# Solutions for End-of-Chapter Questions and Problems: Chapter Thirteen

1. What are four FX risks faced by FIs?

Four risks include (1) trading in foreign securities, (2) making foreign currency loans, (3) issuing foreign currency-denominated debt, and (4) buying foreign currency-issued securities.

1. What is the spot market for FX? What is the forward market for FX? What is the position of being net long in a currency?

The spot market for foreign exchange involves transactions for immediate delivery of a currency, while the forward market involves agreements to deliver a currency at a later time for a price or exchange rate that is determined at the time the agreement is reached. The net exposure of a foreign currency is the net foreign asset position plus the net foreign currency position. Net long in a currency means that the amount of foreign assets exceeds the amount of foreign liabilities.

3. Refer to Table 13-1.

a. What was the spot exchange rate of Canadian dollars for U.S. dollars on July 4, 2012?

The spot exchange rate of Canadian dollars for U.S. dollars was 1.0131 on July 4, 2012.

b. What was the six-month forward exchange rate of Japanese yen for U.S. dollars on

July 4, 2012?

The six-month forward exchange rate of Japanese yen for U.S. dollars was 79.66 on July 4, 2012.

c. What was the three-month forward exchange rate of U.S. dollars for Swiss francs on July 4, 2012?

The three-month forward exchange rate of U.S. dollars for Swiss francs was 1.0455 on July 4, 2012.

4. Refer to Table 13-1.

a. On June 4, 2012, you purchased a British pound-denominated CD by converting $1 million to pounds at a rate of 0.6435 pounds for U.S. dollars. It is now July 4, 2012. Has the U.S. dollar appreciated or depreciated in value relative to the pound?

The exchange rate of British pounds for U.S. dollars on July 4, 2012 was 0.6414. The U.S. dollar has depreciated in value relative to the pound.

b. Using the information in part (a), what is your gain or loss on the investment in the CD? Assume no interest was been paid on the CD.

Initial investment was $1 million x 0.6435 = 643,500 pounds.

Exchanging the funds back to dollars on July 4, 2012 you will have

643,500 pounds / 0.6414 = $1,047,875

Your gain is $1,047,875 - $1,000,000 = $47,875.

5. On July 4, 2012, you convert $500,000 U.S. dollars to Japanese yen in the spot foreign exchange market and purchase a one-month forward contract to convert yen into dollars. How much will you receive in U.S. dollars at the end of the month? Use the data in Table 13-1 for this problem.

At the beginning of the month you convert $500,000 to yen at a rate of 79.87 yen per dollar, or you will have 500,000 x 79.87 = ¥39,935,000.

The one-month forward rate for the U.S. dollar for Japanese yen on July 4, 2012 was 0.012524. So, at the end of the month you will convert ¥39,935,000 to dollars at $0.012524 per ¥ or you will have

¥39,935,000 x 0.012524 = $500,145.94

6. X-IM Bank has ¥14 million in assets and ¥23 million in liabilities and has sold ¥8 million in foreign currency trading. What is the net exposure for X-IM? For what type of exchange rate movement does this exposure put the bank at risk?

The net exposure would be ¥14 million – ¥23 million – ¥8 million = - ¥17 million. This negative exposure puts the bank at risk of an appreciation of the yen against the dollar. A stronger yen means that repayment of the net position would require more dollars.

7. What two factors directly affect the profitability of an FI’s position in a foreign currency?

The profitability is a function of the size of the net exposure and the volatility of the foreign exchange rate.

8. The following are the foreign currency positions of an FI, expressed in the foreign currency.

**Currency Assets Liabilities FX Bought FX Sold**Swiss franc (SF) SF134,394 SF53,758 SF10,752 SF16,127 British pound (£) £30,488 £13,415 £9,146 £12,195

Japanese yen (¥) ¥7,075,472 ¥2,830,189 ¥1,132,075 ¥8,301,887

The exchange rate of dollars per SFs is 0.9301, of dollars per British pounds is 1.6400, and of dollars per yen is 0.010600.

The following are the foreign currency positions converted to dollars.

**Currency Assets Liabilities FX Bought FX Sold**Swiss franc (SF) $125,000 $50,000 $10,000 $15,000 British pound (£) $50,000 $22,001 $14,999 $20,000

Japanese yen (¥) $75,000 $30,000 $12,000 $88,000

a. What is the FI’s net exposure in Swiss francs stated in SF and in $s?

Net exposure in stated in SFs = SF134,394 - SF53,758 + SF10,752 - SF16,127 = SF75,261

Net exposure in stated in $s = $125,000 - $50,000 + $10,000 - $15,000 = $70,000

b. What is the FI’s net exposure in British pounds stated in £ and in $s?

Net exposure in £ = £30,488 - £13,415 + £9,146 - £12,195= £14,024

Net exposure in $ = $50,000 - $22,001 + $15,000 - $20,000 = $22,999

c. What is the FI’s net exposure in Japanese yen stated in ¥s and in $s?

Net exposure in ¥ = ¥7,075,472 - ¥2,830,189 + ¥1,132,075 - ¥8,301,887= - ¥2,924,529

Net exposure in $ = $75,000 - $30,000 + $12,000 - $88,000 = -$31,000

d. What is the expected loss or gain if the SF exchange rate appreciates by 1 percent? State you answer in SFs and $s.

If assets are greater than liabilities, then an appreciation of the foreign exchange rates will generate a gain = SF75,261 x 0.01 = SF7,261, or $70,000 x 0.01 = $7,000.

e. What is the expected loss or gain if the £ exchange rate appreciates by 1 percent? State you answer in £s and $s.

Gain = £14,024 x 0.01 = $140, or $22,999 x 0.01 = $230

f. What is the expected loss or gain if the ¥ exchange rate appreciates by 2 percent? State you answer in ¥s and $s.

Loss = - ¥2,924,529 x 0.02 = -$58,491 or -$31,000 x 0.02 = -$620

9. What are the four FX trading activities undertaken by FIs? How do FIs profit from these activities?

The four areas of FX activity undertaken by FIs are either for their customer’s accounts or for their own proprietary trading accounts. They involve the purchase and sale of FX in order to (a) complete international commercial transactions, (b) invest abroad in direct or portfolio investments, (c) hedge outstanding currency exposures, and (d) speculate against movements in currencies. Most FIs earn commissions on transactions made on behalf of their customers. If the FIs are market makers in currencies, they make their profits on the bid-ask spread.

10. City Bank issued $200 million of one-year CDs in the United States at a rate of 6.50 percent. It invested part of this money, $100 million, in the purchase of a one-year bond issued by a U.S. firm at an annual rate of 7 percent. The remaining $100 million was invested in a one-year Brazilian government bond paying an annual interest rate of 8 percent. The exchange rate at the time of the transaction was Brazilian real 0.50/$1.

a. What will be the net return on this $200 million investment in bonds if the exchange rate between the Brazilian real and the U.S. dollar remains the same?

