CHAPTER 10

SUGGESTED ANSWERS TO CHAPTER 10 QUESTIONS

1. What is translation exposure? Transaction exposure?

**Answer.** Translation exposure equals the difference between exposed assets and exposed liabilities. A foreign currency asset or liability is exposed if it must be translated at the current exchange rate. Transaction exposure equals the net amount of foreign-currency denominated transactions already entered into. Upon settlement, these transactions may give rise to currency gains or losses.

2. What are the basic translation methods? How do they differ?

**Answer.** The basic translation methods are the current/noncurrent method, monetary/nonmonetary method, temporal method, and current-rate method. The current/noncurrent method treats only current assets and liabilities as being exposed. The monetary/nonmonetary method treats only monetary assets and liabilities as being exposed. The temporal method translates assets and liabilities valued at current cost as exposed and historical cost assets and liabilities as unexposed. The current rate method treats all assets and liabilities as exposed.

3. What factors affect a company's translation exposure? What can the company do to affect its degree of translation exposure?

**Answer.** The factors affecting a company's translation exposure under FASB-52 include the currency of the primary economic environment in which the company (or its affiliate) does business, the currency in which it invoices its sales, the currency in which it negotiates to buy, the currency denomination of its borrowings, the currency denomination of the securities in which it invests surplus cash, and the location of its customers. This list suggests the actions that a company can take to affect its degree of translation exposure: borrow, invest, and invoice both sales and purchases in the local currency. It also has some degree of control over which customers to serve--foreign or domestic--but this decision should be based on economic profitability rather than its impact on translation exposure.

4. What alternative hedging transactions are available to a company seeking to hedge the translation exposure of its German subsidiary? How would the appropriate hedge change if the German affiliate's functional currency is the U.S. dollar?

**Answer.** As mentioned in the text, the parent has three available methods for managing its translation exposure: (1) adjusting fund flows, (2) entering into forward contracts, and (3) exposure netting. Direct funds-adjustment methods include pricing exports in hard currencies and imports in a soft currency, investing in hard-currency securities, and replacing hard-currency borrowings with local currency loans. The indirect methods (see Chapter 20), include adjusting transfer prices on the sale of goods between affiliates; speeding up or slowing down the payment of dividends, fees, and royalties; and adjusting the leads and lags of intersubsidiary accounts. The standard techniques for responding to anticipated currency changes are summarized in Exhibit 10.1.

The translation exposure would change if the functional currency were the U.S. dollar. For example, U.S. dollar transactions with the German sub would be considered exposed if the euro were the functional currency; by contrast, U.S. dollar transactions are exposed if the euro is the functional currency.

5. In order to eliminate all risk on its exports to Japan, a company decides to hedge both its actual and anticipated sales there. What risk is the company exposing itself to? How could this risk be managed?

**Answer.** The company faces uncertainty as to what its future yen sales revenue will be. This uncertainty stems from quantity risk, the risk that those future sales will not materialize, and price risk, the uncertainty as to the yen prices it can expect to realize in Japan. If it uses forward contracts to hedge its uncertain future yen sales revenue, it faces the risk that it will overhedge, winding up with yen liabilities not offset by yen assets. The company can
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protect itself by using forward contracts to hedge the certain component of its expected future yen sales then hedging the remainder of its projected sales revenue with currency options.

6. Instead of its previous policy of always hedging its foreign currency receivables, Sun Microsystems has decided to hedge only when it believes the dollar will strengthen. Otherwise, it will go uncovered. Comment on this new policy.

**ANSWER.** Sun is engaging in selective hedging, which is really speculation. Sun faces the risk that it will be unhedged when foreign currencies weaken and be hedged when they strengthen. The purpose of hedging is to reduce risk, not to boost profits.

7. Your bank is working with an American client who wishes to hedge its long exposure in the Malaysian ringgit. Suppose it is possible to invest in ringgit but not borrow in that currency. However, you can both borrow and lend in U.S. dollars.

a. Assuming there is no forward market in ringgit, can you create a homemade forward contract that would allow your client to hedge its ringgit exposure?

**ANSWER.** To hedge its ringgit exposure, your bank's American client should short the ringgit. This strategy would entail buying a forward contract from your bank. To create this forward contract, the bank needs to borrow ringgit, sell the proceeds spot for dollars, and invest the dollars. Unfortunately, since the bank can't borrow ringgit, it cannot create the needed forward contract.

b. Several of your Malaysian clients are interested in selling their U.S. dollar export earnings forward for ringgit. Can you accommodate them by creating a forward contract?

**ANSWER.** In this case, you can create the necessary forward contract by borrowing U.S. dollars, converting them to ringgit, and investing the ringgit until the forward contract you sell your Malaysian clients matures.

8. Eastman Kodak gives its traders bonuses if their selective hedging strategies are less expensive than the cost of hedging all their transaction exposure on a continuous basis. What problems can you foresee from this bonus plan?

**ANSWER.** The danger is that Kodak's traders will take inappropriate risks in order to earn their bonuses. Specifically, they are being incented to engage in selective hedged, which runs the risk of leaving Kodak unhedged when the dollar is rising and being hedged when the dollar is falling.

9. Many managers prefer to use options to hedge their exposure because it allows them the possibility of capitalizing on favorable movements in the exchange rate. In contrast, a company using forward contracts avoids the downside but also loses the upside potential as well. Comment on this strategy.

**ANSWER.** Options are clearly more valuable than forward contracts for the reasons stated in the question. However, this does not mean that options are preferable to forward contracts. The reason has to do with cost. Options are more expensive than forward contracts at the same forward rate or exercise price. One must trade off the added benefits of options against their higher costs. To the extent that these derivative markets are efficient—and the evidence suggests they are—the expected net present value of entering into either of these contracts is zero. The appropriate use of these derivatives is to hedge foreign exchange risk, not to speculate on future exchange rate movements. As explained in the chapter, one should match the derivative against the type of risk being hedged: Known risks should be hedged with forward contracts and contingent risks with options.

10. In January 1988, Arco bought a 24.3% stake in the British oil firm Britoil PLC. It intended to buy a further $1 billion worth of Britoil stock if Britoil was agreeable. However, Arco was uncertain whether Britoil, which had expressed a strong desire to remain independent, would accept its bid. To guard against the possibility of a pound appreciation in the interim, Arco decided to convert $1 billion into pounds and place them on deposit in London, pending the outcome of its discussions with Britoil's management. What exchange risk did Arco face and did it choose the best way to protect itself from that risk?
ANSWER. The exchange risk faced by Arco was that it had a contingent pound liability (the cost of its possible purchase of Britoil) offset by a fixed pound asset (the deposit). If the deal went through, Arco would know exactly how many dollars its bid will cost, namely, $1 billion. But if the deal fell apart (which it did), Arco would have a large bank account in London with an uncertain dollar value. Hedging that deposit would not eliminate exchange risk because if the deal went through Arco would not know at the time of its offer how many dollars it would take to buy $1 billion worth of shares at today's exchange rate. (This analysis leaves aside the issue of fluctuations in the dollar price of Britoil shares.) Note that it doesn't make sense to convert dollars into pounds and then hedge those pounds. Assuming interest parity holds, Arco might as well have deposited dollars.

The solution for Arco is to buy a call option on $1 billion worth of pounds at the current spot exchange rate. This limits Arco's downside risk to the call premium, while enabling it to capitalize on an appreciation in the value of the pound.

11. Sumitomo Chemical of Japan has one week in which to negotiate a contract to supply products to a U.S. company at a dollar price that will remain fixed for one year. What advice would you give Sumitomo?

ANSWER. This problem is identical to that faced by Weyerhaeuser in the example given in the text. The general rule on credit sales overseas is to convert between the foreign currency price and the dollar price using the forward rate, not the spot rate. In the case of a sequence of payments to be received at several points in time, the foreign currency price should be a weighted average of the forward rates for delivery on those dates.

Here, Sumitomo should decide on the yen price that it would set and then convert that yen price into a dollar price using the forward rate or an average of forward rates, depending on whether it will be paid all at once or in installments.

12. U.S. Farm-Raised Fish Trading Co., a catfish concern in Jackson, Mississippi, tells its Japanese customers that it wants to be paid in dollars. According to its director of export marketing, this simple strategy eliminates all its currency risk. Is he right? Why?

ANSWER. The marketing director for U.S. Farm-Raised Fish Trading Co. is confusing transaction exposure with economic exposure. By pricing in dollars, the company eliminates its transaction exposure. But it still has operating exposure. As the yen falls in value, if the firm maintains its dollar price, the yen price of its fish rises and Japanese customers will buy less fish. If the dollar price is reduced to maintain market share, the profit margin falls. Either way, dollar revenues and profits fall. Conversely, a falling dollar will boost the dollar profitability of selling to Japan.

13. The Montreal Expos are a major-league baseball team located in Montreal, Canada. What currency risk is faced by the Expos, and how can this exchange risk be managed?

ANSWER. Payroll costs account for the lion's share of baseball costs. The Expos have currency risk since they pay their players in U.S. dollars while their principal source of income, from home game ticket sales, is in Canadian dollars. This currency mismatch means trouble when the U.S. dollar appreciates relative to the Canadian dollar. Most importantly, salaries for Expo ballplayers are based on the salaries these players would earn in the United States; they are not based on Canadian salaries. An extended discussion of the Toronto Blue Jays, another Canadian major league baseball team, appears in Section 9.4 and sheds further light on the currency risk faced by baseball teams.

The Expos might protect themselves by doing what the Blue Jays do: Buy U.S. dollars forward. The larger the purchase, the greater the amount of protection. Typically, though, the Jays buy enough U.S. dollars to cover their projected currency needs for the coming year. While this strategy protects them for next year, it doesn't hedge their longer-term exposure.

14. General Electric recently had to put together a $50 million bid, denominated in Swiss francs, to upgrade a Swiss power plant. If it won, General Electric expected to pay subcontractors and suppliers in five currencies. The payment schedule for the contract stretched over a five-year period.
a. How should General Electric establish the Swiss franc price of its $50 million bid?

**Answer.** GE should begin with the price it would set if the bid were in dollars, and then convert the expected cash inflows into Swiss francs at the forward rates prevailing for each of the dates on which it expects to receive a cash inflow.

b. What exposure does GE face on this bid? How can it hedge that exposure?

**Answer.** To begin, GE is not certain of winning the bid. To hedge this quantity risk (it's uncertain as to how many Swiss francs it will be receiving--either 0 or the amount of its bid), Westinghouse should buy a Swiss franc put option for the amount of its bid, less the amount of Swiss francs it expects to pay out. It should simultaneously buy call options in the amounts of the non-Swiss franc foreign currency cash payments it will be making if it wins the contract. If it wins the bid, GE should then convert the SFr franc put option into a series of SFr forward sales, with the amounts and maturities of the forward contracts timed to coincide with the net Swiss franc inflows. At the same time, GE should convert the foreign currency call options into forward purchases of those foreign currencies, with the maturities and amounts of these contracts timed to coincide with the payments in those currencies.

15. Dell Computer produces its machines in Asia with components largely imported from the United States and sells its products in various Asian nations in local currencies.

a. What is the likely impact on Dell's Asian profits of a strengthened dollar? Explain.

**Answer.** Dell's dollar costs largely stay fixed whereas its dollar revenues will decline. Thus, a strengthened dollar reduced Dell's dollar profits on its Asian sales.

b. What hedging technique(s) can Dell employ to lock in a desired currency conversion rate for its Asian sales during the next year?

**Answer.** Dell can use forward or futures contracts to sell the local currencies forward against the dollar in an amount equal to its projected annual local currency sales. It can also buy put options on the various Asian currencies that it can exercise in the event of dollar appreciation.

c. Suppose Dell wishes to lock in a specific conversion rate but does not want to foreclose the possibility of profiting from future currency moves. What hedging technique would be most likely to achieve this objective?

**Answer.** Buying put options on the local currencies would allow Dell to offset its currency losses with gains on its put options if the local currencies depreciate against the dollar. If the local currencies remain stable or strengthen, Dell would just allow the options to expire unexercised and convert its local currency revenues at the higher spot rates.

d. What are the limits of Dell's hedging approach?

**Answer.** This approach will cover Dell for the first year. But if the dollar strengthens, when Dell goes to roll over its forwards or options to hedge the next year's revenues, it will pay a price for these contracts that reflects the devalued exchange rates of the local Asian currencies.

**ADDITIONAL CHAPTER 10 QUESTIONS AND ANSWERS**

1. Why was FASB-8 so widely criticized? How did the Financial Accounting Standards Board respond to this criticism?

**Answer.** The major criticism of FASB-8 was that by disallowing all currency reserves, translation gains and losses flowed right through to the income statement, often leading to dramatic fluctuations in reported income. The
corporate belief that this was a problem stemmed from the view that financial markets focus on earnings rather than cash flows.

2. A U.S. firm has fully hedged its sterling receivables and has bought credit insurance to cover the risk of default. Has this firm eliminated all risk on these receivables? Explain.

**ANSWER.** No. The company has converted its sterling receivables into a fixed amount of dollars to be received in the future. But because this sum of money is set in nominal terms, the firm bears exchange risk. That is, it knows how many dollars it will receive in the future but it does not know what the purchasing power of those dollars will be.

