

Section 7.3 The Forward Market and Section 4.5 Interest Rate Parity

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7.3 The Forward Market

- Example of a forward contract: In May, a crude oil producer gets together with a refiner to agree on a price for crude oil. This price is for crude that will be delivered in six months, November.
- The producer wishes to reduce his risk (that the price crude might fall in six months). The refiner wishes to reduce risk also, his worry is that crude prices might rise. *This act of setting a price today for a transaction in the future, is called hedging.*

The Forward Market

- Companies wishing to **hedge currency exposure**, usually do so with a currency dealer (often a money-center bank).
- A company expecting to be paid in Swiss francs in 3 months is **long** (has assets in) SFr. Such a company decides to sell these SFr to the bank, at a set price today for delivery in 3 months.
- This company has engaged in a **short hedge**, that is, it has created a liability in SFr, to offset its assets in SFr.

The Forward Market

- A company that owes Yen, (for goods purchased from Japan) is **short** (has liabilities in) Yen. Such a company decides to purchase Yen from bank, at a set price today for delivery in 3 months.
- This company has engaged in a **long hedge**, that is, it has acquired (future) assets in Yen, to offset its (future) liabilities in Yen.
- The two situations (SFr, Yen) are examples of a forward hedge.

The Forward Market

- A. Definition of a Forward Contract: an legally binding agreement between a bank (dealer) and a customer (hedger) to deliver a specified amount of currency against another currency at a **specified future date** and at a **specified (fixed) exchange rate.**
- Purpose of a Forward contract: Main purpose is for Hedging - the act of reducing exchange rate risk

Participants in the Forward Market:

- 1) **Hedgers**: start with either assets or liabilities in a foreign currency and use the exchange markets to reduce currency exposure.
- 2) **Arbitrageurs**: Start with no currency exposure, they simultaneously buy in a cheap market, sell in a dear market, leaving them still with no net currency exposure.
- The forward (and futures) market was supposedly invented for hedging (not gambling).

Participants in the Forward Market:

- 3) **Speculators:** (gamblers) start with no exposure, and take on currency exposure based on expectations of a currency rise or fall.
- Speculators usually do not have access to forward markets, as forward markets are dominated by commercial banks arranging international trade financing.
- Thus speculators use only the futures and options markets. Futures market “invented” by an angry Milton Friedman?

Hedging using the Forward market

- You import €1,000,000 worth of BMW parts. BMW gives you 60days of “trade credit” (accounts payable for you; accounts receivable for them).
- You now have a liability in euros, thus you have currency risk - the euro may rise against the \$.
- Arrange with Nation’s Bank to buy €1,000,000 for delivery in 60 days on the forward market. “Lock in” at the 60-day rate.
- You have just **hedged** your forex exposure.

The Forward Market

- Calculating the Forward Premium or Discount: **simple annualization**
- **Premium** = $\frac{f - e_0}{e_0} \times \frac{360}{n} \times 100\%$
- where **f** = the exchange rate currently available for some specific future.
- **e₀** = the spot rate of exchange
- **n** = the number of days in the forward contract
- Uses the 360-day accounting year

The Forward Market

- Do everything in American terms
- Suppose the spot Mex\$ is \$.10 and the 30 day forward is \$.099
- **Prem** = $\frac{$.099 - $.10}{$.10} \times \frac{360}{30} \times 100\%$
- = $-.01 \times 12 \times 100\% = -12\%$
- **This is called a forward discount.**

The Forward Market

- Forward Contract Maturities: Normal Contract Terms are for 30-day, 90-day, 180-day, and 360-day. This is only because these are the typical lengths of trade credit offered by corporations.
- Banks also offer longer-term contracts and odd maturities (e.g. 107 days).
- Banks offer a wide range of currencies (more than printed in the WSJ)

The Forward Market

- Banks profit from the bid-ask spread, as they do in the spot market.
- **Spreads widen with longer maturities** because forward contract involve less **more risk and less trading volume** (liquidity and competition).
- Client **default risk** becomes more of a problem with forward contracts.

Alternative to the Forward Market

- A company that owes Yen, (for goods purchased from Japan) is **short** (has liabilities in) Yen, can either go long on the forward market or **purchase Yen today on the spot market**. This second strategy is called a **money-market hedge**.
- A company that is owed SFr. is **long SFr.** can go short (sell the Sfr. on the forward market or **borrow SFr., (convert the Sfr. Loan into dollars today)** then using the eventual payment from the Swiss customer to pay off the loan. This technique is **also called a money-market hedge**.

Section 4.5 Interest Rate Parity

- The forward rate is determined by a relationship called Interest Rate Parity (IRP).
- IRP is nothing more than comparing the different **present value relations** of the two currencies you wish to trade with.
- Present Value allows us to compare cash flows that occur at two different times.

Interest Rate Parity

- Suppose the prevailing one-year interest rate in the U.S. is 6%, then a dollar in year has a PV of $\$1.00/(1.06)$. This means that the typical lender (or borrower) is indifferent to having \$1.00 in one year or \$.943 today.
- Suppose the Mexican one-year rate is 16%, then the typical lender and borrower **in pesos, feels that ten pesos in one year is equivalent to 8.6207 pesos today**.