Brazilian bonds issued in reals = $100m/0.50 = Real 200m

Cost of funds = 0.065 x $200 million = $13,000,000

Return on U.S. loan = 0.07 x $100 million = $ 7,000,000

Return on Brazilian bond = (0.08 x Real 200m) x 0.50 = $ 8,000,000

Total interest earned = $15,000,000

Net return on investment = ($15 million - $13 million)/$200 million = 1.00 percent.

b. What will be the net return on this $200 million investment if the exchange rate changes to real 0.4167/$1?

Cost of funds = 0.065 x $200 million = $13,000,000

Return on U.S. loan = 0.07 x $100 million = $ 7,000,000

Return on Brazilian bond = (0.08 x Real 200m) x 0.4167 = $ 6,667,200

Total interest earned = $13,667,200

Net return on investment = $13,666,667 - $13,000,000/$200,000,000 = 0.33 percent.

Consideration should be given to the fact that the Brazilian bond was for Real200 million. Thus, at maturity the bond will be paid back for Real200 million x 0.4167 = $83,340,000. Therefore, the strengthening dollar will have caused a loss in capital ($16,660,000) that far exceeds the interest earned on the Brazilian bond. Including this capital loss, the net return on investment is:

Net return on investment = ($13,666,667 - $13,000,000 - $16,666,667))/$200,000,000 = -8%

c. What will be the net return on this $200 million investment if the exchange rate changes to real 0.625/$1?

Cost of funds = 0.065 x $200 million = $13,000,000

Return on U.S. loan = 0.07 x $100 million = $ 7,000,000

Return on Brazilian bond = (0.08 x Real 200m) x 0.625 = $10,000,000

Total interest earned = $17,000,000

Net return on investment = $17,000,000 - $13,000,000/$200,000,000 = 2.00 percent.

Consideration should be given to the fact that the Brazilian bond was for Real200 million. Thus, at maturity the bond will be paid back for Real200 million x 0.625 = $125,000,000. Therefore, the strengthening real will have caused a gain in capital of $25,000,000 in addition to the interest earned on the Brazilian bond. Including this capital loss, the net return on investment is:

Net return on investment = ($17,000,000 - $13,000,000 + $25,000,000)/$200,000,000 = 14.50%

11. Sun Bank USA purchased a 16 million one-year euro loan that pays 12 percent interest annually. The spot rate of U.S. dollars per euro is 1.25. Sun Bank has funded this loan by accepting a British pound-denominated deposit for the equivalent amount and maturity at an annual rate of 10 percent. The current spot rate of U.S. dollars per British pound is 1.60.

a. What is the net interest income earned in dollars on this one-year transaction if the spot rates of U.S. dollars per euro and U.S. dollars per British pound at the end of the year are 1.35 and 1.70?

Loan amount = €16 million x 1.25 = $20.0 million

Deposit amount = $20.0m/1.60 = £12,500,000

Interest income at the end of the year = €16m x 0.12 = €1.92m x 1.35 = $2,592,000

Interest expense at the end of the year = £12,500,000 x 0.10 = £1,250,000 x 1.70 = $2,125,000

Net interest income = $2,592,000 - $2,125,000 = $290,000

b. What should be the spot rate of U.S. dollars per British pound at the end of the year in order for the bank to earn a net interest margin of 4 percent?

A net interest margin of 4 percent would imply $20,000,000 x 0.04 = $800,000.

The net cost of deposits should be $2,592,000 - 800,000 = $1,792,000.

Pound rate = $1,792,000/£1,250,000 = $1.4336/£1.

Thus, the pound should be selling at $1.4336/£1 in order for the bank to earn 4 percent.

c. Does your answer to part (b) imply that the dollar should appreciate or depreciate against the pound?

The dollar should depreciate against the pound. Each pound gives fewer dollars.

1. What is the total effect on net interest income and principal of this transaction given the end-of-year spot rates in part (a)?

Interest income and loan principal at year-end = (€16m x 1.12) x 1.35 = $24,192,000

Interest expense and deposit principal at year-end = (£12.5m x 1.10) x 1.70 = $23,375,000

Total income = $24,192,000 - $23,375,000 = $817,000

12. Bank USA just made a one-year $10 million loan that pays 10 percent interest annually. The loan was funded with a Swiss franc-denominated one-year deposit at an annual rate of 6 percent. The current spot rate is SF1.05/$1.

a. What will be the net interest income in dollars on the one-year loan if the spot rate at the end of the year is SF1.03/$1?

Swiss deposit account issued in SF = $10m x 1.05 = SF10.5m

Interest income at year-end = $10m x 0.10 = $1,000,000

Interest expense at year-end = (SF10,500,000 x 0.06)/1.03 = SF630,000/1.03 = $611,650.49

Net interest income = $1,000,000 - $611,650.49 = $388,349.51

b. What will be the net interest return on assets?

Net interest return on assets = $388,349.51/$10,000,000 = 0.0388 or 3.88 percent.

c. What is the total effect on net interest income and principal of this transaction given the end-of-year spot rates in part (a)?

Interest income and loan principal at year-end = $10m x 1.10 = $11,000,000.

Interest expense and deposit principal at year-end = (SF10,500,000 x 1.06)/1.03

= SF11,130,000/1.03 = $10,805,825.24

Total income = $11,000,000 - $10,805,825.24 = $194,173.76

d. How far can the SF/$ appreciate before the transaction will result in a loss for Bank USA?

Interest expense and deposit principal at year-end = (SF10,500,000 x 1.06)/SF/$

$11,000,000 => SF/$ = SF11,130,000/11,000,000 = 1.01182

13. What motivates FIs to hedge foreign currency exposures? What are the limitations to hedging foreign currency exposures?

FIs hedge to manage their exposure to currency risks, not to eliminate it. As in the case of interest rate risk exposure, it is not necessarily an optimal strategy to completely hedge away all currency risk exposure. By its very definition, hedging reduces the FI's risk by reducing the volatility of possible future returns. This narrowing of the probability distribution of returns reduces possible losses, but also reduces possible gains (i.e., it shortens both tails of the distribution). A hedge would be undesirable, therefore, if the FI wants to take a speculative position in a currency in order to benefit from some information about future currency rate movements. The hedge would reduce possible gains from the speculative position.

14. What are the two primary methods of hedging FX risk for an FI? What two conditions are necessary to achieve a perfect hedge through on-balance-sheet hedging? What are the advantages and disadvantages of off-balance-sheet hedging in comparison to on-balance-sheet hedging?

The manager of an FI can hedge using on-balance-sheet techniques or off-balance-sheet techniques. On-balance-sheet hedging requires matching currency positions and durations of assets and liabilities. If the duration of foreign-currency-denominated fixed rate assets is greater than similar currency denominated fixed rate liabilities, the market value of the assets could decline more than the liabilities when market rates rise and therefore the hedge will not be perfect. Thus, in matching foreign currency assets and liabilities, not only do they have to be of the same currency, but also of the same duration in order to have a perfect hedge.

Advantages of off-balance-sheet FX hedging:

The use of off-balance-sheet hedging devices, such as forward contracts, enables an FI to reduce or eliminate its FX risk exposure without forfeiting potentially lucrative transactions. On-balance-sheet transactions result in immediate cash flows, whereas off‑balance-sheet transactions result in contingent future cash flows. Therefore, the up-front cost of hedging using off-balance-sheet instruments is lower than the cost of on-balance-sheet transactions. Moreover, since on-balance-sheet transactions are fully reflected in financial statements, there may be additional disclosure costs to hedging on the balance sheet.