3. What is the basic translation hedging strategy? How does it work?

**ANSWER.** As discussed in the chapter, the basic translation hedging strategy involves increasing hard-currency assets and decreasing soft-currency assets, while simultaneously decreasing hard-currency liabilities and increasing soft-currency liabilities. The specific techniques used to hedge a particular translation exposure all involve establishing an offsetting currency position (e.g., by means of a forward contract) such that whatever is lost or gained on the original currency exposure is exactly offset by a corresponding foreign exchange gain or loss on the currency hedge.

4. Multinational firms can always reduce the foreign exchange risk faced by their foreign affiliates by borrowing in the local currency. True or false? Why?

**ANSWER.** False. Currency risk is reduced when swings in operating profits due to currency changes are offset, in whole or in part, by opposite movements in the cost of servicing its debts. In this way, currency changes have less effect on dollar cash flows. Consider an MNC with a foreign subsidiary that manufactures for export. The subsidiary's dollar operating cash flows will rise with LC appreciation and fall with LC depreciation. If the subsidiary borrowed in the local currency, then the dollar cost of servicing its liabilities would also rise with LC appreciation and fall with LC depreciation. This would reinforce, not dampen, the swings in its operating profits caused by the currency changes.

5. Can hedging provide protection against expected exchange rate changes? Explain.

**ANSWER.** No. The explanation is contained in fundamental point #1 on managing accounting exposure at the start of this chapter discussion.

6. What is the domestic counterpart to exchange risk? Explain.

**ANSWER.** The domestic counterpart to exchange risk is inflation risk. Exchange risk involves uncertain changes in the exchange rate between domestic currency and foreign currency (and, ultimately, between domestic currency and foreign goods and services), while inflation risk involves uncertain changes in the exchange rate between domestic currency and domestic goods and services.

7. If a currency that a company is long in threatens to weaken, many companies will sell that currency forward. Comment on this policy.

**ANSWER.** A reasonable working hypothesis is that financial markets are efficient. If so, the expected currency depreciation will already be reflected in the forward rate in the form of a forward discount which exactly offsets the expected loss-reducing benefits of hedging. Thus the company will benefit from hedging only to the extent that it can estimate the probability and timing of the depreciation more accurately than the general market can. Unless the company has some special information about the future spot rate that it has good reason to believe is not adequately reflected in the forward rate, it should accept the forward rate's predictive validity as a working hypothesis and avoid speculative activities.

8. Studies have shown that in trade dealings between nations that have high and volatile inflation rates, most export prices are quoted in dollars. What might account for this finding?
ANSWER. What matters to both importer and exporter is the real price of the goods traded, not its nominal price. However, with high and uncertain inflation, if the currency of either of the two nations is used, both exporter and importer will face uncertainty as to the real price of the goods being traded. The exporter faces the risk that inflation will be higher than expected, lowering its real revenue. Conversely, the importer faces the risk that inflation will be lower than expected, raising its real cost of goods. By pricing in dollars, which is more likely to maintain its real value than either of their home currencies, both parties can reduce their risk.


ANSWER. Yes. According to the Wall Street Journal (September 27, 1984, p.7), "Kemp & Beatley recently made a sizable purchase of Japanese placemats just before the dollar strengthened again. Competitors, as a result, will be able to buy the items for less and the profit margins of Kemp & Beatley will be squeezed, said Lee Greenbaum, president. 'We had to eat' the price difference, he said." Thus, even though hedging enables the company to lock in a dollar price for its cost of goods, its revenue fluctuates in line with the exchange rate; that is, the price at which it can sell its products depends on the replacement cost of these items, which varies with the exchange rate.

10. Liz Claiborne contracts out much of its production to foreign manufacturers. As such, the company faces currency risk.

a. What currency risk does Liz Claiborne face?

ANSWER. If foreign manufacturers bill in their local currencies, Liz Claiborne is uncertain as to what the dollar cost of its orders will be, both now and in the future. If Liz Claiborne insists on dollar invoicing, the dollar price will likely vary with the exchange rate. Hence, although Liz Claiborne can lock in the dollar price of its current orders, it has no idea what will be the dollar costs of its future orders.

b. How might Liz Claiborne go about hedging its currency risk?

ANSWER. Liz Claiborne can hedge its transaction exposure (equal to the amount of current orders invoiced in foreign currencies) using forward market or money market hedges, depending on their relative costs. The company can hedge its future orders, whether denominated in foreign currencies or in dollars, by buying forward the anticipated amounts of its foreign currency requirements. Liz Claiborne could also use a money market hedge (which would involve the company borrowing dollars and then investing these dollars in foreign money market instruments to create a foreign currency asset to offset its foreign currency liabilities) to lock in the dollar cost of its anticipated future orders. This method would be less practical than the forward market hedge since it would involve Liz Claiborne holding a large portfolio of foreign securities.

c. What danger does it face from locking in currency rates today?

ANSWER. This question is similar to that in Problem 17. The assumption in the hedging analysis so far is that the dollar prices Liz Claiborne can charge customers for its clothes are unrelated to its dollar costs. However, to the extent that its competitors also use foreign manufacturers, a rise in dollar costs of foreign orders will affect all companies in the market to a similar degree. Hence, the companies will likely raise their dollar prices if their dollar costs rise since they have similar cost structures. If Liz Claiborne has hedged its foreign costs, it will earn higher margins. Conversely, if the dollar appreciates, competitors will likely cut their prices to reflect the lower cost of replacing their goods sold. If Liz Claiborne has already locked in a higher dollar price for its orders and tries to recoup its higher costs by raising its prices, it will be placed at a competitive disadvantage and will lose market share. On the other hand, if Liz Claiborne reduces its dollar prices to maintain its competitive position in the market, its margins will shrink since its dollar costs have not fallen. To properly hedge its operating exposure, Liz Claiborne must estimate the responsiveness of price in the marketplace to changes in foreign exchange rates. The more responsive these prices are to changes in costs (and the quicker this response), the less operating exposure faced by Liz Claiborne and the less it needs to hedge.
SUGGESTED SOLUTIONS TO CHAPTER 10 PROBLEMS

1. Suppose that at the start and at the end of the year, Bell U.K., the British subsidiary of Bell U.S., has current assets of £1 million, fixed assets of £2 million, and current liabilities of £1 million. Bell has no long-term liabilities.

   a. What is Bell U.K.’s translation exposure under the current/noncurrent, monetary/nonmonetary, temporal, and current rate methods?

   **Answer.** Under the current/noncurrent method, Bell U.K.’s translation exposure is £1 million - £1 million, or 0. We cannot determine Bell U.K.’s translation exposure under the monetary/nonmonetary method because we do not know the monetary/nonmonetary breakdown of its assets and liabilities. Similarly, we cannot determine Bell U.K.’s temporal exposure because we do not know the breakdown of its current assets between inventory and monetary assets. Under the current rate method, Bell U.K.’s exposure is £3 million - £1 million = £2 million.

   b. Assuming the pound is the functional currency, if the pound depreciated during that year from $1.50 to $1.30, what is the FASB-52 translation gain (loss) to be included in the equity account of Bell's U.S. parent?

   **Answer.** Under FASB-52, Bell U.K. has net pound exposure equal to £3 million - £1 million = £2 million. At the original exchange rate of $1.50, the value of this net exposure is $3 million. By the end of the year, this net pound exposure is worth only 2 million x $1.30 = $2.6 million. The net result is a translation loss for Bell U.K.’s parent equal to the difference between the beginning and end-of-year values or $400,000.

   c. Redo part (b) assuming the dollar is the functional currency. Included in current assets is inventory of £0.5 million. The historical exchange rates for inventory and fixed assets are $1.45 and $1.65, respectively. If the dollar is the functional currency, where does Bell U.K.’s translation gain of loss show up on Bell U.S.’s financial statements?

   **Answer.** If the dollar is the functional currency, then FASB-52 mandates the use of the temporal method for translation purposes. Under the temporal method, the value of fixed assets and inventory stays constant. The only change is to its monetary assets of £0.5 million and current liabilities of £1 million, for net exposure of -£0.5 million. With negative translation exposure, a depreciation in the value of the pound from $1.50 to $1.30 will result in a translation gain of $0.20 x 500,000, or $100,000. This translation gain must be included in Bell U.K.’s income statement.

2. Rolls-Royce, the British jet engine manufacturer, sells engines to U.S. airlines and buys parts from U.S. companies. Suppose it has accounts receivable of $1.5 billion and accounts payable of $740 million. It also borrowed $600 million. The current spot rate is $1.5128/£.

   a. What is Rolls-Royce's dollar transaction exposure in dollar terms? In pound terms?

   **Answer.** Rolls-Royce has $160 million in dollar transaction exposure ($1.5 billion - $740 million - $600 million). In pound terms, its transaction exposure equals £105.76 million (160,000,000/1.5128).

   b. Suppose the pound appreciates to $1.7642/£. What is Rolls-Royce's gain or loss, in pound terms, on its dollar transaction exposure?

   **Answer.** Translated at the new exchange rate, the value of its transaction exposure is now £90.69 million. Compared to the former value of its transaction exposure, the result is a loss of £15.07 million (£90.69 million - £105.76 million).

3. Zapata Auto Parts, the Mexican affiliate of American Diversified, Inc., had the following balance sheet on January 1:

<table>
<thead>
<tr>
<th>Assets (Mex$ millions)</th>
<th>Liabilities (Mex$ millions)</th>
</tr>
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<tbody>
<tr>
<td>Cash, marketable</td>
<td>Mex$1,000</td>
</tr>
</tbody>
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The exchange rate on January 1 was Mex$8,000 = $1.

a. What is Zapata's FASB-52 peso translation exposure on January 1?

**ANSWER.** Zapata's translation exposure depends on the functional currency used. If, over the past three years, Mexico's rate of inflation has exceeded 100%, Zapata must use the dollar as its functional currency. This means that translation exposure is measured using the temporal method. In this case, Zapata's FASB-52 translation exposure will be (all peso figures are in millions) Mex$83,000 - Mex$59,000 = Mex$24,000, or $3 million. This calculation treats cash, receivables, inventory, current liabilities, and long-term debt as exposed, and equity and net fixed assets as unexposed. It also assumes that all these assets and liabilities are in pesos.

If inflation has cooled off, and the peso is the functional currency, then translation exposure equals Zapata's net worth of Mex$135,000 (assuming as before that all assets and liabilities are denominated in pesos), or $16.875 million. The difference between the two translation exposure figures of Mex$111,000 = $13.875 million equals Zapata's net fixed assets, which are exposed under the current rate method but not under the temporal method.

b. Suppose the exchange rate on December 31 is Mex$12,000. What will be Zapata's translation loss for the year?

**ANSWER.** The peso has lost one-third of its dollar value during the year. Hence, Zapata's translation loss equals one-third of its initial exposure. If the dollar is the functional currency, and assuming no change in assets and liabilities, Zapata's translation loss for the year will be $3,000,000/3 = $1 million. Alternatively, if the peso is the functional currency, Zapata's translation loss equals $16,875,000/3 = $5.625 million.

c. Zapata can borrow an additional Mex$15,000 (in millions). What will this do to its translation exposure if it uses the funds to pay a dividend to its parent? If it uses the funds to increase its cash position?

**ANSWER.** If Zapata borrows an additional Mex$15,000 (all peso figures are in millions) and uses these funds to pay a dividend to its parent, its liabilities will rise by Mex$15,000 and its equity will fall by the same amount. With the added peso liabilities, its exposure will fall by Mex$15,000 or $1.875 million regardless of the functional currency. If the dollar is the functional currency, Zapata's new translation exposure becomes $1.125 million; if the peso is the functional currency, the new translation exposure becomes $15 million. If Zapata uses the Mex$15,000 to increase its cash position, then its translation exposure stays the same; the added peso liabilities are exactly offset by the added peso assets.

4. Walt Disney expects to receive a Mex$16 million theatrical fee from Mexico in 90 days. The current spot rate is $0.1321/Mex$ and the 90-day forward rate is $0.1242/Mex$.

a. What is Disney's peso transaction exposure associated with this fee?

**ANSWER.** Disney's peso transaction exposure on this fee equals Mex$16 million or $2,113,600 (16,000,00 x 0.1321).

b. If the spot rate expected in 90 days is $0.1305, what is the expected U.S. dollar value of the fee?

**ANSWER.** The expected value of this fee in 90 days is $2,088,000 (16,000,000 x 0.1305).

c. What is the hedged dollar value of the fee?

**ANSWER.** The hedged value of this fee in 90 days is $1,987,200 (16,000,00 x 0.1242).
d. What factors will influence the hedging decision?

**ANSWER.**

5. A foreign exchange trader assesses the euro exchange rate three months hence as follows:

- $1.11 with probability 0.25
- $1.13 with probability 0.50
- $1.15 with probability 0.25

The 90-day forward rate is $1.12.

a. Will the trader buy or sell euros forward against the dollar if she is concerned solely with expected values? In what volume?

**ANSWER.** The expected future spot exchange rate is $1.13 ($1.11 x 0.25 + $1.13 x 0.50 + $1.15 x 0.25). Because this exceeds the forward rate of $1.12, the trader will buy euros forward against the dollar. She should buy an infinite amount of euros. This absurd result is due to the assumption of a linear utility function.

b. In reality, what is likely to limit the trader's speculative activities?

**ANSWER.** Regardless of her utility function, she will be restrained by bank policies designed to guard against excessive currency speculation.

c. Suppose the trader revises her probability assessment as follows:

- $1.09 with probability 0.33
- $1.13 with probability 0.33
- $1.17 with probability 0.33

Assuming the forward rate remains at $1.12, do you think this new assessment will affect the trader's decision?

