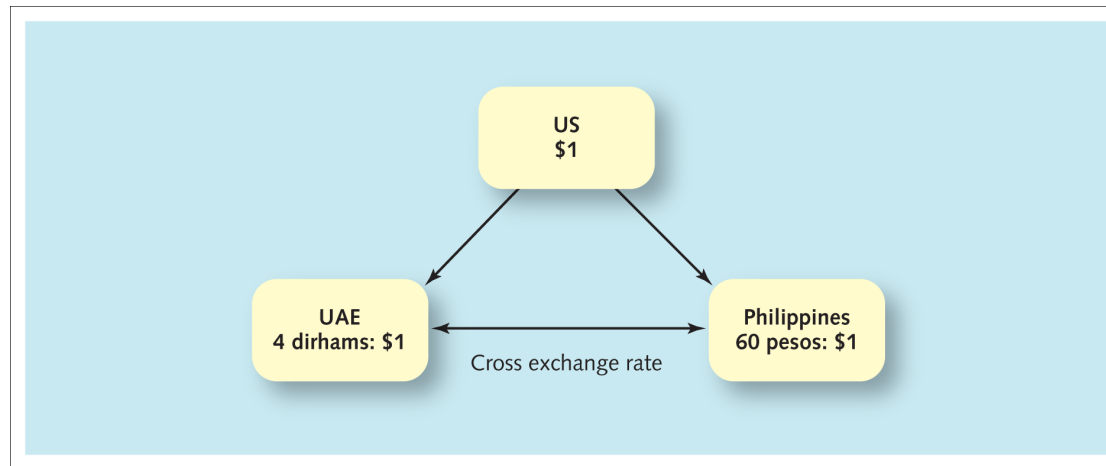


Exhibit 12.8 Example of a cross-rate

Cross exchange rates

- On March 29, 2004, the €/ \$ exchange rate was €0.82/\$ compared to €0.94/\$ exactly one year before. On the same day, the £/\$ exchange rate was £0.56/\$ compared with £0.62/\$ one year earlier.
- March 29, 2004
 - €/ \$=0.82
 - £/\$=0.56
 - €/£=0.82/0.56=1.46
- March 29, 2003
 - €/ \$=0.94
 - £/\$=0.62
 - £/€=0.62/0.94=0.66

Spot Rate and Forward Rate

- The forward rate and spot rate are different prices, or quotes, for different contracts. The forward rate is the settlement price of a forward contract, while the spot rate is the settlement price of a spot contract
- The spot rate, or spot price, is the current price of the asset quoted for the immediate settlement of the spot contract.
 - Historical spot rate
 - Current spot rate
 - Expected spot rate
 - Future spot rate
- forward contract is a contract that involves an agreement of contract terms on the current date with the delivery and payment at a specified future date. Contrary to a spot rate, a forward rate is used to quote a financial transaction that takes place on a future date and is the settlement price of a forward contract.

Spot and Forward exchange rates

- On March 29, 2004, the €/£ exchange rate was €0.82/\$ compared to €0.94/\$ exactly one year before. On the same day, the £/\$ exchange rate was £0.56/\$ compared with £0.62/\$ one year earlier.
- March 29, 2004
 - €/£=0.82
 - £/\$=0.56
- March 29, 2003
 - €/£=0.94
 - £/\$=0.62
- From March 29, 2003 to March 29, 2004
 - \$ has depreciated against € by 13%
 - $(0.82-0.94)/0.94 = -0.13$
- From March 29, 2003 to March 29, 2004
 - \$ has depreciated against £ by 10%
 - $(0.56-0.62)/0.62 = -0.10$

Dealing with exchange rate risk

- Transaction risk
 - The risk that transactions already entered into, or for which the firm is likely to have a commitment in a foreign currency, will have a variable value in the home currency because of exchange-rate movements
- Translation risk
 - Translation risk arises because financial data denominated in one currency are then expressed in terms of another currency. Between two accounting dates the figures can be affected by exchange-rate movements, greatly distorting comparability