Off-balance-sheet hedging instruments have been developed for many types of risk exposures. For currency risk, forward contracts are available for the majority of currencies at a variety of delivery dates. Moreover, since the forward contract is negotiated over the counter, the counterparties have maximum flexibility to set terms and conditions.

Disadvantages of off-balance-sheet FX Hedging:

There is some credit risk associated with off-balance-sheet hedging instruments since there is some possibility that the counterparty will default on its obligations. This credit risk exposure is exacerbated in negotiated markets such as the forward market, but mitigated for exchange-traded hedging instruments such as futures contracts.

15. Suppose that a U.S. FI has the following assets and liabilities:

**Assets** **Liabilities**

$100 million $200 million

U.S. loans (one year) U.S. CDs (one year)

in dollars in dollars

$100 million equivalent

U.K. loans (one year)

(loans made in pounds)

The promised one-year U.S. CD rate is 5 percent, to be paid in dollars at the end of the year; the one-year, default risk–free loans in the United States are yielding 6 percent; and default risk–free one-year loans are yielding 12 percent in the United Kingdom. The exchange rate of dollars for pounds at the beginning of the year is $1.6/£1.

a. Calculate the dollar proceeds from the UK investment at the end of the year, the return on the FI’s investment portfolio, and the net interest margin for the FI if the spot foreign exchange rate has not changed over the year.

At the beginning of the year, the FI sells $100 million for pounds on the spot currency markets at an exchange rate of $1.60 to £ => $100 million/1.60 = £62.5 million.

At the end of the year, pound revenue from these loans will be £62.5(1.12) = £70 million.

Then the dollar proceeds from the U.K. investment are:

£70 million x $1.60/£1 = $112 million or as a return

$112 million - $100 million = 12.00%

$100 million

Given this, the weighted return on the FI’s portfolio of investments would be:

(0.5)(0.06) + (0.5)(0.12) = 0.09, or 9%

This exceeds the cost of the FI’s CDs by 4 percent (9% - 5%).

b. Calculate the dollar proceeds from the UK investment at the end of the year, the return on the FI’s investment portfolio, and the net interest margin for the FI if the spot foreign exchange rate falls to $1.45/£1 over the year.

At the end of the year, pound revenue from these loans will be £62.5(1.12) = £70 million.

Then the dollar proceeds from the U.K. investment are:

£70 million x $1.45/£1 = $101.5 million or as a return

$101.5 million - $100 million = 1.50%

$100 million

Given this, the weighted return on the FI’s portfolio of investments would be:

(0.5)(0.06) + (0.5)(0.0150) = 0.0375, or 3.75%

In this case, the FI actually has a loss or a negative interest margin (3.75% - 5% = -1.25%) on its balance sheet investments.

c. Calculate the dollar proceeds from the UK investment at the end of the year, the return on the FI’s investment portfolio, and the net interest margin for the FI if the spot foreign exchange rate rises to $1.70/£1 over the year.

At the end of the year, pound revenue from the loans will be £62.5(1.12) = £70 million.

Then the dollar proceeds from the U.K. investment are:

£70 million x $1.70/£1 = $119 million or as a return

$119 million - $100 million = 19.00%

$100 million

Given this, the weighted return on the FI’s portfolio of investments would be:

(0.5)(0.06) + (0.5)(0.19) = 0.1250, or 12.50%

This exceeds the cost of the FI’s CDs by 7.5 percent (12.5% - 5%).

16. Suppose that instead of funding the $100 million investment in 12 percent British loans with U.S. CDs, the FI manager in problem 15 funds the British loans with $100 million equivalent one-year pound CDs at a rate of 8 percent. Now the balance sheet of the FI would be as follows:

**Assets**   **Liabilities**

$100 million $100 million

U.S. loans (6%) U.S. CDs (5%)

$100 million $100 million

U.K. loans (12%) U.K. CDs (8%)

(loans made in pounds) (deposits raised in pounds)

a. Calculate the return on the FI’s investment portfolio, the average cost of funds, and the net interest margin for the FI if the spot foreign exchange rate falls to $1.45/£1 over the year.

As in part b in question 15, when the pound falls in value to $1.45/£1 at the end of the year, pound revenue from the British loans is be £62.5(1.12) = £70 million.

Then the dollar proceeds from the U.K. investment are:

£70 million x $1.45/£1 = $101.5 million or as a return

$101.5 million - $100 million = 1.50%

$100 million

and the weighted return on the FI’s portfolio of investments would be:

(0.5)(0.06) + (0.5)(0.0150) = 0.0375, or 3.75%

On the liability side of the balance sheet, at the beginning of the year, the FI borrows $100 million equivalent in pound CDs for one year at a promised interest rate of 11 percent. At an exchange rate of $1.60/£1, this is a pound equivalent amount of borrowing of $100 million/1.6 = £62.5 million.

At the end of the year, the FI must pay the pound CD holders their principal and interest, £62.5 million (1.08) = £67.50 million.

If the pound falls to $1.45/£1 over the year, the repayment in dollar terms would be

£67.50 million x $1.45/£1 = $97.875 million or as a return

$97.875 million - $100 million = -2.125%

$100 million

Thus, at the end of the year,

Average cost of funds:

(0.5)(0.05) + (0.5)(-0.02125) = 0.014375 = 1.4375%

Net return:

Average return on assets - Average cost of funds

3.75% - 1.4375% = 2.3125%

b. Calculate the return on the FI’s investment portfolio, the average cost of funds, and the net interest margin for the FI if the spot foreign exchange rate rises to $1.70/£1 over the year.

As in part c in question 15, when the pound rises in value to $1.70/£1 at the end of the year, pound revenue from the British loans is be £62.5(1.12) = £70 million.

Then the dollar proceeds from the U.K. investment are:

£70 million x $1.70/£1 = $119 million or as a return

$119 million - $100 million = 19.00%

$100 million

and the weighted return on the FI’s portfolio of investments would be:

(0.5)(0.06) + (0.5)(0.19) = 0.1250, or 12.50%

On the liability side of the balance sheet, at the beginning of the year, the FI borrows $100 million equivalent in pound CDs for one year at a promised interest rate of 11 percent. At an exchange rate of $1.60/£1, this is a pound equivalent amount of borrowing of $100 million/1.6 = £62.5 million.

At the end of the year, the FI must pay the pound CD holders their principal and interest, £62.5 million (1.08) = £67.50 million.

If the pound increases to $1.70/£1 over the year, the repayment in dollar terms would be

£67.50 million x $1.70/£1 = $114.75 million or as a return

$114.75 million - $100 million = 14.75%

$100 million

Thus, at the end of the year,

Average cost of funds:

(0.5)(0.05) + (0.5)(0.1475) = 0.09875 = 9.875%

Net return:

Average return on assets - Average cost of funds

12.50% - 9.875% = 2.625%

17. Suppose that instead of funding the $100 million investment in 12 percent British loans with CDs issued in the United Kingdom, the FI manager in problem 16 hedges the foreign exchange risk on the British loans by immediately selling its expected one-year pound loan proceeds in the forward FX market. The current forward one-year exchange rate between dollars and pounds is $1.53/£1.

a. Calculate the return on the FI’s investment portfolio (including the hedge) and the net interest margin for the FI over the year.