**ANSWER.** The expected future spot rate remains at $1.13. However, the variance of the expected spot rate is now greater than it was before. If the trader is concerned solely with expected values, this will not affect her speculative activities. But if she is concerned with risk in addition to expected return, the greater variance and consequent greater risk should lead her to reduce her speculative activities.

6. An investment manager hedges a portfolio of Bunds (German government bonds) with a 6-month forward contract. The current spot rate is €0.84:$1 and the 180-day forward rate is €0.81:$1. At the end of the 6-month period, the Bunds have risen in value by 3.75 percent (in euro terms), and the spot rate is now €0.76:$1.

a. If the Bunds earn interest at the annual rate of 5 percent, paid semi-annually, what is the investment manager's total dollar return on the hedged Bunds?

**ANSWER.** Ignoring hedging for the time being, for each $100 invested in Bunds at a spot rate of €0.84 per dollar, the investment manager would have at the end of six months an amount of euros equal to €89.25, as follows

\[
0.84 \times 100 \times (1 + 0.025 + 0.0375) = €89.25
\]

This amount takes into account both the 3.75% capital gain on the Bunds and the 2.5% semiannual interest payment. Assuming that the investment manager did not anticipate the 3.75% capital gain and hedged only the expected amount of €86.10, he would now have $106.30 (86.10/0.81) from the original hedged principal and interest plus an additional $4.14 (0.84 x 100 x 0.0375/0.76) from the 3.75% capital gain on the Bund principal of €84 converted into dollars at the spot rate of €0.76:$1. The total dollar amount received in six months would, therefore, be $110.44 (106.30 + 4.14), which is a 10.44% return on the original $100 investment.

b. What would the return on the Bunds have been without hedging?
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ANSWER. As shown in the answer to part a, the euro value of the Bund's principal plus interest at the end of six months would be €89.25. Converting this amount into dollars at the spot rate of €0.76:$1 yields an amount equal to $117.43 (89.25/0.76). This amount translates into a dollar return of 17.43%.

c. What was the true cost of the forward contract?

ANSWER. As shown in the text (see the section titled "The True Cost of Hedging"), the forward contract reduces the return per dollar invested by an amount equal to the difference between the forward rate and the actual spot rate at the time of settlement, or €0.05 (€0.81 - €0.76) per euro hedged. Relative to the original spot rate, this cost translates into 5.95% ((€0.81 - €0.76)/€0.84).

7. Magnetronics, Inc., a U.S. company, owes its Taiwanese supplier NT$205 million in three months. The company wishes to hedge its NT$ payable. The current spot rate is NT$1 = U.S. $0.03987, and the three-month forward rate is NT$1 = U.S. $0.04051. Magnetronics can also borrow/lend U.S. dollars at an annualized interest rate of 12 percent and Taiwanese dollars at an annualized interest rate of 8 percent.

a. What is the U.S. dollar accounting entry for this payable?

ANSWER. Magnetronics will record a payable of U.S. $8,173,350, which is just NT$205 converted at the spot rate of U.S. $0.03987.

b. What is the minimum U.S. dollar cost that Magnetronics can lock in for this payable? Describe the procedure it would use to get this price.

ANSWER. Magnetronics can use either a forward market hedge or a money market hedge. The forward market hedge will lock in a cost of U.S. $8,304,550 (205,000,000 x 0.04051). Alternatively, Magnetronics can borrow U.S. dollars, convert them into NT$, and invest the NT$ for three months and use the proceeds to settle the NT$ payable. To estimate the cost of this money market hedge, we must work backwards to figure out first how many NT$ are needed today. At a quarterly interest rate of 2%, Magnetronics must invest NT$200,980,392 (205,000,000/1.02) today in order to have NT$205 million in three months. At the current spot rate, this amount translates into U.S. $8,013,088 today. At a quarterly U.S. interest rate of 3%, this loan will cost U.S. $8,253,481 to repay in three months (8,013,088 x 1.03). Since this amount is $51,069 less than the cost of satisfying the payable using the forward market, it makes sense to use the money market hedge and lock in a cost of U.S. $8,253,481.

c. At what forward rate would interest rate parity hold given the interest rates?

ANSWER. Interest rate parity will hold when the U.S. dollar return on U.S. dollars, 1.12, equals the hedged U.S. dollar return on NT$, or (1/0.03987) x 1.08 x f, where f is the equilibrium forward rate. The solution to this equation is f = .03987 x 1.12/1.08 = $0.04135. At this forward rate, interest rate parity will hold.

8. Cooper Inc., a U.S. firm, has just invested £500,000 in a note that will come due in 90 days and is yielding 9.5% annualized. The current spot value of the pound is $1.5612 and the 90-day forward rate is $1.5467.

a. What is the hedged dollar value of this note at maturity?

ANSWER. At maturity, this note will pay off £511,875 (500,000 x 1 + 0.095/4). The hedged dollar value of this note at maturity is $791,717 (511,875 x 1.5467).

b. What is the annualized dollar yield on the hedged note?

ANSWER. The dollar investment in the note today is $780,600 (500,000 x 1.5612). The 90-day return is 1.424% (791,717/780,600 - 1). Annualized, this dollar return is 5.697% (1.424% x 4).

c. Cooper anticipates that the value of the pound in 90 days will be $1.5550. Should it hedge? Why or why not?
**ANSWER.** If Cooper does not hedge, it will expect to collect at maturity $795,966 (511,875 x 1.5550). This amount exceeds the hedged return. Whether it should hedge depends on how strongly it believes that its expectation of the 90-day spot rate is correct and the forward market is wrong, and on its risk preferences. It also depends on whether it has an offsetting exposure, as the question in part c indicates.

d. Suppose that Cooper has a payable of £980,000 coming due in 180 days. Should this affect its decision of whether to hedge its sterling note? How and why?

**ANSWER.** Yes. If Cooper hedges its investment, it will actually exacerbate its pound exposure. As it stands, the pound investment currently provides an offset of £511,875 to its negative exposure of £980,000, yielding a net exposure of -£468,125 (£511,875 - £980,000). If Cooper hedges the pound investment, its net exposure rises to -£980,000.

9. American Airlines is trying to decide how to go about hedging SFr70 million in ticket sales receivable in 180 days. Suppose it faces the following exchange and interest rates.

<table>
<thead>
<tr>
<th></th>
<th>Spot rate: $0.6433-42/SFr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward rate (180 days):</td>
<td>$0.6578-99/SFr</td>
</tr>
<tr>
<td>SFr 180-day interest rate (annualized):</td>
<td>4.01%-3.97%</td>
</tr>
<tr>
<td>U.S. dollar 180-day interest rate (annualized):</td>
<td>8.01%-7.98%</td>
</tr>
</tbody>
</table>

a. What is the hedged value of American's ticket sales using a forward market hedge?

**ANSWER.** By selling the ticket receipts forward, American Airlines can lock in a dollar value of 70,000,000 x 0.6578 = $46,046,000.

b. What is the hedged value of American's ticket sales using a money market hedge? Assume the first interest rate is the rate at which money can be borrowed and the second one the rate at which it can be lent.

**ANSWER.** American can also hedge its euro receivable by borrowing the present value of SFr70 million at a 180-day interest rate of 2.005% (4.01%/2), sell the proceeds in the spot market at a rate of $0.6433/SFr, and invest the dollar proceeds at a 180-day interest rate of 3.99% (7.98%/2). Using this money market hedge, American can lock in a value for its SFr70 million Receivable of $45,907,296 (70,000,000/1.02005 x 0.6433 x 1.0399).

c. Which hedge is less expensive?

**ANSWER.** The forward market hedge yields a higher dollar value for the ticket receivables, so it is preferable.

d. Is there an arbitrage opportunity here?

**ANSWER.** Yes. By borrowing dollars at a semiannual rate of 4.005% (8.01%/2), converting them to SFr at the ask rate of $0.6442, and simultaneously investing the SFr at a semiannual rate of 1.985% (3.97%/2) and selling the loan proceeds forward at a bid rate of $0.6578, you can lock in an arbitrage spread of 0.133% semiannually.

\[
\frac{1}{0.6442} \times 1.01985 \times 0.6578 = 1.04138
\]

This can be seen as follows. Following the steps outlined above, the return on the borrowed dollars will be 4.138%. Subtracting off the 4.005% cost of borrowing the dollars yields a semiannual covered interest differential of 0.133% (4.138% - 4.005%)

e. Suppose the expected spot rate in 180 days is $0.67/SFr with a most likely range of $0.64-$0.70/SFr. Should American hedge? What factors should enter into its decision?
ANSWER. Based on the expected 180-day spot rate and its expected range, it would appear that American would be better off waiting to convert its ticket sales at the future spot rate. However, American must ask itself where its comparative advantage lies? Does it lie in running an innovative airline or does it reside in trying to outguess apparently sophisticated financial markets? If the former, which most would agree with, American should stick to its knitting and leave the speculation to financial institutions specifically organized for that purpose.

10. Madison Inc. imports olive oil from Chilean firms and the invoices are always denominated in pesos (Ch$). It currently has a payable in the amount of Ch$250 million that it would like to hedge. Unfortunately, there are no drachma futures contracts available and Madison is having difficulty arranging a drachma forward contract. Its treasurer, who recently received her MBA, suggests using Brazilian real (R) to cross-hedge the peso exposure. She recently ran the following regression of the change in the exchange rate for the drachma against the real exchange rate:

\[ \Delta \text{Ch$/}$ = 1.6(\Delta \text{R$/}) \]

a. There is an active market in the forward real. To cross-hedge Madison's peso exposure, should the treasurer buy or sell the real forward?

ANSWER. Given that Madison is short pesos and there is a positive correlation between the real and the peso, Madison should create a long position in the real; that is, Madison should buy the real forward.

b. What is the risk-minimizing amount of reais that the treasurer would have to buy or sell forward to hedge Madison's peso exposure?

ANSWER. According to the regression, a 1¢ change in the value of the real leads to a 1.6¢ change in the value of the peso. To cross-hedge the forthcoming payment of Ch$, R1.6 must be bought forward for every peso owed. With a peso exposure of Ch$250 million, the exporter must buy forward reais in the amount of R400 million (1.6 x 250,000,000).

ADDITIONAL CHAPTER 10 PROBLEMS AND SOLUTIONS

1. Paragon U.S.'s Japanese subsidiary, Paragon Japan, has exposed assets of ¥8 billion and exposed liabilities of ¥6 billion. During the year, the yen appreciates from ¥125/$ to ¥95/$.

a. What is Paragon Japan's net translation exposure at the beginning of the year in yen? in dollars?

ANSWER. Paragon Japan has net translation exposure of ¥2 billion (¥8 billion - ¥6 billion). Converted into dollars, this figure yields translation exposure of $16 million (2 billion/125).

b. What is Paragon Japan's translation gain or loss from the change in the yen's value?

ANSWER. At the end-of-year exchange rate, Paragon Japan's translation exposure equals $21,052,632 (2 billion/95). The net result is a translation gain for the year of $5,052,632 ($21,052,632 - $16,000,000).

c. At the start of the next year, Paragon Japan adds exposed assets of ¥1.5 billion and exposed liabilities of ¥2 billion. During the year, the yen depreciates from ¥95/$ to ¥130/$. What is Paragon Japan's translation gain or loss for this year? What is its total translation gain or loss for the two years?

ANSWER. Paragon Japan's new translation exposure at the start of the year is ¥1.5 billion (¥2 billion + ¥1.5 billion - ¥2 billion). Given this exposure and the exchange rate change during the year, its translation loss for the year equals $4,251,012 (1,500,000,000 x (1/95 - 1/130)). Over the two-year period, Paragon Japan has realized a translation gain of $801,620 ($5,052,632 - $4,251,012).
2. Suppose that on January 1, American Golf's Mexico subsidiary, Golf de Mexico, had a balance sheet that showed current assets of Mex$1 million; current liabilities of Mex$300,000; total assets of Mex$2.5 million; and total liabilities of Mex$900,000. On December 31, Golf de Mexico's balance sheet in pesos was unchanged from the figures given above, but the peso had declined in value from $0.1270 at the start of the year to $0.1180 at the end of the year. Under FASB-52, what is the translation amount to be shown on American Golf's equity account for the year if the peso is the functional currency? How would your answer change if the dollar were the functional currency?

**Answer.** According to FASB-52, balance sheets must be translated using the current rate method; that is, all assets and all liabilities must be translated at the current rate. Golf de Mexico's net foreign currency translation exposure, therefore, is Mex$2,500,000 - Mex$900,000 or Mex$1,600,000. At the original rate of $.1270, the value of the peso net exposure was Mex$1,600,000 x .1270 = $203,200. By the end of the year, this net exposure equals Mex$1,600,000 x $.1180 = $188,800. This involves a translation loss for American Golf of $14,400 ($203,200 - $188,800).

If the current assets are all monetary or if inventory is carried at market value, Golf de Mexico's exposure if the dollar is the functional currency would be current assets minus current liabilities or Mex$1,000,000 - Mex$900,000 = Mex$100,000. In this case, American Golf's translation loss would equal 100,000 x (.1270 -.1180) = $900. This loss must be included in the income statement.
3. Halon Norway, the Norwegian subsidiary of a U.S. company, Halon, Inc., has the following balance sheet:

<table>
<thead>
<tr>
<th>Assets (NKr thousands)</th>
<th>Liabilities (NKr thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash, marketable securities</td>
<td>7,000</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>18,000</td>
</tr>
<tr>
<td>Inventory</td>
<td>31,000</td>
</tr>
<tr>
<td>Net fixed assets</td>
<td>63,000</td>
</tr>
<tr>
<td></td>
<td>NKr119,000</td>
</tr>
</tbody>
</table>

a. At the current spot rate of $0.21/NKr, calculate Halon Norway's accounting exposure under the current/noncurrent, monetary/nonmonetary, temporal, and current rate methods.