Interest Rate Parity

- Now suppose one peso is worth \$0.10 on the **spot market**, what should the one-year forward exchange rate be?
- Ex: You **owe** a supplier Mex\$ 1 million, due in one year. You would like to set aside the funds today for this forex payable.
- 1) You could convert dollars to pesos now, and hold the pesos in a Mexican bank - earning 16%. One million peso discounted at 16% means that you need to first buy 862,067 pesos (**\$86,207**).

Interest Rate Parity

- The previous is often called a **money-market hedge**.
- 2) Another approach, the **forward hedge**, hold the \$86,207 in a Eurodollar account in the same Mexican bank, where you would earn the dollar-based 6% rate. At the same time, arrange to convert the dollars (plus interest) into peso at a one-year forward rate. What should the forward peso rate be?

Interest Rate Parity

- Both forward and money market hedges are used frequently, because they **usually provide the hedger with about the same benefits and costs: we should spend \$86,207 either way**.
- If the forward peso rate is too high, everyone will **buy pesos using the spot market**. If it too low, everyone will **buy pesos using the forward market**

Interest Rate Parity

- 1) $\$86,207(1/e_0)(1+.16) = \text{Mex}\1 million (mmkt)
 $\text{Mex}\$862,070(1+.16) = \text{Mex}\1 million
- 2) We are looking for a forward rate “ f_1 ” that will cost the same in USD and give us the needed pesos. $\$86,207(1+.06) (1/f_1) = \text{Mex}\1 million
- so $\$86,207(1/e_0)(1+.16) = \$86,207(1+.06) (1/f_1)$
- $(f_1/e_0) = (1+.06) (1+.16)$ see equation 4.17
- $f_1 = e_0(1+.06) (1+.16) = \$.09138/\text{peso}$

Interest Rate Parity

- May be easier to see using FV (inverse of PV)
- Trade Date T = 0 FV at T = 1
 U.S \$.10 \$.10(1.06)
 Mexico Mex\$1.00 Mex\$1.00(1.16)
- The spot rate and the two interest rates establish that these four expression are equivalent.
- Thus, **\$.10(1.06) = Mex \$1.00(1.16)**

Interest Rate Parity

- therefore the rate at which pesos and dollars contract at T = 0, for delivery in one year, is $\$.10(1.06) = \text{Mex } \$1.00(1.16)$
- always use American terms in this course
- $f_1 = \$.10(1.06)/\text{Mex}\$1.00(1.16)$
 $\$.10/\text{Mex}\$1.00 (1.06)/ (1.16)$
 $e_0 (1.06)/ (1.16) = \mathbf{\$.09138}$

Interest Rate Parity

The IRP formula is thus

$$f_1 = e_0 \frac{(1 + r_h)}{(1 + r_f)}$$

where r_h is the **nominal rate** in the **home country**, the foreign country’s rate is r_f .

- **Nominal rate:** the observed or contract rate. As opposed to the real or inflation-adjusted rate.
- Here you must use decimal rather than percents.

Interest Rate Parity

- Consider a currency with a lower interest rate.
- Suppose the spot rate on the Euro is \$1.05 and the US interest rate is 6% and the Euro rate is 3%. What is the Euro’s six month forward rate?
- You must apply only six month’s worth of interest:
- $f = \frac{\$1.05 (1 + .03)}{(1 + .015)} = \1.0655 a premium

Interest Rate Parity

- The forward rate (f) should differ from the spot rate (e_0) by an amount *approximately* equal to the interest differential ($r_h - r_f$) between two countries (The quick version)
- **Suppose the Real sells for \$.55 spot, the one year interest rate in the US is 5% and Brazil’s is 20%. The Real will sell at forward discount one year out.**
- **5% - 20% \cong -15%**

Interest Rate Parity

- **\$.55 reduced by 15% is $f = \$.4675$**
- **a six month forward discount would be less because the effects of the interest difference has been cut in half (7.5%) $f = \$.50875$**
- **This is meant to be a “quick and dirty” method and is a good way to guess a forward discount or premium at a glance.**

Interest Rate Parity

- **IRP is “enforced” by *covered interest arbitrage***: “Arbs” can make money when the forward rate does not equal the value predicted by the IRP equation:
- Hedgers enforce IRP too.
- Ex: If the one year forward peso also sells for \$0.10, then **according to IRP**, the forward peso is expensive. Hedgers expecting payments in peso will sell their exposure on the forward markets at ten cents.

IRP: Interest Rate Parity

- Hedgers with a **liability in pesos** one year out will not buy pesos on the forward market, but buy them at spot for 10 cents and hold them in a high yield peso account until the pesos are needed to satisfy the debts. (what about currency risk?)
- So hedgers are either buying pesos at spot or selling them on the forward market.
- What should eventually happen?

Interest Rate Parity predicts:

- 1.Currencies with higher interest rates will sell at forward discounts. Mexican Peso, Real
- 2.Currencies with lower interest rates will sell at forward premiums. Yen, Swiss Franc, Euro.
- Such effects are also seen on the currency futures market, also for gold and bond futures.
- Gold futures should sell at?
- Bond futures should sell at?