The U.S. FI sells $100 million for pounds at the spot exchange rate today and receives $100 million/1.6 = £62.5 million. The FI then immediately lends the £62.5 million to a British customer at 12 percent for one year.

The FI also sells the expected principal and interest proceeds from the pound loan forward for dollars at today’s forward rate for one-year delivery.

This means that the forward buyer of pounds promises to pay:

£62.5 million (1.12) x $1.53/£1 = £70 million x $1.53/£1 = $107.1 million

to the FI (the forward seller) in one year when the FI delivers the £70 million proceeds of the loan to the forward buyer.

In one year, the British borrower repays the loan to the FI plus interest in pounds (£70 million).

The FI delivers the £70 million to the buyer of the one-year forward contract and receives the promised $107.1 million.

The FI knows from the very beginning of the investment period that it has locked in a guaranteed return on the British loan of:

$107.10m - $100m = 0.0710 = 7.10%

$100m

Given this return on British loans, the overall expected return on the FI’s asset portfolio is:

(0.5)(0.06) + (0.5)(0.0710) = 0.0655, or 6.55%

Net return:

Average return on assets - Average cost of funds

6.55% - 5.00% = 1.55%

b. Will the net return be affected by changes in the dollar for pound spot foreign exchange rate at the end of the year?

The net return is fully hedged against any dollar/pound exchange rate changes over the one-year holding period of the loan investment. By selling the expected proceeds on the pound loan forward, at a known (forward FX) exchange rate today, the FI removes the future spot exchange rate uncertainty and thus, the uncertainty relating to investment returns on the British loan.

18. Suppose that a U.S. FI has the following assets and liabilities:

**Assets** **Liabilities**

$300 million $500 million

U.S. loans (one year) U.S. CDs (one year)

in dollars in dollars

$200 million equivalent

German loans (one year)

(loans made in euros)

The promised one-year U.S. CD rate is 4 percent, to be paid in dollars at the end of the year; the one-year, default risk–free loans in the United States are yielding 6 percent; and default risk–free one-year loans are yielding 10 percent in Germany. The exchange rate of dollars for euros at the beginning of the year is $1.25/€1.

a. Calculate the dollar proceeds from the German loan at the end of the year, the return on the FI’s investment portfolio, and the net interest margin for the FI if the spot foreign exchange rate has not changed over the year.

At the beginning of the year, the FI sells $200 million for euros on the spot currency markets at an exchange rate of $1.25 to € => $200 million/1.25 = €160 million.

At the end of the year, euro revenue from these loans will be €160(1.10) = €176 million.

Then the dollar proceeds from the German loan are:

€176 million x $1.25/€1 = $220 million or as a return

$220 million - $200 million = 10%

$200 million

Given this, the weighted return on the FI’s portfolio of investments would be:

(300m/500m)(0.06) + (200m/500m)(0.10) = 0.076, or 7.60%

This exceeds the cost of the FI’s CDs by 3.6 percent (7.6% - 4%).

b. Calculate the dollar proceeds from the German loan at the end of the year, the return on the FI’s investment portfolio, and the net interest margin for the FI if the spot foreign exchange rate falls to $1.15/€1 over the year.

At the end of the year, euro revenue from these loans will be €160(1.10) = €176 million.

Then the dollar proceeds from the German loan are:

€176 million x $1.15/€1 = $202.4 million or as a return

$202.4 million - $200 million = 1.20%

$200 million

Given this, the weighted return on the FI’s portfolio of investments would be:

(300m/500m)(0.06) + (200m/500m)(0.0120) = 0.0408, or 4.08%

This exceeds the cost of the FI’s CDs by 0.08 percent (4.08% - 4% = 0.08%).

c. Calculate the dollar proceeds from the German loan at the end of the year, the return on the FI’s investment portfolio, and the net interest margin for the FI if the spot foreign exchange rate rises to $1.35/€1 over the year.

At the end of the year, euro revenue from the loans will be €160(1.10) = €176 million.

Then the dollar proceeds from the German loan are:

€176 million x $1.35/€1 = $237.6 million or as a return

$237.6 million - $200 million = 18.8%

$200 million

Given this, the weighted return on the FI’s portfolio of investments would be:

(300m/500m)(0.06) + (200m/500m)(0.188) = 0.1112, or 11.12%

This exceeds the cost of the FI’s CDs by 7.12 percent (11.12% - 4%).

19. Suppose that instead of funding the $200 million investment in 10 percent German loans with U.S. CDs, the FI manager in problem 18 funds the German loans with $200 million equivalent one-year euro CDs at a rate of 7 percent. Now the balance sheet of the FI would be as follows:

**Assets**   **Liabilities**

$300 million $300 million

U.S. loans (6%) U.S. CDs (4%)

$200 million $200 million

German loans (10%) German CDs (7%)

(loans made in euros) (deposits raised in euros)

a. Calculate the return on the FI’s investment portfolio, the average cost of funds, and the net interest margin for the FI if the spot foreign exchange rate falls to $1.15/€1 over the year.

As in part b in question 18, when the euro falls in value to $1.15/€1 at the end of the year, euro revenue from the German loans is be €160(1.10) = €176 million.

Then the dollar proceeds from the German loan are:

€176 million x $1.15/€1 = $202.4 million or as a return

$202.4 million - $200 million = 1.20%

$200 million

and the weighted return on the FI’s portfolio of investments would be:

(300m/500m)(0.06) + (200m/500m)(0.0120) = 0.0408, or 4.08%

On the liability side of the balance sheet, at the beginning of the year, the FI borrows $200 million equivalent in euro CDs for one year at a promised interest rate of 7 percent. At an exchange rate of $1.25/€1, this is a euro equivalent amount of borrowing of $200 million/1.25 = €160 million.

At the end of the year, the FI must pay the pound CD holders their principal and interest, €160 million (1.07) = €171.20 million.

If the euro falls to $1.15/€1 over the year, the repayment in dollar terms would be

€171.20 million x $1.15/€1 = $196.88 million or as a return

$196.88 million - $200 million = -1.56%

$200 million

Thus, at the end of the year,

Average cost of funds:

(300m/500m)(0.04) + (200m/500m)(-0.0156) = 0.01776, or 1.776%

Net return:

Average return on assets - Average cost of funds

4.08% - 1.776% = 2.304%

b. Calculate the return on the FI’s investment portfolio, the average cost of funds, and the net interest margin for the FI if the spot foreign exchange rate rises to $1.35/€1 over the year.

As in part c in question 18, when the euro rises in value to $1.35/€1 at the end of the year, euro revenue from the German loans is be €160(1.10) = €176 million.