**ANSWER.** Under the current/noncurrent method, Halon Norway's accounting exposure is NKr34 million (7 + 18 + 31 - 14 - 8, in millions), or $7.14 million (0.21 x 34 million). Its monetary/nonmonetary method accounting exposure is - NKr42 million (7 + 18 - 14 - 8 - 45, in millions), or -$8.82 million (0.21 x -42 million). Halon Norway's temporal method exposure is the same as its current/noncurrent method exposure. Under the current rate method, Halon Norway's exposure is its equity of NKr52 million, or $10.92 million (0.21 x 52 million). The calculations assume that all assets and liabilities are denominated in NKr.

b. Suppose the Norwegian krone depreciates to $0.17. Produce balance sheets for Halon Norway at the new exchange rate under each of the four alternative translation methods.

**ANSWER.**

**Current/noncurrent rate and temporal methods:**

<table>
<thead>
<tr>
<th>Assets ($ thousands)</th>
<th>Liabilities ($ thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash, marketable securities*</td>
<td>1,190 Accounts payable*</td>
</tr>
<tr>
<td>Accounts receivable*</td>
<td>3,060 Short-term debt*</td>
</tr>
<tr>
<td>Inventory*</td>
<td>5,270 Long-term debt</td>
</tr>
<tr>
<td>Net fixed assets</td>
<td>13,230 Equity</td>
</tr>
<tr>
<td>$22,750</td>
<td>$22,750</td>
</tr>
</tbody>
</table>

*Exposed

**Monetary/nonmonetary method**

<table>
<thead>
<tr>
<th>Assets ($ thousands)</th>
<th>Liabilities ($ thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash, marketable securities*</td>
<td>1,190 Accounts payable*</td>
</tr>
<tr>
<td>Accounts receivable*</td>
<td>3,060 Short-term debt*</td>
</tr>
<tr>
<td>Inventory</td>
<td>6,510 Long-term debt*</td>
</tr>
<tr>
<td>Net fixed assets</td>
<td>13,230 Equity</td>
</tr>
<tr>
<td>$23,990</td>
<td>$23,990</td>
</tr>
</tbody>
</table>

*Exposed

**Current rate method**

<table>
<thead>
<tr>
<th>Assets ($ thousands)</th>
<th>Liabilities ($ thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash, marketable securities*</td>
<td>1,190 Accounts payable*</td>
</tr>
<tr>
<td>Accounts receivable*</td>
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</tr>
<tr>
<td>Inventory*</td>
<td>5,270 Long-term debt*</td>
</tr>
<tr>
<td>Net fixed assets*</td>
<td>10,710 Equity</td>
</tr>
<tr>
<td>$20,230</td>
<td>$20,230</td>
</tr>
</tbody>
</table>

*Exposed
c. Calculate the translation gains or losses associated with the NKr depreciation for each of the four methods. Relate these gains and losses to the exposure calculations performed in part (a) combined with the exchange rate change. Where would these translation gains or losses show up in the balance sheets prepared for part (b)?

**Answer.** The translation gain (loss) equals the krone exposure multiplied by the -$0.04 change in the exchange rate. These translation gains (losses) are as follows: current/noncurrent/temporal methods--loss of $1.36 million (-0.04 x 34 million); monetary/nonmonetary method--gain of $1.68 million (-0.04 x -42 million); and current rate method--loss of $2.08 million (-0.04 x 52 million). These gains (losses) show up on the equity account and equal the difference in equity values calculated at the new exchange rate of $0.17/NKr and the old exchange rate of $0.21/NKr.

4. An importer has a payment of £8 million due in 90 days.

a. If the 90-day pound forward rate is $1.4201, what is the hedged cost of making that payment?

**Answer.** The hedged cost of making the payment is $11,360,800 (8,000,000 x 1.4201).

b. If the spot rate expected in 90 days is $1.4050, what is the expected cost of payment?

**Answer.** The expected cost of payment is $11,240,000 (8,000,000 x 1.4050)/

c. What factors will influence the hedging decision?

**Answer.** The importer must consider the basis for its expected future spot rate and why that value diverges from the forward rate, its willingness to bear risk, and whether it has any offsetting pound assets.

5. International Worldwide would like to execute a money market hedge to cover a ¥250,000,000 shipment from Japan of sound systems it will receive in six months. The current exchange rate is ¥124 = $1.

a. How would International structure the hedge? What would it do to hedge the Japanese yen it must pay in six months? The annual yen interest rate is 4%.

**Answer.** International should invest the present value of ¥250,000,000, or ¥250,000,000/1.02 = ¥245,098,039 = $1,976,597 at today's exchange rate of ¥124 = $1. In six months International can cash in its investment, which by then will have grown to ¥250,000,000, and use the proceeds to pay off its supplier.

b. The yen may rise to as much as ¥140 = $1 or fall to ¥115 = $1. What will the total dollar cash flow be in six months in either case?

**Answer.** We can only value the future dollar cash flow in relation to the current spot rate of the yen. Converting the future value of ¥250,000,000 into dollars at today's spot rate of ¥124, International Worldwide's total dollar cost of paying for the sound system delivery, assuming it makes use of the money market hedge, will be $2,016,100, which is shown as follows:

### Possible Outcomes of Money Market Hedge in 6 Months

<table>
<thead>
<tr>
<th>Spot Exchange Rate in 6 Months</th>
<th>Value of Payable</th>
<th>Loss (gain) on Money Market Hedge</th>
<th>Total Cash Flow in 6 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>¥115 = $1</td>
<td>$2,173,900</td>
<td>(1) (1) (-157,800)</td>
<td>$2,016,100</td>
</tr>
<tr>
<td>¥124 = $1</td>
<td>$2,016,100</td>
<td>(1) (2) 0</td>
<td>$2,016,100</td>
</tr>
<tr>
<td>¥140 = $1</td>
<td>$1,785,700</td>
<td>(1) (3) 230,400</td>
<td>$2,016,100</td>
</tr>
</tbody>
</table>

The money market hedge gain of $157,800 if the exchange rate moves to ¥115 = $1 arises because the investment proceeds of ¥250,000,000, valued at $2,016,100 at the exchange rate of ¥124 = $1, will be worth $2,173,900 at the new exchange rate. This gain is subtracted off the cost of the payable.
6. A Polish corporate treasurer expects to receive a €11 million payment in 90 days from a German customer. The current spot rate is €0.29870:zł and the 90-day forward rate is €0.29631:zł. In addition, the annualized three-month euro and zloty interest rates are 9.8% and 12.3%, respectively.

a. What is the hedged value of the euro receivable using the forward contract?

**Answer.** By selling the euro receivable forward, the Polish treasurer can lock in revenue of zł37,123,283 (11,000,000/0.29631).

b. Describe how the Polish treasurer could use a money market hedge to lock in the zloty value of the euro receivable. What is the hedged value of the euro receivable? What is the effective forward rate that the treasurer can obtain using this money market hedge?

**Answer.** The Polish treasurer can borrow the present value of the €11 million receivable, which equals €10,736,945 (11,000,000/1.0245) at the 2.45% quarterly interest rate (9.8%/4). Next, the treasurer converts these Euros into zloty at the spot rate of €0.29870:zł to get zł35,945,580. Finally, the treasurer will invest the zloty at the quarterly rate of 3.075% (12.3%/4) and receive zł37,050,907 in 90 days. The result from this money market hedge is the equivalent of selling forward the €11 million at a forward rate of 0.29689 (11,000,000/37,050,907). From the standpoint of the treasurer, this is a worse rate than could be realized directly in the forward market (as evidenced by the fact that the forward market hedge yields zł72,376 more than does the money market hedge).

c. Given your answers in parts a and b, is there an arbitrage opportunity? How could the treasurer take advantage of it?

**Answer.** There is an arbitrage opportunity here, assuming that transaction costs (such as the bid-ask spreads in both the foreign exchange and money markets, which were ignored in this example) don’t offset the gains. The opportunity would involve borrowing zloty, converting them into Euros, investing the Euros while simultaneously selling them forward for zloty, and using the proceeds to repay the zloty loan. However, since the difference between the actual and the constructed forward rates is only 0.2%, it is quite likely that transaction costs will preclude an arbitrage profit.

d. At what 90-day forward rate would interest rate parity hold?

**Answer.** Interest rate parity holds when the Polish zloty return on zloty equals the hedged zloty return on Euros. The former return is $1 + 0.123/4 = 1.03075. The latter return is 0.29870*1.0246/f₉₀, where f₉₀ is the 90-day forward rate. Setting these two terms equal and solving for f₉₀ yields f₉₀ = (1.0246/1.03075)*0.29870 = €0.29692.

7. Plantronics owes SKr 50 million, due in one year, for some electrical equipment it recently bought from ABB Asea Brown Boveri. At the current spot rate of $0.1480/SKr, this payable is $7.4 million. It wishes to hedge this payable but is undecided how to do it. The one-year forward rate is currently $0.1436. Plantronics’ treasurer notes that the company has $10 million in a marketable U.S. dollar CD yielding 7% per annum. At the same time, SE Banken in Stockholm is offering a one-year time deposit rate of 10.5%.

a. What is the low-cost hedging alternative for Plantronics? What is the cost?

**Answer.** Plantronics can use the forward market to lock in a cost for its payable of $7.18 million. Alternatively, Plantronics can use a money market hedge to lock in a lower dollar cost of $7,165,611 for its payable. Thus, the money market hedge is the low-cost hedge. To compute this cost, note that Plantronics must invest SKr 45,248,869 today at 10.5% to have SKr 50 million in one year (45,248,869 x 0.105 = 50 million). This amount is equivalent to $6,696,833 at the current spot of SKr $0.1480/SKr. The opportunity cost to Plantronics of taking this amount from its CD today and converting it into SKr is $7,165,611, which is the future value of $6,696,833 invested at 7%.

b. Suppose interest rate parity held. What would the one-year forward rate be?
ANSWER. Interest rate parity holds when the dollar return on investing dollars equals the dollar return on investing SKr, or $1.07 = \frac{1}{0.1480} \times 1.105 \times f_1$, where $f_1$ is the equilibrium one-year forward rate. The solution to this equation is $f_1 = \$0.1433/\text{SKr}$.

8. Dow Chemical has sold SFr 25 million in chemicals to Ciba-Geigy. Payment is due in 180 days.

<table>
<thead>
<tr>
<th></th>
<th>$0.7957/\text{SFr}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot rate:</td>
<td>$0.8095/\text{SFr}$</td>
</tr>
<tr>
<td>180-day forward rate</td>
<td>5.25%</td>
</tr>
<tr>
<td>180-day U.S. dollar interest rate (annualized)</td>
<td>1.90%</td>
</tr>
<tr>
<td>180-day Swiss franc interest rate (annualized)</td>
<td>2% premium</td>
</tr>
<tr>
<td>180-day call option at $0.80/\text{SFr}$</td>
<td>2% premium</td>
</tr>
<tr>
<td>180-day put option at $0.80/\text{SFr}$</td>
<td>1% premium</td>
</tr>
</tbody>
</table>

a. What is the hedged value of Dow's receivable using the forward market hedge? the money market hedge?

ANSWER. Dow Chemical can use a forward contract to lock in a value of $20,237,500 (25,000,000 \times 0.8095)$ for its receivable. It can also use a money market hedge, which would proceed as follows. Dow would borrow the present value of the SFr 25 million receivable, which equals SFr 24,764,735 (25,000,000/1.0095) at the 0.95% 180-day interest rate (1.9%/2). This franc amount translates into a dollar amount of $19,705,300 at the current spot rate of $0.7957/\text{SFr}$. By investing these dollars at the semiannual rate of 2.625% (5.25%/2), Dow will have $20,222,564 at the end of 180 days (1.02625 \times $19,705,300). It can then pay off the Swiss franc loan with the SFr 25 million in collected receivables.

b. What alternatives are available to Dow to use currency options to hedge its receivable? Which option hedging strategy would you recommend?

ANSWER. Dow can buy a put option giving it the right but not the obligation to sell SFr 25 million in 180 days at a price of $0.80/\text{SFr}$ and a put premium of 1%. Dow can also use a currency collar, which would involve buying the put option and selling a call option in the amount of SFr 25 million and receiving a 2% premium. With sale of the call option, if the Swiss franc appreciates beyond $0.80, the holder of the call option will call the francs away. Thus, Dow will cap its upside potential at $0.80 plus the 2% premium and be protected on the downside by the put option.

By buying the put option and selling the call option at a strike price of $0.80/\text{SFr}$ and pocketing the 1% premium of $0.008 (0.01 \times 0.7957), Dow would create the equivalent of a forward contract at $0.808. This is a poorer price than Dow would receive via the forward contract.

c. Which of the hedging alternatives analyzed in parts (a) and (b) would you recommend to Dow? Why?

ANSWER. The forward contract is the preferred alternative because its hedging characteristics are identical to those of the others but it has a higher payoff. Dow would be speculating on the future spot price of the Swiss franc if it bought the put option. Since Dow has no comparative advantage in pricing options, it should drop this alternative.