Two elements to translation risk:

1 *The balance sheet effect*

2 *The profit and loss account effect*

- Economic risk
 - A company's economic value may decline as a result of FX movements causing a loss in competitive strength
 - *Directly*
 - *Indirectly.*

Foreign Exchange Parities

- Interest Rate Parity
 - spot FX rate, spot forward FX rate and interest rate
- Purchasing Power Parity
 - expected spot FX rate and inflation
- International Fisher Effect
 - inflation rate, nominal and real interest rate
- Uncovered Interest Rate Parity.
 - spot FX rate, expected FX spot rate and interest rate
- Foreign Exchange expectation relation
 - spot forward FX rate with expected FX spot rate

Foreign Exchange Market

- The market for immediate exchange is known as the spot market.
- The forward market enables investors to lock in the exchange rate at which they will buy or sell a certain quantity of currency on a specified future date.
- Spot rate, forward rate, and expected spot rate in the future.

Foreign Exchange Market

- Unlike forward contracts, futures contracts traded at the Exchange with standardized terms.
- A currency options give its holder the right to buy (sell) a specific currency at a specific price within a specific period of time.
- Note: From this slide on, we use Direct Quotation: **DC/FC** unless otherwise stated.

(covered) Interest Rate Parity

- Spot FX rate, spot forward FX rate and interest rate have the following parity relation.
- It is an arbitrageur free relationship.
- Imagine the spot rate is 0.50 £/\$, the risk free rate of \$ is 3%, and the risk free rate of £ is 5%, what will be the forward rate in one year time?

(covered) Interest Rate Parity

- At the present 1\$ “equals” 0.50 £.
 1. If you deposit 1\$ today, you will get 1.03 \$ in one year time.
 2. Alternatively, you can convert 1\$ to 0.50 £, and deposit 0.5 £, you will get $0.5 \times 1.05 = 0.525$ £ in one year time
- The forward rate should make the proceeds from 1 and 2 be the same, which is arbitrageur free.

(covered) Interest Rate Parity

- The forward rate should be

$$F = \frac{0.5\text{£} * (1 + 5\%)}{1 * (1 + 3\%)} = \frac{0.525\text{£}}{1.03\$} = 0.5097 \text{ £ / \$}$$

- The forward premium for \$ is

$$\text{Premium} = \frac{0.5097 - 0.5}{0.5} = 2\%$$

- The forward rate discount for £ is 2%.

(covered) Interest Rate Parity

- The covered interest rate parity is

$$F_{1(DC/FC)} = S_{0(DC/FC)} * \left(\frac{1 + r_{DC}}{1 + r_{FC}} \right)$$

$$F_{1(FC/DC)} = S_{0(FC/DC)} * \left(\frac{1 + r_{FC}}{1 + r_{DC}} \right)$$

S_0 : spot FX rate

F_1 : forward FX rate

r : nominal interest rate

(covered) Interest Rate Parity

- There is negative relationship between (nominal) interest rate and forward rate.
- The forward premium or discount is equal to the interest rate differentials between the two countries.
 - If the domestic interest rate is 2% higher, the domestic currency forward rate with a 2% discount.
 - If the domestic interest rate is 2% lower, the domestic currency forward rate with a 2% premium.

(covered) Interest Rate Parity

- What if the forward rate is not the equilibrium rate calculated? The arbitrageur opportunity emerges.
- Assume that the forward is 0.5150 £/\$, above the 0.5097 £/\$.
- The \$ forward rate is at 3% premium compared to 2%.

(covered) Interest Rate Parity

- Long (buy) £/\$ spot rate, and short (sell) £/\$ forward rate.
- Now (start with nothing at hand)
 - Borrow 1000 £ at the rate of 5% interest rate.
 - Use 1000 £ to buy 2000 \$ (spot rate).
 - Deposit 2000 \$ at the rate of 3% interest rate.
- In one-year time
 - Receive 2060 \$.
 - Use 2060 \$ to buy 1060.9 £ (forward rate).
 - Repay the loan of 1050 £, making a profit of 10.9 \$ (1%) without risk.