Then the dollar proceeds from the German loan are:

€176 million x $1.35/€1 = $237.6 million or as a return

$237.6 million - $200 million = 18.80%

$200 million

and the weighted return on the FI’s portfolio of investments would be:

(300m/500m)(0.06) + (200m/500m)(0.188) = 0.112, or 11.20%

On the liability side of the balance sheet, at the beginning of the year, the FI borrows $200 million equivalent in euro CDs for one year at a promised interest rate of 7 percent. At an exchange rate of $1.25/€1, this is a euro equivalent amount of borrowing of $200 million/1.25 = €160 million.

At the end of the year, the FI must pay the pound CD holders their principal and interest, €160 million (1.07) = €171.20 million.

If the euro increases to $1.35/€1 over the year, the repayment in dollar terms would be

€171.20 million x $1.35/€1 = $231.12 million or as a return

$231.12 million - $200 million = 15.56%

$200 million

Thus, at the end of the year,

Average cost of funds:

(300m/500m)(0.04) + (200m/500m)(0.1556) = 0.08624, or 8.624%

Net return:

Average return on assets - Average cost of funds

11.2% - 8.624% = 2.576%

20. Suppose that instead of funding the $200 million investment in 10 percent German loans with CDs issued in Germany, the FI manager in problem 19 hedges the foreign exchange risk on the German loans by immediately selling its expected one-year euro loan proceeds in the forward FX market. The current forward one-year exchange rate between dollars and euros is $1.20/€1.

a. Calculate the return on the FI’s investment portfolio (including the hedge) and the net interest margin for the FI over the year.

The U.S. FI sells $200 million for pounds at the spot exchange rate today and receives $200 million/1.25 = €160 million. The FI then immediately lends the €160 million to a German customer at 10 percent for one year.

The FI also sells the expected principal and interest proceeds from the euro loan forward for dollars at today’s forward rate for one-year delivery.

This means that the forward buyer of euros promises to pay:

€160 million (1.10) x $1.20/€1 = €176 million x $1.20/€1 = $211.2 million

to the FI (the forward seller) in one year when the FI delivers the €176 million proceeds of the loan to the forward buyer.

In one year, the German borrower repays the loan to the FI plus interest in euros (€176 million).

The FI delivers the €176 million to the buyer of the one-year forward contract and receives the promised $211.2 million.

The FI knows from the very beginning of the investment period that it has locked in a guaranteed return on the German loan of:

$211.20m - $200m = 0.0560 = 5.60%

$200m

Given this return on British loans, the overall expected return on the FI’s asset portfolio is:

(300m/500m)(0.06) + (200m/500m)(0.0560) = 0.0584, or 5.84%

Net return:

Average return on assets - Average cost of funds

5.84% - 4.00% = 1.84%

b. Will the net return be affected by changes in the dollar for euro spot foreign exchange rate at the end of the year?

The net return is fully hedged against any dollar/euro exchange rate changes over the one-year holding period of the loan investment. By selling the expected proceeds on the euro loan forward, at a known (forward FX) exchange rate today, the FI removes the future spot exchange rate uncertainty and thus, the uncertainty relating to investment returns on the German loan.

21. North Bank has been borrowing in the U.S. markets and lending abroad, thus incurring foreign exchange risk. In a recent transaction, it issued a one-year, $2 million CD at 6 percent and funded a loan in euros at 8 percent. The spot rate for the euro was €1.45/$1 at the time of the transaction.

a. Information received immediately after the transaction closing indicated that the euro will change to €1.47/$1 by year-end. If the information is correct, what will be the realized spread on the loan inclusive of principal? What should have been the bank interest rate on the loan to maintain the 2 percent spread?

Amount of loan in € = $2 million x 1.45 = €2.9 million

Interest and principal at year-end = €2.9m x 1.08 = €3.132m/1.47 = $2,130,612.24

Interest and principal of CDs = $2m x 1.06 = $2,120,000

Net interest income = $2,130,612.24 – $2,120,000 = $10,612.24

Net interest margin = $10,612.24/2,000,000 = 0.0053 or 0.53 percent

In order to maintain a 2 percent spread, the interest and principal earned at €1.47/$ should be: €2.9m(1 + x)/1.47 = $2.16m (Because ($2.16m - $2.12m)/$2.00m = 0.02, or 2%).

Therefore, (1 + x) = ($2.16m x 1.47)/ €2.9m = 1.0949, and x = 0.0949 or 9.49 percent,

or the bank should have charged a rate of 9.49 percent on the loan.

b. The bank had an opportunity to sell one-year forward euros at €1.46/$1. What would have been the spread on the loan if the bank had hedged forward its foreign exchange exposure?

Net interest income if hedged = €2.9m x 1.08 = €3.132m/1.46 = $2.1452m - $2.12m

= $0.0252 million, or $25,205.48

Net interest margin = $0.0252m/$2m = 0.0126, or 1.26 percent

c. What would have been an appropriate change in loan rates to maintain the 2 percent spread if the bank intended to hedge its exposure using the forward contracts?

To maintain a 2 percent spread: €2.9m(1 + x)/1.46 = $2.16m => x = 8.74 percent

The bank should increase the loan rate to 8.74 percent and hedge with the sale of forward €s to maintain a 2 percent spread.

22. A bank purchases a six-month, $1 million Eurodollar deposit at an annual interest rate of 6.5 percent. It invests the funds in a six-month Swedish krone AA-rated bond paying 7.5 percent per year. The current spot rate is $0.18/SK1.

a. The six-month forward rate on the Swedish krone is being quoted at $0.1810/SK1. What is the net spread earned on this investment if the bank covers its foreign exchange exposure using the forward market?

Interest plus principal expense on six-month CD = $1m x (1 + 0.065/2) = $1,032,500

Principal of Swedish bond = $1,000,000/0.18 = SK5,555,555.56

Interest and principle = SK5,555,555.56 x (1 + 0.075/2) = SK 5,763,888.89

Interest and principle in dollars if hedged: SK 5,763,888.89 x 0.1810 = $1,043,263.89

Spread = $1,043,263.89 - 1,032,500 = $10,763.89/1 million = 0.010764 for 6 months, or 2.15 percent annually

b. What forward rate will cause the spread to be only 1 percent per year?

In this case, net interest income should be = (0.01/2) x 1,000,000 = $5,000

Therefore, interest income should be = $1,043,263.86 - $5,000 = $1,038,263.86

Forward rate = $1,038,263.86/SK5,763,888.89 = $0.18/SK1

For the spread to be 1% the spot and the forward need to be equal.

c. Explain how forward and spot rates will both change in response to the increased spread?

If FIs are able to earn higher spreads in other countries and guarantee these returns by using the forward markets, these are equivalent to risk-free investments (except for default risk). As a result, in part (a), there will be an increase in demand for the Swedish krone in the spot market and an increase in sales of the forward Swedish krone as more FIs engage in this kind of lending. This results in an appreciation of the spot krone rate and a depreciation of the forward krone rate until the spread is zero for securities of equal risk.

d. Why will a bank still be able to earn a spread of 1 percent knowing that interest rate parity usually eliminates arbitrage opportunities created by differential rates?

In part (b), the FI is still able to earn a spread of one percent because the risks of the securities are not equal. The FI earns an extra one percent because it is lending to an AA-rated firm. The dollar-denominated deposits in the Eurocurrency markets are rated higher because these deposits usually are issued by large institutions. Thus, the one percent spread reflects credit or default risk. If the FI were to invest in securities of equal risk in Sweden, arbitrage would ensure that the spread is zero.