9. Metalgesellschaft, a leading German metal processor, has scheduled a supply of 20,000 metric tons of copper for October 1. On April 1, copper is quoted on the London Metals Exchange at £562 per metric ton for immediate delivery and £605 per metric ton for delivery on October 1. Monthly storage costs are £10 for a metric ton in London and DM 30 in Hamburg, payable on the first day of storage.

Exchange rate quotations are as follows: The pound is worth DM 3.61 on April 1 and is selling at a 6.3% annual discount. The opportunity cost of capital for Metalgesellschaft is estimated at 8% annually, and the pound sterling is expected to depreciate at a yearly rate of 6.3% throughout the next 12 months.

Compute the DM cost for Metalgesellschaft on April 1 of the following options:

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*Problem contributed by Laurent Jacque.
CHAPTer 10: MEASURING AND MANAGING ACCOUNTING EXPOSURE

a. Buy 20,000 metric tons of copper on April 1 and store it in London until October 1.

b. Buy a forward contract of 20,000 metric tons on April 1, for delivery in six months. Cover sterling debt by purchasing forward pounds on April 1.

c. Buy 20,000 metric tons of copper on October 1.

Can you identify other options available to Metalgesselschaft? Which one would you recommend?

ANSWER. This problem illustrates some of the difficulties often encountered when trading in commodities, where the bulk of the contracting is generally done in pounds or U.S. dollars. In this case, Metalgesselschaft is confronted with two types of risk: (i) relative price risk stemming from fluctuations in the price of copper on the London Metals Exchange and (ii) currency risk resulting from fluctuations in the DM/pound exchange rate. Here are calculations for the present values of the alternatives.

a. Buy the required 20,000 metric tons of copper and incur storage costs in London. Payment occurs on April 1 so the present value of the cost is the same as the actual cost.

\[
DM \text{ cost} = 20,000 \times (562 + 60) \times 3.61 = DM \ 44,908,400
\]

b. Cover both commodity and currency risks through forward contracts of matching maturities in the respective markets. Payment doesn't take place until October 1.

\[
DM \text{ cost} = 20,000 \times 605 \times 3.61 \times (1 - .063/2)/(1 + .08/2) = DM \ 40,677,931
\]

c. Leave both commodity and currency positions uncovered. The DM cost of this option cannot be computed since no information is given as to the projected price of copper or the projected DM value of the pound six months hence.

An additional option would consist of buying the copper on April 1 and storing it in Hamburg. This option is analogous to the first one, except for the geographical location of storage. This option is less expensive than the first one, however, because the cost of storage in Hamburg is only DM180, whereas it costs DM60 x 3.61 = DM216.6 to store copper in London. The total cost of this option is 20,000[562 x 3.61 + 180] = DM 44,176,400.

Of the options we can price, the second one, which involves hedging both commodity price risk and currency risk, is the least expensive. Whether Metalgesselschaft should, in fact, hedge depends on how its DM revenues vary with the spot cost of copper expressed in DM. If its DM revenues don't vary with the current DM spot price of copper, the firm is probably better off hedging its copper purchases. On the other hand, if DM revenues vary directly with the spot price of copper, then hedging one end of the profit equation (costs) without hedging the other end (revenues) could subject Metalgesselschaft to more risk than if it didn't hedge at all.

10. Cosmo, a Japanese exporter, wishes to hedge its $15 million in dollar receivables coming due in 60 days. In order to reduce its net cost of hedging to zero, however, Cosmo sells a 60-day dollar call option for $15 million
with a strike price of ¥98/$ and uses the premium of $314,000 to buy a 60-day $15 million put option at a strike price of ¥90/$.

a. Graph the payoff on Cosmo's hedged position over the range ¥80/$-¥110/$. What risk is Cosmo subjecting itself to with this option hedge?

ANSWER. As can be seen from the payoff diagram on Cosmo's currency collar, Cosmo is limiting the upside potential on its receivable with the call option but also limiting its downside risk. The put and call premiums of $314,000 cancel offset each other and so don't affect the payoff on the currency collar. The diagram reflects the fact that Cosmo will not exercise its put option at an exchange rate above ¥90/$ and the buyer will not exercise its call option below ¥98/$. Neither option, therefore, will be exercised in the range of ¥90/$:¥98/$.

b. What is the net yen value of Cosmo's option hedged position at the following future spot rates: ¥85/$, ¥95/$, and ¥105/$?

ANSWER. Cosmo's currency collar will return the following amounts of yen at the given exchange rates: ¥85/$, ¥1,350,000,000 (Cosmo will exercise its option to sell dollars at ¥90/$); ¥95/$, ¥1,425,000,000 (this exchange rate falls in the range where the put and call options won't be exercised, so Cosmo will convert at the actual spot rate); ¥105/$, ¥1,470,000,000 (Cosmo's dollars will be called away at the exercise price of ¥98/$).

c. As an alternative to using options, Cosmo could have hedged with a 60-day forward contract at a price of ¥97/$. What would be the yen value of Cosmo's hedged receivable if it had used a forward contract to hedge?

ANSWER. Cosmo can lock in a value of ¥1,455,000,000 (¥97 x 15,000,000) with the forward contract.

d. At what exchange rate will the hedged value of Cosmo's dollar receivables be the same whether it used the option hedge or forward hedge?

ANSWER. At an exchange rate of ¥97/$, the currency collar will return ¥1,455,000,000 since at this rate neither option will be exercised and Cosmo will convert at the spot rate.
CHAPTER 11

SUGGESTED ANSWERS TO CHAPTER 11 QUESTIONS

1. a. Define exposure, differentiating between accounting and economic exposure. What role does inflation play?

**ANSWER.** Accounting exposure results when exchange rate changes alter the home currency value of foreign currency-denominated assets and liabilities. The big debate in the accounting profession centers on which foreign currency assets and liabilities should be translated at the current rate (these assets and liabilities are exposed because their HC values change in line with the exchange rate) and which assets and liabilities should be translated at the historical rate (the rate in effect at the time the asset was acquired or the liability incurred). These latter assets and liabilities are regarded as not being exposed because they maintain their home currency values regardless of what happens to the exchange rate.

By contrast, economic exposure measures the extent to which a given currency change affects the value of the firm. Nominal exchange rate changes affect the home currency value of the transaction exposure component of economic exposure because these cash flows are fixed. But only real exchange rate changes—flation-adjusted currency changes—affect the firm's future sales revenues and costs, its operating cash flows.

b. Describe at least three circumstances under which economic exposure is likely to exist.

**ANSWER.** Circumstances in which a firm faces economic exposure include when the firm:

1. has entered into sales or purchase contracts denominated in a foreign currency.
2. is selling or buying abroad or it faces domestic competition from imports and the real exchange rate changes.
3. is operating in a foreign country whose government taxes nominal rather than real income.

c. Of what relevance are the international Fisher effect and purchasing power parity to your answers to parts a and b?

**ANSWER.** If PPP holds exactly, then the second situation involving exchange risk—a change in the real exchange rate—can never occur. Similarly, if the international Fisher effect holds continually, firms face no exposure on foreign currency-denominated transactions. In cases, gains or losses on exchange rate changes are always offset, either by losses or gains due to offsetting changes in price levels or by price adjustments that reflect expected change rate changes.

d. What is exchange risk, as distinct from exposure?

**ANSWER.** Exchange risk involves the extent to which uncertain exchange rate changes lead to uncertain fluctuations in the value of the firm. If the firm has no exposure, it has no exchange risk.

e. Under what circumstances might multinational firms be less subject to exchange risk than purely domestic firms in the same industry?

**ANSWER.** See the discussion of Myth 2 above.

2. The sharp decline of the U.S. dollar between 1985 and 1995 significantly improved the profitability of U.S. firms both at home and abroad.

a. In what sense is this profit improvement false prosperity?

**ANSWER.** High profits are due to the state of the dollar, not to sustainable competitive advantage. A reversal of the dollar's fortunes (as has recently occurred) will cause these profits to disappear. In the meantime, management may
mistakenly believe it has performed well; this could lower incentives for efficient production and critical innovation of sustainable competitive advantages.

b. How would you incorporate the decline in the dollar in evaluating management performance? In making investment decisions?

**ANSWER.** There are several ways to insulate the manager's performance against currency shocks. First, one could tie compensation to comparable firms who will suffer the same relative currency shocks. Second, one could construct a hedge (real or synthetic) to determine the value added based on activity outside of exchange variations. In other words, try to determine what fraction of a firm’s profits is due to the value of the dollar, and what fraction can be attributed to controllable factors.

In investment decisions, the manager should determine the market price of currency risk. Do otherwise equivalent firms that bear differing levels of currency risk earn different required rates of return? If so, then the market price of currency risk needs to be incorporated explicitly into the discount rate applied to capital projects. Also, an investment manager can develop future currency scenarios and assess profitability under these alternative scenarios. This exercise determines how robust profit projections are to changing international conditions.

c. Comment on the following statement: "The sharp appreciation of the U.S. dollar during the early 1980s might have been the best thing that ever happened to American industry."

**ANSWER.** The resulting severe competitive pressure from foreign firms forced American industry to get lean and mean. This corporate restructuring raised productivity, made companies more responsive to the marketplace, led to improved product quality, shorter product cycles, and redirected capital to more productive uses. This doesn't mean that American companies appreciated the tune-up; most people don't like being put on a restrictive diet and being forced to exercise.

3. What marketing and production techniques can firms initiate to cope with exchange risk?

**ANSWER.** Market selection and market segmentation provide the basic parameters within which a company may adjust its marketing mix over time. Short-term tactical responses include adjustments of pricing, promotional, and credit policies. Product sourcing and plant location are the principal variables companies manipulate to manage competitive risks that can't be dealt with through marketing changes alone. This could include building plants overseas, buying more components overseas, allocating production among plants in line with their changing relative costs, and designing new facilities to provide added flexibility in making substitutions among various sources of goods so as to be better able to respond to relative price differences among domestic and imported inputs.

4. What is the role of finance in protecting against exchange risk?

**ANSWER.** The role of financial management is to structure the firm's liabilities in such a way that, during the time strategic operational adjustments are underway, the reduction in asset earnings is matched by a corresponding decrease in the cost of servicing these liabilities. For example, a company that has developed a sizable export market should hold a portion of its liabilities in the currency of that country. In this way, any shortfall in operating cash flows due to an exchange rate change will be offset by a reduction in the debt service expenses.

5. E & J Gallo is the largest vintner in the United States. It gets its grapes in California (some of which it grows itself) and sells its wines throughout the United States. Does Gallo face currency risk? Why and how?

**ANSWER.** E&J Gallo faces exchange risk because its wines are competing against foreign wines and changes in the value of the dollar affect its competitiveness. In the early 1980s, for example, the soaring dollar enabled vintners from countries such as France and Italy to cut their wine prices in the United States and still earn a good franc or lira profit. Gallo was forced to match these price cuts since the wine categories it sells tend to be very price sensitive. Gallo's loss of revenue was offset somewhat by the drop in wine grape prices. California wine grape prices fell since the demand for these grapes is derived from the demand for California wines. As the demand for California wines fell so did the demand for California wine grapes and their prices.
6. Chrysler exports vans to Europe in competition with the Japanese. Similarly, Compaq exports computers to Europe. However, its biggest competitors are all American companies--IBM, Hewlett-Packard, and Tandem. Assuming all else is equal, which of these companies--Chrysler or Digital--is likely to benefit more from a weak dollar? Explain.

**ANSWER.** Chrysler is likely to be the bigger beneficiary of a weak dollar since its primary competitors are the Japanese. The falling dollar gives Chrysler an opportunity to gain market share in Europe from the Japanese by holding its dollar prices constant, thereby lowering its prices in terms of the various European currencies. The Japanese carmakers cannot respond effectively since their costs have not changed in European currency terms. Conversely, by holding its prices constant in European currency terms, Chrysler can fatten its profit margins.

Compaq, on the other hand, will not gain a competitive advantage relative to its primary competitors from a falling dollar since all of them, being U.S. companies, share a common cost structure. Competition will likely force them to pass along lower costs (in European terms) in the form of lower European currency prices. This will probably expand the market overall, but no one company will gain a competitive advantage. By the same token, the existence of a common cost structure means that Compaq will be less affected than Chrysler by a rise in the dollar's value.

7. In 1994, the Singapore dollar rose by 9% in real terms against the U.S. dollar. What was the likely impact of the strong Singapore dollar on U.S. electronics manufacturers using Singapore as an export platform? Consider the following facts. On average, materials and components--85% of which are purchased abroad--account for about 60% of product costs. Labor accounts for an additional 15%; other operating costs account for the remaining 25%.

**ANSWER.** The impact was less than might be expected. With 85% of materials and components coming from abroad, the net effect of the 9% rise in the real value of the Singapore dollar on this component of cost is likely to be only about 1.35% (0.15 x 0.09). Since these costs account for about 60% of product costs, the net effect on the overall cost of manufacturing will be only about 0.8%. Assuming that the other 40% of costs are fully exposed to the rise in the real value of the Singapore dollar, the impact of a 9% rise on overall manufacturing costs is 3.6% (0.4 x 0.09). The combination of these two cost elements is a rise in total costs of 4.4%, or just about half the 9% rise in the Singapore dollar. To the extent that some of the other elements of cost (especially energy and capital equipment) come from abroad or are price in U.S. dollar terms, this amount will overstate the overall impact of the rise in the real value of the Singapore dollar on U.S. costs of producing in Singapore. At the extreme, if only labor costs (which account for only 15% of total costs) are exposed, the net impact of the rise in the Singapore dollar is just 1.35% (0.15 x 0.09).