Purchasing Power Parity

- Purchasing power parity states that exchange rate movements adjust to inflation difference.
 - Absolute and relative PPP
- Absolute PPP: the law of one price states that the price of one good must be the same in all countries.
 - MacDonald
 - Weighted average of the prices of all goods in the economy.
 - Empirical shows that it does not hold.

Purchasing Power Parity

- Relative PPP states that a currency loses part of its purchasing power once the domestic currency depreciates.
 - A country's currency appreciate (depreciate) adjust perfectly to the inflation differentials against the other country.
- Imagine the spot rate is 0.50 £/\$, the inflation rate in U.S. is 1%, and the inflation rate in U.K. is 3%, what will be the exchange rate in one year time?

Purchasing Power Parity

- At the present 1\$ “equals” 0.50 £.
 1. With annual inflation rate of 1% in U.S., it will cost you 1.01 \$ in one year time to buy the same package of goods which only costs you 1\$ today.
 2. With annual inflation rate of 3% in U.K., it will cost you 0.515 \$ in one year time to buy the same package of goods which only costs you 0.5 £ today.
- The law of one price suggests that the purchasing power of 1.01 \$ and 0.515 £ should be the same.

Purchasing Power Parity

- Relative Purchasing Power Parity

$$S_1 = \frac{0.5\text{£} * (1 + 3\%)}{1 * (1 + 1\%)} = \frac{0.515\text{£}}{1.01\$} = 0.51 \text{ £ / \$}$$

Purchasing Power Parity

- The relative purchasing power parity is

$$S_{1(DC/FC)} = S_{0(DC/FC)} * \left(\frac{1 + f_{DC}}{1 + f_{FC}} \right)$$

$$S_{1(FC/DC)} = S_{0(FC/DC)} * \left(\frac{1 + f_{FC}}{1 + f_{DC}} \right)$$

S_0 : spot FX rate

S_1 : expected spot FX rate

f : inflation rate

Purchasing Power Parity

- There is negative relationship between inflation rate and expected spot exchange rate.
- The exchange rate premium or discount is equal to the inflation differentials between the two countries.
 - If the domestic inflation rate is 2% higher (lower), the domestic currency rate should depreciate (appreciate) by 2%.