23. How does the lack of perfect correlation of economic returns between international

financial markets affect the risk-return opportunities for FIs holding multicurrency assets

and liabilities? Refer to Table 13-6. Which country pairings seem to have the highest

correlation of stock returns before and during the financial crisis?

If financial markets are not perfectly correlated, they provide opportunities to diversify and reduce risk from mismatches in assets and liabilities in individual currencies. The benefits of diversification depend on the extent of the correlations. The lower the correlation, the greater the benefits. However, FIs that only hold one or two foreign assets and liabilities cannot take advantage of these benefits and have to hedge their individual portfolio exposures.

From Table 13-6 in order of rank the country pairs with the highest correlations before the financial crisis are United Kingdom-Canada, United States-Canada, United States-Brazil, United States-Germany, Japan-Hong Kong, and Australia-Hong Kong. The country pairs with the lowest correlations before the financial crisis are United States-Australia, United States-Japan, Japan-Brazil, United States-Hong Kong, Brazil-Hong Kong, and Japan-Canada.

Relative to the pre-crisis period, stock market return correlations increased during the financial crisis. The country pairs with the highest correlations during the financial crisis are United Kingdom-Canada, United States-Canada, United States-Brazil, United States-Germany, Japan-Australia, United States-United Kingdom, and Australia-Hong Kong. The country pairs with the lowest correlations before the financial crisis are Japan-Brazil, United States-Japan, United States-Australia, Japan-Canada, United States-Hong Kong, Japan-Germany, and United Kingdome-Japan.

24. What is the purchasing power parity theorem?

As relative inflation rates (and interest rates) change, foreign currency exchange rates that are not constrained by government regulation should also adjust to account for relative differences in the price levels (inflation rates) between the two countries. According to purchasing power parity (PPP), foreign currency exchange rates between two countries adjust to reflect changes in each country’s price levels (or inflation rates and implicitly interest rates) as consumers and importers switch their demands for goods from relatively high inflation (interest) rate countries to low inflation (interest) rate countries. Specifically, the PPP theorem states that the change in the exchange rate between two countries’ currencies is proportional to the difference in the inflation rates in the two countries.

25. Suppose that the current spot exchange rate of U.S. dollars for Australian dollars, *SUS$/A$,*

is 1.0277 (i.e., $1.0277 can be received for 1 Australian dollar). The price of Australian-

produced goods increases by 5 percent (i.e., inflation in Australia, *IPA*, is 5 percent), and the U.S. price index increases by 3 percent (i.e., inflation in the United States, *IPUS*, is 3 percent). Calculate the new spot exchange rate of U.S. dollars for Australian dollars that should result from the differences in inflation rates.

According to PPP, the 5 percent rise in the price of Australian goods relative to the 3 percent rise in the price of U.S. goods results in a depreciation of the Australian dollar (by 2 percent). Specifically, the exchange rate of Australian dollars to U.S. dollars should fall, so that:

i*US*- i*A*= Δ*SUS$/A$*/*SUS$/A$*

Plugging in the inflation and exchange rates, we get:

0.03 - 0.05 = Δ*SUS$/A$/SUS$/A$* = Δ*SUS$/A$*/ 1.0277

or: -0.02 = Δ*SUS$/A$*/1.0277

and: Δ*SUS$/A$* = -(0.02) × 1.0277 = -0.020554

Thus, it costs 2.0554 cents less to receive an Australian dollar (or $1.007146 ($1.0277 - $0.020554), can be received for 1 Australian dollar). The Australian dollar depreciates in value by 2 percent against the U.S. dollar as a result of its higher inflation rate.

26. Explain the concept of interest rate parity? What does this concept imply about the long-run profit opportunities from investing in international markets? What market conditions must prevail for the concept to be valid?

Interest rate parity argues that the discounted spread between domestic and foreign interest rates is equal to the percentage spread between forward and spot exchange rates. If interest rate parity holds, then it is not possible for FIs to borrow and lend in different currencies to take advantage of the differences in interest rates between countries. This is because the spot and forward rates will adjust to ensure that no arbitrage can take place through cross-border investments. If a disparity exists, the sale and purchase of spot and forward currencies by arbitragers will ensure that in equilibrium interest rate parity is maintained.

27. Assume that annual interest rates are 8 percent in the United States and 4 percent in Japan. An FI can borrow (by issuing CDs) or lend (by purchasing CDs) at these rates. The spot rate is $0.0125/¥.

a. If the forward rate is $0.0135/¥, how could the FI arbitrage using a sum of $1million? What is the expected spread?

Borrow $1,000,000 in U.S. by issuing CDs

⇒ Interest and principal at year-end = $1,000,000 x 1.08 = $1,080,000

Make a loan in Japan

⇒ Interest and principal = $1,000,000/0.0125 = ¥80m x 1.04 = ¥83.2m

Purchase U.S. dollars at the forward rate of $0.0135 x 83.2m = $1,123,200

Spread = $1,123,200 - $1,080,000 = $43,200/1,000,000 = 4.32%

b. What forward rate will prevent an arbitrage opportunity?

The forward rate that will prevent any arbitrage is given by solving the following equation:



Ft = [(1 + 0.08) x 0.0125]/(1.04) = $0.01298/¥

28. What is the relationship between the real interest rate, the expected inflation rate, and the nominal interest rate on fixed-income securities in any particular country? What factors may be the reasons for the relatively high correlation coefficients?

The nominal interest rate is equal to the real interest rate plus the expected inflation rate on assets where default risk is not an issue. The strength of correlations among countries whose economies are considered to be the leaders of the industrialized nations is evidence that the world capital markets among these markets are reasonably well-integrated.

29. What is economic integration? What impact does the extent of economic integration of international markets have on the investment opportunities for FIs?

If markets are not perfectly correlated, some barriers for free trade exist between the markets and, therefore, they are not fully integrated. When markets are fully integrated, opportunities for diversification are reduced. Also, real returns across countries are equal. Thus, diversification benefits occur only when nominal and real rates differ between countries. This happens when some formal or informal barriers exist to prevent the free flow of capital across countries.

30. An FI has $100,000 of net positions outstanding in British pounds (£) and -$30,000 in Swiss francs (SF). The standard deviation of the net positions as a result of exchange rate changes is 1 percent for the SF and 1.3 percent for the £. The correlation coefficient between the changes in exchange rates of the £ and the SF is 0.80.

a. What is the risk exposure to the FI of fluctuations in the £/$ rate?

Since the FI has a positive £ position, an appreciation of the £ will increase the value of its £-denominated assets more than its liabilities, providing a net gain. The opposite will occur if the £ depreciates.

b. What is the risk exposure to the FI of fluctuations in the SF/$ rate?

Since the FI has a negative net position in SFs, the value of its Swiss-denominated assets will increase in value, but not as much as the value of its liabilities. Hence, an appreciation of the SF will lead to a net loss. The opposite will occur if the currency depreciates.

c. What is the risk exposure if both the £ and the SF positions are combined?