8. Di Giorgio International, a subsidiary of California-based Di Giorgio Corp., processes fruit juices and packages condiments in Turnhout, Belgium. It buys Brazilian orange concentrate in dollars, British apples in pounds, Italian peaches in Euros, and cartons in Danish kroner. At the same time, its exports 85% of its production. Assess Di Giorgio International's currency risk and determine how it can structure its financing to reduce this risk.

**ANSWER.** A key question is whether the supplies bought by Di Giorgio International (DGI) and the products it sells are priced domestically or internationally. The odds are that both inputs and outputs are priced at least somewhat in domestic terms because of the costs and time lags involved in arbitraging among markets. Thus, while DGI is exposed to exchange risk on both its exports and its domestic (Belgian) sales, it has a natural hedge in the form of inputs purchased abroad and Belgian inputs. Since the currencies of the countries in which it does business all tend to move together (except for Brazil), in the absence of better information, a best guess is that DGI is exposed to foreign exchange risk on its profit margin. One way to hedge this profit margin is to finance in Euros a fraction of its assets equal to its return on investment. In this way, changes in the dollar value of operating profits will be offset by changes in the dollar cost of servicing its liabilities.

Since the depreciation tax shield is also an important component of operating cash flow, and DGI's depreciation is in Euros (Belgium is a member of EMU), it should finance in Euros a fraction of its assets equal to annual asset
depreciation divided by total assets. In this way, if the euro devalues, DGI's dollar cash flow from the depreciation tax shield will drop, but so will the cost of servicing its euro liabilities.

9. A U.S. company needs to borrow $100 million for a period of seven years. It can issue dollar debt at 7 percent or yen debt at 3 percent.

a. Suppose the company is a multinational firm with sales in the United States and inputs purchased in Japan. How should this affect its financing choice?

**Answer.** According to the international Fisher effect, the difference in interest rates reflects expected appreciation in the value of the yen. That is, yen are not automatically less expensive to borrow just because the interest rate on yen is lower than the rate on dollars. From a risk management standpoint, the key issue is the currency risk being borne by the MNC and the effect of its borrowing decision on that currency risk. From the facts given in the question, it appears that based on its sourcing of inputs in Japan, the company is short yen (regardless of whether the input prices are denominated in yen or dollars). Other things being equal, therefore, it appears that the MNC should borrow dollars; borrowing yen will just exacerbate its short position in yen. However, if the company is competing with Japanese firms, then it is more likely to be long yen, in the sense that if the yen appreciates, its competitive position improves and vice versa if the yen depreciates. If this is the case, then the firm's yen exposure is the net of its short and long exposure, which we cannot ascertain from the facts presented in the question.

b. Suppose the company is a multinational firm with sales in Japan and inputs that are primarily determined in dollars. How should this affect its financing choice?

**Answer.** In this case, the firm clearly has a long economic exposure to yen. By financing in yen, the MNC can offset its economic exposure.

10. Huaneng Power International is a large Chinese company that runs coal-fired power plants in five provinces and in Shanghai. It has close to $1.2 billion in U.S. dollar debt whose proceeds it has used to purchase equipment abroad.

a. What currency risks does Huaneng face?

**Answer.** The biggest problem for HPI is that its debt is denominated in dollars whereas its revenues are both denominated and determined in yuan. If the yuan depreciates in real terms against the dollar, HPI will see its dollar-equivalent cash inflows fall while its dollar cash outflows will remain the same on its debt. Given this currency mismatch, HPI's net yuan profit will rise when the yuan appreciates in real terms against the U.S. dollar and fall when the yuan depreciates in real terms. Another currency risk faced by HPI stems from the fact that coal is traded in a global market and tends to be priced in dollars. If the dollar appreciates in real terms against the yuan, the yuan cost of coal will rise. If HPI is unable to pass that higher cost along to its customers, then it will see its yuan margins shrink.

b. Do its lenders face any currency risks? Explain.

**Answer.** Yes. If the U.S. dollar appreciates enough, HPI will have difficulty servicing its dollar debts. Thus, the lenders are exposed to risk on their loans stemming from currency fluctuations even though these loans are priced in dollars. In effect, currency risk will be turned into credit risk.

**ADDITIONAL CHAPTER 11 QUESTIONS AND ANSWERS**

1. Suppliers of the equipment used to make semiconductors, such as Applied Materials and LAM Research, who produce in the United States but are heavily dependent on sales to Asia, saw their share prices plummet in the wake of the Asian financial crisis. Explain.
Answer. These companies had their costs denominated in dollars and a large portion of their revenues originating in Asia, particularly in Japan and South Korea. The steep decline in the value of Asian currencies led to a dramatic rise in the local currency prices of their equipment. Asian demand fell because of the price increases and because Japanese equipment makers became more competitive. Lower dollar profits, in turn, lowered the present value of the future cash flows of these companies and led to a decline in their stock prices.

2. Malaysian palm oil producers export more than 90% of their product for sale in dollars. Virtually all their costs, however, are in Malaysian ringgit.

a. How would the 30% fall in the value of the ringgit during 1997 affect the ringgit profitability of these producers? Explain.

Answer. Ringgit depreciation combined with a dollar price for palm oil translates into an increase in the ringgit revenue generated by exports of palm oil. At the same time, ringgit costs stay about the same. The result is an increase in the ringgit profit earned by Malaysia’s palm oil producers.

b. How would the ringgit's depreciation affect the dollar profits of these producers? Explain.

Answer. With over 90% of their output exported, the dollar revenue earned by the producers will remain constant (even though domestic sales are priced in ringgit, the ringgit price will reflect the dollar price earned overseas). Their dollar costs, which are sourced in ringgit, will decline in line with the ringgit's depreciation. Hence, Malaysian palm oil producers will see their dollar profits rise with the ringgit's depreciation.

3. Many business people and the business press are convinced that a devalued dollar offers a significant advantage to foreign bidders for American companies and real estate. Comment on this position.

Answer. It is true that the foreign currency (FC) cost of buying U.S. assets declines in line with depreciation of the U.S. dollar. However, the FC value of future dollar cash flows generated by these assets will simultaneously decline as well. The net result is that the foreign currency return on investment in U.S. assets will remain the same with dollar depreciation.

4. Saint-Gobain, a French firm, and Pilkington PLC, a British firm, are arch rivals in the European flat-glass business. After Britain's exit from the ERM in September 1992, the pound fell by 15% against the franc.

a. What was the likely impact on Saint-Gobain's profitability of the pound devaluation?

Answer. Saint-Gobain will be placed at a competitive disadvantage vis-à-vis Pilkington since Pilkington can maintain its pound prices--thereby cutting its prices in French franc and other European currency terms--and gain market share. Were Saint-Gobain to respond by cutting its prices, its franc profits would fall. Of course, if Saint-Gobain has substantial production capacity in the U.K. it will be able to offset some of its problems by shifting more production to its U.K. operations. (It doesn't, so it must bear the full brunt of the pound devaluation.)

b. What was the likely impact on Pilkington's profitability of the pound devaluation?

Answer. Assuming that Pilkington is producing in England, its profitability should have gone up. Either it can fatten its margins by holding its European currency prices constant, or it can hold its pound prices constant and thereby gain market share from its European competitors. Of course, if Pilkington has other competitors who are producing in the U.K., then its competitive advantage will not be as great as it otherwise would be.

5. Bakrie, an Indonesian conglomerate, is assessing the likely consequences of the rupiah's precipitous decline on its different businesses. These businesses include a telecommunications company that is building a network (using mostly imported equipment) throughout Jakarta to offer wireless service to its residents, a company that sells pipe to the Western firms exploiting Indonesia's oil and gas fields, and a big agricultural business (54% of its revenues are in dollars, compared with 40% of its costs) that owns rubber and palm plantations feeding a large refining and distribution operation.
CHAPTER 11: MEASURING AND MANAGING ECONOMIC EXPOSURE

a. Assess the likely impact of the rupiah's depreciation on Bakrie's three different businesses.

**ANSWER.** The telecommunications has its equipment costs in foreign currency whereas its revenues will be in devalued rupiah. Although its operating costs will be in rupiah as well, most expenses on a wireless network come from equipment costs. Hence, the net effect of rupiah devaluation on the telecommunications unit will be very negative.

The pipe business will likely benefit from rupiah devaluation since it is paid in dollars, whereas its costs are largely in rupiah. Although the agricultural business's dollar revenues and costs are more evenly balanced, it is a net recipient of dollars. Thus, it too should benefit from rupiah devaluation.

b. Which of Bakrie's businesses will be most hurt by the rupiah's fall? Will any of these businesses actually benefit from rupiah depreciation?

**ANSWER.** The telecommunications business will be greatly hurt by rupiah devaluation. The other two businesses will benefit, although it is difficult to say which will benefit the most.

c. Bakrie has about $1 billion in foreign debt. Will this debt increase or decrease its currency exposure? Explain.

**ANSWER.** As it turns out, the magnitude of Bakrie's debt is so large that it completely offsets any benefits that rupiah devaluation might have on its agricultural and pipe businesses. The net effect of this transaction exposure is to swamp Bakrie and leave it greatly exposed to adverse effects from the rupiah's devaluation.

6. Midwestern Bank has lent $10 million to finance an equipment sale to Thailand by Lasertech, a major exporter located in Michigan. Both the loan and the sale are priced in U.S. dollars.

a. Is Midwestern's loan to Lasertech exposed to exchange risk? Explain.

**ANSWER.** Yes. If the U.S. dollar appreciates against the Thai baht (which it has), the Thai importer's cost of paying Lasertech will go up and Lasertech will likely have more difficulty collecting on its sale. If the importer defaults on the sale, Lasertech may have trouble repaying its debt. Thus, Midwestern is exposed to risk on its loan stemming from currency fluctuations even though the loan is priced in dollars.

b. Suppose Midwestern has lent money to Lasertech secured by the general credit of the company. Are these loans exposed to exchange risk? Explain.

**ANSWER.** Yes. If the dollar appreciates against other currencies, Lasertech will face more competition from foreign companies and will be under pressure from foreign customers to lower its dollar prices (who will see prices in their domestic currencies rise with dollar appreciation). By diminishing Lasertech's profitability, a stronger dollar will also diminish the probability of timely repayment of Midwestern's loans to Lasertech and, hence, Midwestern's profitability. To the extent Midwestern's loans are affected by the value of the dollar, those loans are subject to exchange risk.

7. Why should managers focus on marketing and production strategies to cope with foreign exchange risk?

**ANSWER.** Unlike transaction exposure, which is amenable to financial hedging, competitive exposures--those arising from competition with firms based in other currencies--are longer-term, harder to quantify, and cannot be dealt with solely through financial hedging techniques. Rather, they require more strategic maneuvers involving changes in operating strategies. For this reason, the major burden of exchange risk management must fall on the shoulders of marketing and production executives. These executives deal in imperfect product and factor markets where their superior knowledge and specialized skills provide them with a comparative advantage in adjusting to the relative price changes caused by currency changes.

8. In what sense is the boost in profits of American companies due to a falling dollar artificial?
ANSWER. The higher profits experienced by American companies due to a falling dollar are not the result of management excellence, product innovation, or a new low-cost production process. They are also not permanent since the real exchange rate follows a random walk. In this sense they are artificial.

9. How does a shorter product-cycle time help companies reduce the exchange risk they face?

ANSWER. Success in an environment characterized by volatile exchange rates depends on a company's ability to react to change within a shorter time horizon than ever before. A key is shorter product cycle times—the time it takes to bring new and improved products to market. With shorter product cycles, the company can incorporate more up-to-date technology in its goods and respond faster to emerging market niches and changes in taste. The result is less price elasticity of demand and less exchange risk. Such speed and flexibility enable companies to change their strategies substantially before the impact of any currency change can make itself felt. In this way, the adjustment period following a large exchange rate change can be compressed dramatically, lessening exchange risk.

10. Why do exchange rate changes bring feast or famine for Volvo, but neither feast nor famine for Ford? Consider the distribution and concentration of their production facilities worldwide.

ANSWER. Volvo has almost all its production facilities located in Sweden while it exports a large fraction of its output. The resulting imbalance in its revenue/cost structure means that for Volvo it has been feast or famine: When the krona appreciates, Volvo's exports suffer from a lack of cost competitiveness, while a real krona depreciation brings high profits.

By contrast, Ford, with worldwide manufacturing facilities, has substantial leeway in reallocating various stages of production among its several plants in line with relative production and shipping costs. For Ford, therefore, it is neither feast nor famine. It neither benefits as much from dollar depreciation nor loses as much from dollar appreciation.

11. In order to cut costs when the dollar was at its peak, Caterpillar shifted production of small construction equipment overseas. By contrast, Caterpillar's main competitors in that area, Deere & Co. and J. I. Case, make most of their small construction equipment in the United States. What are the most likely competitive consequences of this restructuring?

ANSWER. Caterpillar now has a diversified cost structure. This means it won't be hurt as much when the dollar rises again, but it also will not benefit as much when the dollar falls. Its main competitors, Deere & Co. and J.I. Case, now have a competitive advantage vis-à-vis Caterpillar by producing most of their small construction equipment in the United States. Caterpillar has responded to the weak dollar by shifting parts sourcing back to the U.S. It has also made an intense commitment to improving its U.S. manufacturing. To do this, it launched its so-called Plant With a Future program. The program involved overhauling virtually all the company's U.S. factories, installing fancy new robotics and streamlining assembly systems. It replaced old-fashioned assembly lines and their large parts inventories with highly automated clusters or cells that produce components for final assembly.

