CHAPTER 1

Solutions to Exercises

Solution to Exercise 1.

As Figure 1.3 shows, a long position in a bond at time t_1 and a forward loan starting at t_1 can be used to replicate the payoffs of an interest rate swap.

Solution to Exercise 2.

Eurodollars are time deposits denominated in U.S. dollars at banks outside the United States. The euro-prefix is used to refer to any currency held in a country where it is not the official currency, for example, Euroyen or Euroeuro. The euro-prefix has therefore no connection with the euro currency or the eurozone. The Eurodollar term was first used for U.S. dollars in European banks, but it expanded over the years to its present definition—a U.S. dollar-denominated deposit in Tokyo or Beijing would be likewise deemed a Eurodollar deposit.

Solution to Exercise 3.

Figure 1.4 shows, a long position in an equity at time t_1 and a forward loan starting at t_1 can be used to replicate the payoffs of an equity swap. Eurodollar are deposits denominated in U.S. dollars at a bank outside the United States

Solution to Exercise 4.

As Figure 1.8 shows, a a foreign currency loan can be synthetically created by borrowing in local currency, converting the local currency into foreign currency in the spot market and entering

forward agreement to sell the foreign currency in the future and buying local currency. The euro-prefix refers to any currency held in a country where it is not the official currency: for example, euroyen or even euroeuro.

Solution Case Study: Japanese Loans and Forwards

1.   Follow Figures 1-7 and 1-8 from the text.

2.   Japanese banks borrow in yen, and buy spot dollars from their Western counterparties. So, the Western banks are left holding the yen for the time of the loan (three months, in this case). The main point is here. In an FX transaction, in this case buying Yen, the purchased currency may have to be kept overnight in a Yen denominated account. The FX is by definition not euroYen, so these accounts have to be in a bank Japan. Some of these will be Japanese banks.

3.   A nostro account is one that a bank holds with a "foreign bank". (In this case London banks hold Nostro accounts with Japanese Banks inTokyo, for example).[1] Nostro accounts are usually in the currency of the foreign country. Suppose an American bank called Bank A buys Euros from an European bank Bank B. These Euros cannot "leave" Europe. They will be sent to a European bank, say Bank of Europe, to be kept in a Deposit account for the use of Bank A. This would be a nostro account of Bank A. Bank A will have similar nostro accounts in Japan, Australia, etc... to trade Dollar against Yen or Australian dollar. This allows for easy cash management because the currency doesn't need to be converted. Incidentally, nostro is derived from the Latin term "ours".[2] The Western banks may not be willing to hold the Yen in their

[1] Nostro accounts are mostly commonly used for currency settlement, where a bank or other financial institution needs to hold balances in a currency other than its home accounting unit.
[2] For more details, see http://en.wikipedia.org/wiki/Nostro_and_vostro_accounts.

nostro accounts because this requires them to hold capital against the yen for regulatory purposes. Japanese banks being more risky, risk managers may also be against holding "too much" in a Nostro account in Japan. Note that banks operate in an environment where others have credit lines against each other. The "Headquarters" may not want a currency desk to have exposure to Japanese Banks beyond a certain limit. This may force Western banks to dump the excess Yens at a negative interest rate.

4.   By not holding the yen, the Western banks could potentially lose significant sums if the bank where the Nostro account is held defaults. For this reason they may prefer to dump the yen deposits and earn negative yield because they can be more than compensated with their earnings from the spot-forward trade.

5.   The Covered Interest Rate Parity (CIRP) relationship, derived in Chapter 6, is the appropriate formula. The CIRP states that the forward-spot spread is equal to the interest rate differential:

$$F(t,T)/S(t)= (1+i(t,T))/(1+i^*(t,T)),$$

where S(t) is, for example, the spot USD/EUR rate expressed a the amount of USD that 1 EUR can buy. An increase in S(t) over time means that the EUR appreciates relative to the USD as more USD can be bought with 1 EUR. The interest rate i(t,T) is the USD interst rate from time t to time T. The interest rate i*(t,T) is the EUR interest rate from t to T. For CIRP to hold any positive (negative) interest rate differential must be offset by the currency loss (gain). For example, if $i(t,T) > i^*(t,T)$ then (under certain simplying assumptions) an arbitrage could potentially be available by borrowing in EUR at the rate $i^*(t,T)$, converting the EUR into USD and investing at the rate USD interest rate $i(t,T)$ and locking in the rate at which the USD are

converted back into EUR in the future to pay back the EUR loan. This arbitrage would exist

unless $F(t,T) > S(t)$.