Use the formula:

 = $72,671

The FI’s net position is actually $72,671. Without including correlation, the exposure is estimated at $100,000 - $30,000 = $70,000.

31. A money market mutual fund manager is looking for some profitable investment opportunities and observes the following one-year interest rates on government securities and exchange rates: rUS = 12%, rUK = 9%, S = $1.50/£1, F = $1.60/£1, where S is the spot exchange rate and F is the forward exchange rate. Which of the two types of government securities would constitute a better investment?

The U.K. securities would yield a higher return. Compared to the 12 percent return in the U.S., a U.S. investor could convert $1,000,000 to £666,667 and invest it at 9 percent. In one year the expected return of principal and interest is £726,667. If these pounds are sold forward at $1.6/£1, the investor will lock in $1,162,667 for a 16.27 percent return.

**Integrated Mini Case: Foreign Exchange Risk Exposure**

Suppose that a U.S. FI has the following assets and liabilities:

**Assets** **Liabilities**

$500 million $1,000 million

U.S. loans (one year) U.S. CDs (one year)

in dollars in dollars

$300 million equivalent

U.K. loans (one year)

(loans made in pounds)

$200 million equivalent

Turkish loans (one year)

(loans made in Turkish lira)

The promised one-year U.S. CD rate is 4 percent, to be paid in dollars at the end of the year; the one-year, default risk–free loans in the United States are yielding 6 percent; default risk–free one-year loans are yielding 8 percent in the United Kingdom; and default risk–free one-year loans are yielding 10 percent in Turkey. The exchange rate of dollars for pounds at the beginning of the year is $1.6/£1, and the exchange rate of dollars for Turkish lira at the beginning of the year is $0.5533/TRY1.

1. Calculate the dollar proceeds from the FI’s loan portfolio at the end of the year, the return on the FI’s loan portfolio, and the net interest margin for the FI if the spot foreign exchange rate has not changed over the year.

At the beginning of the year, the FI sells $300 million for pounds on the spot currency markets at an exchange rate of $1.60 to £ => $300 million/1.60 = £187.5 million.

In addition, the FI sells $200 million for lira on the spot currency markets at an exchange rate of $0.5533 to TRY => $200 million/0.5533 = TRY361,467,558.

At the end of the year, pound revenue from these loans will be £187.5(1.08) = £202.5 million and lira revenue from these loans will be TRY361,467,558 (1.10) = TRY397,614,314.

Then the dollar proceeds from the U.K. loan are:

£202.5 million x $1.60/£1 = $324 million or as a return

$324 million - $300 million = 8.00%

$300 million

and the dollar proceeds from the Turkish loan are:

TRY397,614,314 x $0.5533/TRY1 = $220 million or as a return

$220 million - $200 million = 10.00%

$200 million

Given this, the weighted return on the FI’s loan portfolio would be:

(0.5)(0.06) + (0.3)(0.08) + (0.2)(0.10) = 0.074, or 7.40%

This exceeds the cost of the FI’s CDs by 3.4 percent (7.4% - 4%).

2. Calculate the dollar proceeds from the FI’s loan portfolio at the end of the year, the return on the FI’s loan portfolio, and the net interest margin for the FI if the pound spot foreign exchange rate falls to $1.45/£1 and the lira spot foreign exchange rate falls to $0.52/TRY1 over the year.

At the end of the year, pound revenue from these loans will be £187.5(1.08) = £202.5 million and lira revenue from these loans will be TRY361,467,558 (1.10) = TRY397,614,314.

Then the dollar proceeds from the U.K. loan are:

£202.5 million x $1.45/£1 = $293.625 million or as a return

$293.625 million - $300 million = -2.125%

$300 million

and the dollar proceeds from the Turkish loan are:

TRY397,614,314 x $0.52/TRY1 = $206,759,443 or as a return

$206,759,443 - $200 million = 3.38%

$200 million

Given this, the weighted return on the FI’s loan portfolio would be:

(0.5)(0.06) + (0.3)(-0.02125) + (0.2)(0.0338) = 0.0304, or 3.04%

In this case, the FI actually has a loss or a negative interest margin (3.04% - 4% = -0.96%) on its balance sheet investments.

3. Calculate the dollar proceeds from the FI’s loan portfolio at the end of the year, the return on the FI’s loan portfolio, and the net interest margin for the FI if the pound spot foreign exchange rate rises to $1.70/£1 and the lira spot foreign exchange rate rises to $0.58/TRY1 over the year.

At the end of the year, pound revenue from these loans will be £187.5(1.08) = £202.5 million and lira revenue from these loans will be TRY361,467,558 (1.10) = TRY397,614,314.

Then the dollar proceeds from the U.K. investment are:

£202.5 million x $1.70/£1 = $344.25 million or as a return

$344.25 million - $300 million = 14.75%

$300 million

and the dollar proceeds from the Turkish loan are:

TRY397,614,314 x $0.58/TRY1 = $230,616,302 or as a return

$230,616,302 - $200 million = 15.31%

$200 million

Given this, the weighted return on the FI’s loan portfolio would be:

(0.5)(0.06) + (0.3)(0.1475) + (0.2)(0.1531) = 0.1049, or 10.49%

This exceeds the cost of the FI’s CDs by 6.49 percent (10.49% - 4%).

4. Suppose that instead of funding the $300 million investment in 8 percent British loans with U.S. CDs, the FI manager funds the British loans with $300 million equivalent one-year pound CDs at a rate of 5 percent and that instead of funding the $200 million investment in 10 percent Turkish loans with U.S. CDs, the FI manager funds the Turkish loans with $200 million equivalent one-year Turkish lira CDs at a rate of 6 percent. What will the FI’s balance sheet look like after these changes have been made?

The balance sheet of the FI would be as follows:

**Assets**   **Liabilities**

$500 million $500 million

U.S. loans (6%) U.S. CDs (4%)

$300 million $300 million

U.K. loans (8%) U.K. CDs (5%)

(loans made in pounds) (deposits raised in pounds)

$200 million $200 million

Turkish loans (10%) Turkish CDs (6%)

(loans made in Turkish lira) (deposits raised in Turkish lira)

5. Using the information in part 4, calculate the return on the FI’s loan portfolio, the average cost of funds, and the net interest margin for the FI if the pound spot foreign exchange rate falls to $1.45/£1 and the lira spot foreign exchange rate falls to $0.52/TRY1 over the year.

As in part 2, when the pound falls in value to $1.45/£1 at the end of the year, pound revenue from the British loans is £187.5(1.08) = £202.5 million. When the lira falls in value to $0.52/TRY1 at the end of the year, lira revenue from the Turkish loans is be TRY361,467,558 (1.10) = TRY397,614,314.

Then the dollar proceeds from the U.K. loan are:

£202.5 million x $1.45/£1 = $293.625 million or as a return

$293.625 million - $300 million = -2.125%

$300 million

and the dollar proceeds from the Turkish loan are:

TRY397,614,314 x $0.52/TRY1 = $206,759,443 or as a return

$206,759,443 - $200 million = 3.38%

$200 million

and the weighted return on the FI’s loan portfolio would be:

(0.5)(0.06) + (0.3)(-0.02125) + (0.2)(0.0338) = 0.0304, or 3.04%

On the liability side of the balance sheet, at the beginning of the year, the FI borrows $300 million equivalent in pound CDs for one year at a promised interest rate of 5 percent. At an exchange rate of $1.60/£1, this is a pound equivalent amount of borrowing of $300 million/1.6 = £187.5 million.