12. When the dollar was strong, and it could no longer earn a reasonable profit margin on European sales, Osmose International gave up its government permits to sell its chemical wood preservatives in much of Europe. "Why pay for a permit when you can't sell anything there anyway?" explained its president.

a. What response do you have for the president of Osmose?

ANSWER. Maintaining its permits gives Osmose the option to return to the European market if and when the dollar weakened. This option is valuable in a world where exchange rates can fluctuate dramatically and stay at depressed levels for many years (as has subsequently proved to be the case). When the dollar fell in value, Osmose decided to reenter the European market, but it found that reapplying for permits takes years. At the same time, Osmose no longer has a service organization in Europe.

b. How might you go about assessing the trade-offs involved for Osmose?
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ANSWER. The more a currency fluctuates, the more valuable an option to move back into a market quickly becomes. Such an option also rises in value with the cost of reentry (in the form of having to recreate a sales organization) and with the time it takes to reapply for permits. The value of maintaining the option of reentering the market quickly must be traded off against the cost of maintaining the permits and the sales organization. All else being equal, the higher the cost of maintaining the permits and sales organization, the less valuable it is to preserve the market reentry option.

13. In order to avoid speculation, Honda hedges only the sales it has clinched, not the ones it expects. Comment on Honda's currency risk strategy.

ANSWER. Honda is hedging its transaction exposure, but this leaves it with operating exposure, which is typically a much larger fraction of total economic exposure. In other words, while hedging some of its exposure reduces risk, the risk reduction is much less than it could be if Honda took its operating exposure into account when deciding on how much to hedge. The policy of only hedging actual sales also leaves Honda vulnerable if the dollar strengthens temporarily, as it did at the end of 1993. A bigger problem facing the Japanese companies in hedging their exposure is that they tend to hedge selectively; that is, they hedge only if they think the dollar will decline and go unhedged otherwise. However, their guesses are often wrong. For example, at the start of 1994, many Japanese firms thought the dollar would continue to strengthen and thus failed to roll over their forward contracts. They subsequently lost a great deal of money when the dollar plummeted in January following another trade fight between Japan and the U.S.

SUGGESTED SOLUTIONS TO CHAPTER 11 PROBLEMS

1. Hilton International is considering investing in a new Swiss hotel. The required initial investment is $1.5 million (or SFr 2.38 million at the current exchange rate of $0.63 = SFr 1). Profits for the first ten years will be reinvested, at which time Hilton will sell out to its partner. Based on projected earnings, Hilton's share of this hotel will be worth SFr 3.88 million in ten years.

   a. What factors are relevant in evaluating this investment?

   ANSWER. Hilton should focus on the real dollar value of future cash flows, or

   \[ 3,880,000e_{10}/[(1+k)(1+i_{us})]^{10} \]

   where \( e_{10} \) is the nominal dollar value of the Swiss franc in ten years, \( i_{us} \) is the average annual rate of U.S. inflation over the next ten years, and \( k \) is Hilton's real required return for this project. That is, the SFr 3.88 million expected to be received in ten years should first be converted to nominal dollars, then into real dollars, and finally discounted at the real required return. This present value figure should then be compared to $1.5 million, the current cost of the investment (2,380,000 x .63).

   b. How will fluctuations in the value of the Swiss franc affect this investment?

   ANSWER. Only fluctuations in the real value of the Swiss franc matter; fluctuations in the nominal value of the Swiss franc that are fully offset by higher U.S. inflation should not affect the investment. If the real value of the Swiss franc rises, the real dollar price of the hotel services being sold by Hilton will also rise. If demand for these services is elastic, which it seems to be given the Swiss hotel industry's heavy dependence on tourists, real dollar revenues will decline. Inelastic demand will cause an increase in real dollar revenues. The hotel's real dollar cost of Swiss labor and services will rise. Thus, if PPP holds, nominal currency changes shouldn't affect Hilton's Swiss investment; if PPP does not hold, an increase in the real exchange rate is likely to reduce the real value of Hilton's investment.

   c. How would you forecast the $:SFr exchange rate ten years ahead?
ANSWER. There are several ways to forecast the nominal Swiss exchange rate ten years out: (1) Rely on the international Fisher effect, using nominal interest differentials between U.S. and Swiss bonds with maturities of ten years; (2) project relative price levels changes in Switzerland and the U.S. over the next ten years and then use PPP to forecast the rate change; and (3) use the forward rate if a ten-year swap can be found. But what really matters is what happens to the real exchange rate. The best forecast of the real rate ten years out is the current spot rate. Over the long run, PPP tends to hold, leading to a relatively constant real exchange rate.

2. A proposed foreign investment involves a plant whose entire output of 1 million units per annum is to be exported. With a selling price of $10 per unit, the yearly revenue from this investment equals $10 million. At the present rate of exchange, dollar costs of local production equal $6 per unit. A ten percent devaluation is expected to lower unit costs by $0.30, while a fifteen percent devaluation will reduce these costs by an additional $0.15. Suppose a devaluation of either 10 percent or 15 percent is likely, with respective probabilities of .4 and .2 (the probability of no currency change is .4). Depreciation at the current exchange rate equals $1 million annually, while the local tax rate is 40 percent.

a. What will annual dollar cash flows be if no devaluation occurs?

ANSWER. The cash flows associated with each exchange rate scenario are:

<table>
<thead>
<tr>
<th>Cash Flow Statement</th>
<th>0%</th>
<th>10%</th>
<th>15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>$10.0</td>
<td>$10.00</td>
<td>$10.00</td>
</tr>
<tr>
<td>Variable Cost</td>
<td>6.0</td>
<td>5.70</td>
<td>5.55</td>
</tr>
<tr>
<td>Depreciation</td>
<td>1.0</td>
<td>0.90</td>
<td>0.85</td>
</tr>
<tr>
<td>Taxable income</td>
<td>3.0</td>
<td>3.40</td>
<td>3.60</td>
</tr>
<tr>
<td>Tax @ 40%</td>
<td>1.2</td>
<td>1.36</td>
<td>1.44</td>
</tr>
<tr>
<td>After-tax income</td>
<td>1.8</td>
<td>2.04</td>
<td>2.16</td>
</tr>
<tr>
<td>Depreciation</td>
<td>1.0</td>
<td>0.90</td>
<td>0.85</td>
</tr>
<tr>
<td>Cash Flow</td>
<td>$2.8</td>
<td>$2.94</td>
<td>$3.01</td>
</tr>
</tbody>
</table>

With no devaluation, the annual cash flow will equal $2.8 million.

b. Given the currency scenario described above, what is the expected value of annual after-tax dollar cash flows assuming no repatriation of profits to the United States?

ANSWER. The expected dollar cash flow will equal the sum of the cash flows under each possible devaluation percentage multiplied by the probability of that devaluation occurring or $2.8(.4) + 2.94(.4) + 3.01(.2) = $2.9 million. Thus expected dollar cash flows actually increase by $100,000. If the impact of the expected devaluation of 7% (.1 x .4 + .15 x .2) were calculated by reducing expected cash flows by 7%, the expected (and incorrect) result would be a loss of $196,000 (2.8 x .07).

3. Mucho Macho is the leading beer in Patagonia, with a 65 percent share of the market. Because of trade barriers, it faces essentially no import competition. Exports account for less than 2 percent of sales. Although some of its raw material is bought overseas, the large majority of the value added is provided by locally supplied goods and services. Over the past five years, Patagonian prices have risen by 300 percent, and U.S. prices have risen by about 10 percent. During this time period, the value of the Patagonian peso has dropped from P 1 = $1.00 to P 1 = $0.50.

a. What has happened to the real value of the peso over the past five years? Has it gone up or down? A little or a lot?
ANSWER. The real value of the Patagonian peso, relative to its value five years ago, is now $0.50 x 4/1.1 = $1.82. Thus, the real value of the peso has risen by 82 percent. As discussed in the chapter, an increase in the real value of the local currency should boost dollar profits for those firms selling locally and not subject to import competition.

b. What has the high inflation over the past five years likely done to Mucho Macho's peso profits? Has it moved profits up or down? A lot or a little? Explain.

ANSWER. A reasonable assumption is that both Mucho Macho's sales and costs have risen at least at the rate of Patagonian inflation. This means that its peso profits, which equal the difference between the two, have risen at least 300% over the past five years. In fact, sales have probably risen by more than the rate of inflation, while costs have risen at less than the rate of inflation because some of the inputs are bought overseas.

c. Based on your answer to part a, what has been the likely effect of the change in the peso's real value on Mucho Macho's peso profits converted into dollars? Have dollar-equivalent profits gone up or down? A lot or a little? Explain.

ANSWER. Given the answers to items a and b, each peso of profits five years ago should now have grown to at least four pesos. Converting these profits into dollars at the lower exchange rate ($0.50 vs. $1) yields at least two dollars of profit today for every dollar of profit five years ago.

d. Mucho Macho has applied for a dollar loan to finance its expansion. Were you to look solely at its past financial statements in judging its creditworthiness, what would be your likely response to Mucho Macho's dollar loan request?

ANSWER. The real appreciation of the Patagonian peso should have boosted Mucho Macho's dollar profits dramatically. Thus, any analysis of creditworthiness based solely on its financial statements would show a very profitable and successful company and one deserving of a loan.

e. What foreign exchange risk would such a dollar loan face? Explain.

ANSWER. The profitability of Mucho Macho is an artifact of the real peso appreciation. Thus it is artificial and not sustainable. The odds are that the government will be unable to maintain such an overvalued exchange rate for long. Once the peso devalues, the dollar value of Mucho Macho's peso cash flow will plummet and so will its ability to repay its dollar loan.

This exercise points out that an analysis of credit risk based solely on financial statements is valid only if one assumes that the conditions that gave rise to the numbers reflected on these statements will persist into the future. Under a controlled exchange rate system in an inflationary environment, the real exchange rate is subject to dramatic changes. These changes in turn will give rise to dramatic changes in the business environment, making past financial statements irrelevant in forecasting future cash flows.

Although the numbers have been changed, this problem is based on an actual situation. In the late 1970s, some major American banks lent a great deal of money to one of the largest Chilean brewers. This brewer faced essentially no competition and so was highly profitable in both peso and dollar terms prior to devaluation of the peso. Although its credit looked impeccable, the brewer's loans are now in default. The bankers forgot to assess the conditions that led to the brewer's high profits and the likelihood that these conditions would persist.

When government intervention causes nominal exchange rate changes to lag inflation, the real value of the currency will rise. The more rapid the inflation and the greater the lag, the greater the real exchange rate change. The increasing real value of the local currency in turn will cause pressures to build up that must ultimately be released through an LC devaluation. Thus, in assessing credit risk for foreign borrowers operating in a controlled rate system, it is necessary to assess their creditworthiness both before and after the inevitable devaluation.

4. In 1990, General Electric acquired Tungsram Ltd., a Hungarian light bulb manufacturer. Hungary's inflation rate was 28 percent in 1990 and 35 percent in 1991, while the forint (Hungary's currency) was devalued 5
percent and 15 percent, respectively, during those years. Corresponding inflation for the U.S. was 6.1 percent in 1990 and 3.1 percent in 1991.

a. What has happened to the competitiveness of GE's Hungarian operations during 1990 and 1991? Explain.

**Answer.** Since forint devaluations haven't kept pace with Hungary's roaring inflation, we know that the forint's real exchange rate has risen. Specifically, if the nominal exchange rate (dollar value of the forint) at the start of 1990 was $e_0$, the forint's real value at the end of 1991 was:

$$0.95 \times 0.85 e_0 \times (1.28)(1.35)/[(1.061)(1.031)] = 1.276e_0$$

This equation reflects the fact that if the nominal exchange rate (dollar value of the forint) at the start of 1990 was $e_0$, then the 5% devaluation during 1990 left it at $0.95e_0$ by the end of 1990. A further 15% devaluation during 1991 would have left the nominal rate equal to $0.95 \times 0.85e_0$ by the end of 1991.

Based on this equation, we can see that the real exchange rate increased by 27.6% during this two-year period. The sharp appreciation in the real value of the forint reduced the cost competitiveness of GE's Hungarian operations.

b. In early 1992, GE announced that it would cut back its capital investment in Tungsram. What might have been the purpose of GE's publicly announced cutback?

**Answer.** GE was trying to put pressure on the Hungarian government to devalue further the forint and thereby improve the cost competitiveness of its Tungsram manufacturing facilities. In effect, GE was telling the Hungarian government that it was in business to make a profit and that if it couldn't make a profit in Hungary because of the high forint and the resulting sharp jump in its costs, it was not going to invest there in the future.

5. In 1985, Japan Airlines (JAL) bought $3 billion of foreign exchange contracts at ¥180/$1 over 11 years to hedge its purchases of U.S. aircraft. By 1994, with the yen at about ¥100/$1, JAL had incurred over $1 billion in cumulative foreign exchange losses on that deal.

a. What was the economic rationale behind JAL's hedges?

**Answer.** Most likely, JAL had signed contracts to take delivery of planes in the future and was using forward contracts to protect itself against a rise in the value of the dollar that would increase the yen cost of buying the planes. Alternatively, the forward contracts could have been used to hedge purchases of U.S. planes financed by borrowing dollars.

b. Did JAL's forward contracts constitute an economic hedge? That is, is it likely that JAL's losses on its forward contracts were offset by currency gains on its operations?