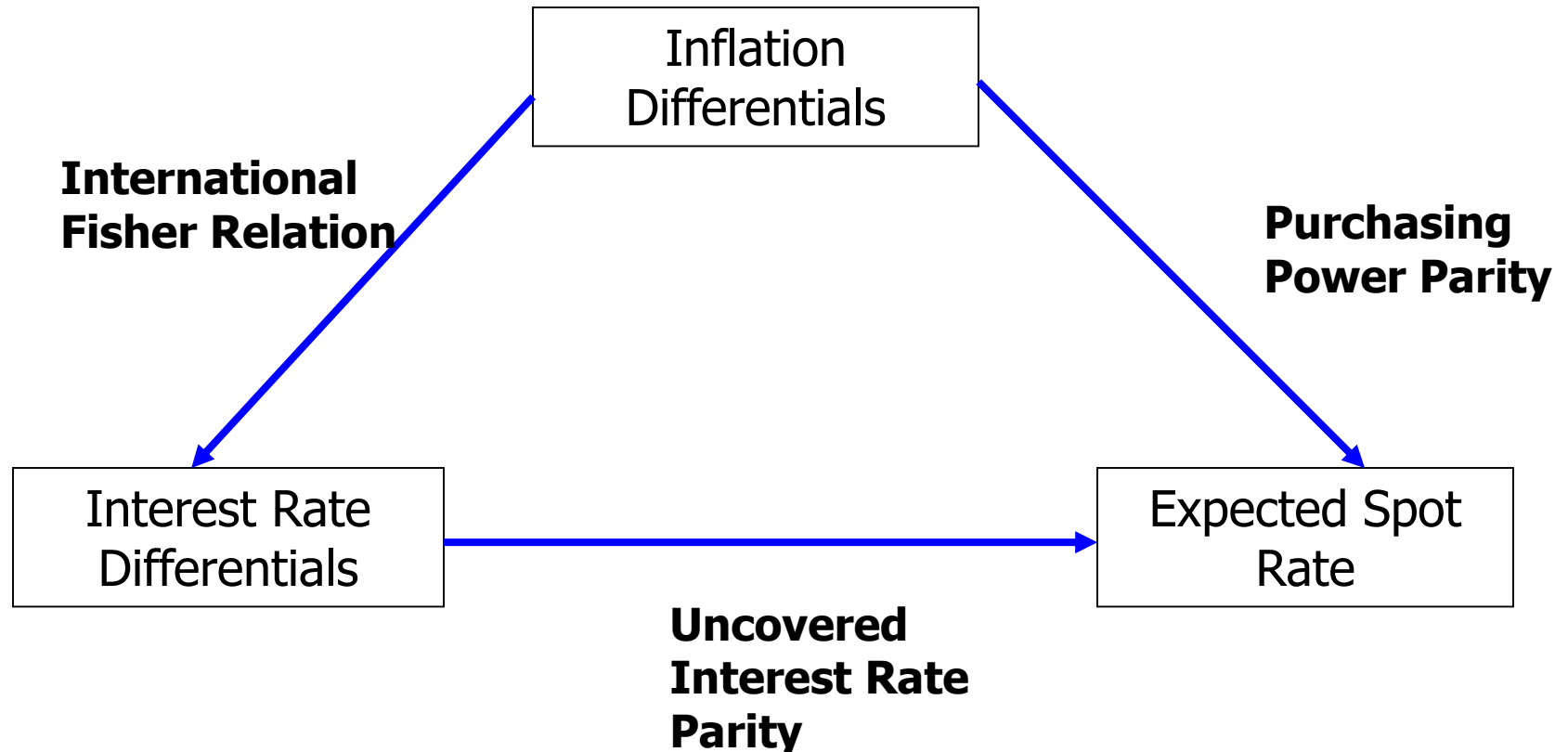
International Fisher Relation

- International Fisher Relation states that the nominal interest rate differentials should equal the inflation rate differentials: that is the real interest rate should be the same among all countries.
 - $1+r = (1+r_{\text{real}})*(1+f)$
 - Approximately $r \approx \tilde{r}_{\text{real}} + f$

International Fisher Relation

- It implies that the nominal interest rate is only caused by the revision in inflation expectations, not by real interest rate.
 - The higher the expected inflation rate, the higher the nominal interest rate.
- In our previous example, the interest differentials in 2%, which is the same as the inflation differentials.

Uncovered Interest Rate Parity



Uncovered Interest Rate Parity

- Combining international fisher relation with purchasing power parity, it states that the expected currency depreciation should offset the interest rate differentials.
- Uncovered interest rate parity refers to the idea that the exchange rate exposure is not covered by the a forward contract.

Uncovered Interest Rate Parity

- The uncovered interest rate parity is

$$S_{1(DC/FC)} = S_{0(DC/FC)} * \left(\frac{1 + r_{DC}}{1 + r_{FC}} \right)$$

$$S_{1(FC/DC)} = S_{0(FC/DC)} * \left(\frac{1 + r_{FC}}{1 + r_{DC}} \right)$$

S_0 : spot FX rate

S_1 : expected spot FX rate

r : nominal interest rate

Uncovered Interest Rate Parity

- Currency of the country with higher nominal interest rate tend to depreciate against the currency with lower interest rate.
- If the interest differentials in 2%.
 - The lower rate currency is expected to depreciate by approximately 2%,
 - The higher rate currency is expected to appreciate by approximately 2%.