At the end of the year, the FI must pay the pound CD holders their principal and interest, £187.5 million (1.05) = £196.875 million.

If the pound falls to $1.45/£1 over the year, the repayment in dollar terms would be

£196.875 million x $1.45/£1 = $285,468,750 or as a return

$285,468,750 - $300 million = -4.844%

$300 million

Additionally, the FI borrows $200 million equivalent in Turkish lira CDs for one year at a promised interest rate of 6 percent. At an exchange rate of $0.5533/TRY1, this is a lira equivalent amount of borrowing of $200 million/0.5533 = TRY361,467,558.

At the end of the year, the FI must pay the lira CD holders their principal and interest, TRY361,467,558 (1.06) = TRY383,155,612.

If the lira falls to $0.52/TRY1 over the year, the repayment in dollar terms would be

TRY383,155,612 x $0.52/TRY1 = $199,240,918 or as a return

$199,240,918 - $200 million = -0.38%

$200 million

Thus, at the end of the year,

Average cost of funds:

(0.5)(0.04) + (0.3)(-0.04847) + (0.2)(-0.0038) = 0.0047, or 0.47%

Net return:

Average return on assets - Average cost of funds

3.04% - 0.47% = 2.57%

6. Using the information in part 4, calculate the return on the FI’s loan portfolio, the average cost of funds, and the net interest margin for the FI if the pound spot foreign exchange rate rises to $1.70/£1 and the lira spot foreign exchange rate falls to $0.58/TRY1 over the year.

As in part 3, when the pound rises in value to $1.70/£1 at the end of the year, pound revenue from the British loans is £187.5(1.08) = £202.5 million.

Then the dollar proceeds from the U.K. loan are:

£202.5 million x $1.70/£1 = $344.25 million or as a return

$344.25 million - $300 million = 14.75%

$300 million

When the lira rises in value to $0.58/TRY1 at the end of the year, lira revenue from the Turkish loans is be TRY361,467,558 (1.10) = TRY397,614,314 and the dollar proceeds from the Turkish loan are:

TRY397,614,314 x $0.58/TRY1 = $230,616,302 or as a return

$230,616,302 - $200 million = 15.31%

$200 million

The weighted return on the FI’s loan portfolio would be:

(0.5)(0.06) + (0.3)(0.1475) + (0.2)(0.1531) = 0.1049, or 10.49%

On the liability side of the balance sheet, at the beginning of the year, the FI borrows $300 million equivalent in pound CDs for one year at a promised interest rate of 5 percent. At an exchange rate of $1.60/£1, this is a pound equivalent amount of borrowing of $300 million/1.6 = £187.5 million.

At the end of the year, the FI must pay the pound CD holders their principal and interest, £187.5 million (1.05) = £196.875 million.

If the pound rises to $1.70/£1 over the year, the repayment in dollar terms would be

£196.875 million x $1.70/£1 = $334,687,200 or as a return

$334,687,200 - $300 million = 11.5625%

$300 million

Additionally, the FI borrows $200 million equivalent in Turkish lira CDs for one year at a promised interest rate of 6 percent. At an exchange rate of $0.5533/TRY1, this is a lira equivalent amount of borrowing of $200 million/0.5533 = TRY361,467,558.

At the end of the year, the FI must pay the lira CD holders their principal and interest, TRY361,467,558 (1.06) = TRY383,155,612.

If the lira rises to $0.58/TRY1 over the year, the repayment in dollar terms would be

TRY383,155,612 x $0.58/TRY1 = $222,230,255 or as a return

$222,230,255 - $200 million = 11.12%

$200 million

Thus, at the end of the year,

Average cost of funds:

(0.5)(0.04) + (0.3)(0.115625) + (0.2)(0.1112) = 0.0769, or 7.69%

Net return:

Average return on assets - Average cost of funds

10.49% - 7.69% = 2.80%

7. Suppose that instead of funding the $300 million investment in 8 percent British loans with CDs issued in the United Kingdom, the FI manager hedges the foreign exchange risk on the British loans by immediately selling its expected one-year pound loan proceeds in the forward FX market. The current forward one-year exchange rate between dollars and pounds is $1.53/£1. Additionally, instead of funding the $200 million investment in 10 percent Turkish loans with CDs issued in the Turkey, the FI manager hedges the foreign exchange risk on the Turkish loans by immediately selling its expected one-year lira loan proceeds in the forward FX market. The current forward one-year exchange rate between dollars and Turkish lira is $0.5486/TRY1. Calculate the return on the FI’s investment portfolio (including the hedge) and the net interest margin for the FI over the year.

The U.S. FI sells $300 million for pounds at the spot exchange rate today and receives $300 million/1.6 = £187.5 million. The FI then immediately lends the £187.5 million to a British customer at 8 percent for one year.

The FI also sells the expected principal and interest proceeds from the pound loan forward for dollars at today’s forward rate for one-year delivery.

This means that the forward buyer of pounds promises to pay:

£187.5 million (1.08) x $1.53/£1 = £202.5 million x $1.53/£1 = $309.825 million

to the FI (the forward seller) in one year when the FI delivers the £202.5 million proceeds of the loan to the forward buyer.

In one year, the British borrower repays the loan to the FI plus interest in pounds (£202.5 million).

The FI delivers the £202.5 million to the buyer of the one-year forward contract and receives the promised $309.825 million.

The FI knows from the very beginning of the investment period that it has locked in a guaranteed return on the British loan of:

$309.825m - $300m = 0.03275 = 3.275%

$300m

Additionally, the U.S. FI sells $200 million for Turkish lira at the spot exchange rate today and receives $200 million/0.5533 = TRY361,467,558. The FI then immediately lends the TRY361,467,558 to a Turkish customer at 10 percent for one year.

The FI also sells the expected principal and interest proceeds from the Turkish lira loan forward for dollars at today’s forward rate for one-year delivery.

This means that the forward buyer of lira promises to pay:

TRY361,467,558 (1.10) x $0.5486/TRY1 = TRY397,614,314 x $0.5486/TRY1 = $218,131,213

to the FI (the forward seller) in one year when the FI delivers the TRY397,614,314 proceeds of the loan to the forward buyer.

In one year, the Turkish borrower repays the loan to the FI plus interest in pounds TRY397,614,314.

The FI delivers the TRY397,614,314 to the buyer of the one-year forward contract and receives the promised $218,131,213.

The FI knows from the very beginning of the investment period that it has locked in a guaranteed return on the British loan of:

$218,131,213 - $200m = 0.09066 = 9.066%

$200m

Given this return on British loans, the overall expected return on the FI’s asset portfolio is:

(0.5)(0.06) + (0.3)(0.03275) + (0.2)(0.09066) = 0.0580, or 5.80%

Net return:

Average return on assets - Average cost of funds

5.80% - 4.00% = 1.80%