**Answer.** The answer to this question depends on whether JAL's yen operating profits are negatively correlated with the yen's value. If a stronger yen means lower yen operating profits, then these forward contracts would constitute an economic hedge. Some factors to consider in deciding whether this is likely to be the case are as follows. First, a good part of JAL's costs are for Japanese flight crews, whose pay is denominated and determined in yen. To the extent that fares are determined in dollars (in part because JAL is competing with U.S. airlines, JAL's yen profits will vary inversely with the yen's value). At the same time, a stronger yen will induce more Japanese to travel to the U.S. but fewer Americans to visit Japan, increasing outbound volume but reducing inbound volume. Where the balance lies is an empirical question. It turns out that JAL has been hurt by yen appreciation and is now looking to cut costs, primarily by reducing its Japanese work force through job buyouts and hiring foreigners. It has also focused more on serving leisure travelers since the yen's strength has led unprecedented numbers of Japanese tourists to travel abroad.

6. Nissan produces a car that sells in Japan for ¥1.8 million. On September 1, the beginning of the model year, the exchange rate is ¥150:$1. Consequently, Nissan sets the U.S. sticker price at $12,000. By October 1, the exchange rate has dropped to ¥125:$1. Nissan is upset because it now receives only $12,000 x 125 = ¥1.5 million per sale.
a. What scenarios are consistent with the U.S. dollar's depreciation?

**Answer.** Any model of exchange rate determination may be applied here. In a monetary model this would include a relative increase in the U.S. money supply (or velocity), a relative decrease in U.S. income, or the expectation of these events in future periods. In an open-economy Keynesian model, yen appreciation could arise from an increase in U.S. imports from Japan (due to an increase in U.S. income). If PPP holds, then relative prices levels should also have changed by 10%. Alternatively, the exchange rate change could be due to government intervention to push down the dollar's value, or it could be due to the cessation of government intervention that was previously maintaining an overvalued dollar.

b. What alternatives are open to Nissan to improve its situation?

**Answer.** The alternatives open to Nissan are:

1. Raise prices in the U.S. market.
2. Do nothing for the short run. Incur some losses and hope that the exchange rate will return to ¥200. In addition, hold U.S. sales receipts in dollars and do not repatriate funds until the exchange rate is more favorable. The second part of this strategy is probably useless since it requires that any exchange rates changes not be offset by the differing interest rates between Japan and the United States.
3. Invest in the U.S. and build the cars there. (In 1993, 45% of the cars Toyota sold in the U.S. were U.S. made.)
4. Try to reduce production costs in Japan, including buying more parts overseas. (How have production costs in Japan changed because of the exchange rate change? For example, consider the cost of domestic labor and the costs of imported iron ore and oil.) Many Japanese firms have also found that they could cut costs by simplifying their product line as well as by reducing the variety of parts used in their products. For example, Nissan offers 437 different kinds of dashboard meters, 110 types of radiators, and over 300 varieties of ashtrays. In 1993, Nissan ordered its designers to slash the number of unique parts in its vehicles by 40%. Model variations, which had ballooned to more than 2,200, will be rolled back 35%. Another strategy being used by Japanese automakers is have designers work closely with suppliers, marketing, and manufacturing people--thus avoiding expensive mistakes later on and reducing product development times and costs. Japanese companies are also, for the first time, closing factories and cutting jobs.
5. Recognize that your comparative advantage is permanently lost and exit the U.S. market.
6. Switch production to higher quality, less price-elastic and more income-elastic cars.

c. How should Nissan respond in this situation?

**Answer.** The appropriate response by Nissan depends on its interpretation of the nature of the economic disturbance that caused the exchange rate change. If it believes that the shock is temporary, Nissan must calculate how long it will take for the exchange rate to return to its original level. If the shock is nominal (PPP holds), then the real terms of trade between Japan and the U.S. are unaffected. In this case, U.S. prices in general should have been rising and Nissan can pass along all of the exchange rate change to its U.S. customers. (This is an important point: Is PPP a "leading" or a "lagging" relationship? How quickly can exchange rate changes be incorporated into domestic prices?) In the present circumstance, it is virtually certain that the 10% drop in the value of the dollar is not just a manifestation of purchasing power parity; that is, the dollar depreciation is not due to a 10% jump in the U.S. price level relative to the Japanese price level in the space of one month (a 314% annual rate of U.S. inflation).

If the exchange rate change is real, which it almost surely is, then the yen appreciation is not associated with offsetting changes in domestic prices. In this case, Nissan must make some real changes in response to stay competitive with U.S. automakers. These changes depend on whether the increase in the real exchange rate is expected to be temporary or permanent. If the increase is due to intervention by the U.S. or Japanese central banks, the change is likely to be temporary because it is a movement away from equilibrium. Alternatively, a real exchange rate change that is due to market forces or to the cessation of intervention by the Japanese or U.S. central banks can be assumed permanent. Permanent in this context means that the best predictor of tomorrow's real
exchange rate is today's rate. It doesn't mean that the real rate tomorrow will be the same as the real rate today; rather, the real rate follows a random walk.

If the real exchange rate increase is expected to be temporary, it may not pay Nissan to raise dollar prices and lose market share in the United States. The reason is that when the real exchange rate readjusts, enabling Nissan to be price competitive again, it will be expensive to buy back market share. But if the real exchange rate increase is expected to be permanent, then Nissan should consider raising its prices (the extent depends on the price elasticity of demand) and making more basic changes in production and marketing strategy. Most Japanese firms have followed a strategy of cutting costs at home and keeping dollar prices constant as long as possible so as to hang onto U.S. market share.

d. Suppose that on November 1, the U.S. Federal Reserve intervenes to rescue the dollar, and the exchange rate adjusts to ¥220:$1 by the following July. What problems and/or opportunities does this situation present for Nissan and for General Motors?

**ANSWER.** Here, the tables are reversed from part c. Nissan is "enjoying" an increase of 10% in its yen receipts from U.S. auto sales. Whether its "enjoyment" is real depends again on the nature of the economic disturbance associated with the exchange rate change. If Japanese production costs are rising because of inflation (associated with the yen devaluation) Nissan need not be better off in real terms. Its opportunities still depend on the "real/nominal" and "permanent/ temporary" nature of the shock.

It is interesting to think about the possibilities here for domestic wage and price controls, foreign exchange controls, or foreign exchange market intervention that might be associated with these sharp exchange rate changes. Even if Nissan can determine an optimal response to the exchange rate change, its response may be foreclosed by government regulations. In this case, Nissan must consider second best strategies.

7. Chemex, a U.S. maker of specialty chemicals, exports 40 percent of its $600 million in annual sales: 5 percent goes to Canada and 7 percent each to Japan, Britain, Germany, France, and Italy. It incurs all its costs in U.S. dollars, while most of its export sales are priced in the local currency.

a. How is Chemex affected by exchange rate changes?

**ANSWER.** As an exporter, Chemex is helped by dollar depreciation and hurt by dollar appreciation. If the dollar appreciates, the firm's costs will appreciate in terms of the foreign currencies in which it sells. If it raises its foreign currency prices, it risks losing sales, and with them profits--and worse, permanent market standing. If it does not raise prices in the foreign currencies, its dollar profit margins shrink, and with them its profits. Yet, Chemex may not be affected as much by currency changes as a commodity chemical maker would be since its products are differentiated (it makes specialty chemicals). To the extent that its major competitors are other American companies, who share a common cost structure, its exchange risk will be lower still.

b. Distinguish between Chemex's transaction exposure and its operating exposure.

**ANSWER.** Chemex's transaction exposure stems from the fact that most of its export sales are priced in the local currency of the countries to which it exports. Its operating exposure arises because the dollar-equivalent prices that it can charge in foreign markets and its foreign sales volume at a given dollar price are affected by currency changes. In other words, currency changes will affect the profits that Chemex can earn abroad. To the extent that Chemex faces competition in the U.S. from foreign firms, its domestic profits will also depend on exchange rates.

c. How can Chemex protect itself against transaction exposure?

**ANSWER.** Chemex can hedge its transaction exposure by selling its foreign currency receipts forward for dollars.

d. What financial, marketing, and production techniques can Chemex use to protect itself against operating exposure?
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**ANSWER.** Chemex can finance its assets with foreign currency-denominated debt in proportion to its sales in each country. In Chemex's case, this would involve raising 40% of its financing in foreign currencies, in the following proportions: 5% in Canadian dollars and 7% each in Japanese yen, British pounds, DM, French francs, and Italian lira. Although only a rough guide, this approach would help align its cost structure with its market structure.

On the marketing side, Chemex's position in the specialty chemical business already provides a hedge against currency risk since it reduces the price elasticity of demand. Chemex should continue to fund research and development to ensure a continuing stream of products with lower price elasticity of demand and work on bringing these new products to market quickly. In addition, Chemex should try to add more value to its products by providing more service to customers. This technique also lowers the price elasticity of demand, which is the basic marketing strategy for coping with currency risk. Chemex must also decide whether to price for market share or profit margin. This decision, which depends on both the price elasticity of demand and the marginal cost of production, will determine by how much it adjusts its dollar price when exchange rates change.

On the production side, Chemex could try for a policy of global sourcing to shift suppliers in line with changing relative production costs in different countries. This strategy, however, is unlikely to pay big dividends because the raw materials that Chemex uses are commodity chemicals whose prices are pretty similar worldwide. Chemex might also consider setting production facilities in its major markets. But this strategy may not permit Chemex to take full advantage of production economies of scale. Chemex can also embark on a program of institutionalized cost cutting. The latter is just good business practice and will be beneficial regardless of currency movements.

e. Can Chemex eliminate its operating exposure by hedging its position every time it makes a foreign sale or by pricing all foreign sales in dollars? Why or why not?

**ANSWER.** Either approach will allow Chemex to eliminate its transaction exposure. But neither will protect Chemex's margins on future sales. This can only be done by hedging the present value of future sales, which is what financing assets with foreign currency debt in proportion to foreign sales effectively does.

8. During 1993, the Japanese yen appreciated by 11 percent against the dollar. In response to the lower cost of the main imported ingredients—beef, cheese, potatoes, and wheat for burger buns—McDonald's Japanese affiliate reduced the price on certain set menus. For example, a cheeseburger, soda, and small order of french fries were marked down to ¥410 from ¥530. Suppose the higher yen lowered the cost of ingredients for this meal by ¥30.

a. How much of a volume increase is necessary to justify the price cut from 530 to 410 yen? Assume the previous profit margin (contribution to overhead) for this meal was ¥220. What is the implied price elasticity of demand associated with this necessary rise in demand?

**ANSWER.** The net effect of the price cut and the lower yen cost of ingredients is a decline in profit per meal of ¥90 (¥120 - ¥30). The new profit margin per meal will now fall to ¥130 (¥220 - ¥90). This is a decline of 41% (90/220). In order to maintain overall yen profitability, given unit profits only 59% of what they were previously, the volume of meals must rise by 69% (0.59 x 1.69 = 1). From a dollar standpoint, however, the new profit margin has fallen only 34%. This can be seen as follows. The new profit margin of ¥130 is worth 11% more in dollar terms. As a fraction of the previous margin, this is equivalent to a dollar margin that is 66% of the previous dollar margin (130 x 1.11/220). The difference of 34% represents the decline in the dollar margin. In order to maintain total dollar profits, therefore, McDonald's volume must rise by 52% (0.66 x 1.52 = 1).

b. Suppose sales volume of this meal rises by 60 percent. What will be the percentage change in McDonald's dollar profit from this meal?

**ANSWER.** Here, the new dollar profit relative to the previous one will be 0.66 x 1.60 = 1.06, or a 6% rise in dollar profit.

c. What other reasons might McDonald's have had for cutting price besides raising its profits?

**ANSWER.** McDonald's may be trying to raise its market share in the expectation that this will enable it to later capitalize on this expansion and sell additional meals in the future. In addition, McDonald's may be able to sell
higher-priced meals to the additional people (family members and friends) that come along with the customers buying the discounted meals. In other words, the discounted meals may serve as loss leaders.

9. In 1990, a Japanese investor paid $100 million for an office building in downtown Los Angeles. At the time, the exchange rate was ¥145/$1. When the investor went to sell the building five years later, in early 1995, the exchange rate was ¥85/$1 and the building's value had collapsed to $50 million.

a. What exchange risk did the Japanese investor face at the time of his purchase?

**Answer.** The risk is that the value of the dollar would fall against the yen and that the dollar revenues would not keep up with the decline in the value of the dollar.

b. How could the investor have hedged his risk?

**Answer.** The investor could have financed his purchase of the building by borrowing dollars, so that the very same event that led to a decline in the yen value of his asset—namely, a dollar decline—would simultaneously reduce the yen cost of the liability used to finance that asset. He could also have taken out a long-dated forward contract to hedge the yen value of his building. Nothing would have protected the investor from the decline in the building's dollar price.

c. Suppose the investor financed the building with a 10 percent down payment in yen and a 90 percent dollar loan accumulating interest at the rate of 8 percent per annum. Since this is a zero-coupon loan, the interest on it (along with the principal) is not due and payable until the building is sold. How much has the investor lost in yen terms? In dollar terms?

**Answer.** Based on the 10% down payment, the investor's initial yen investment was ¥1.45 billion (0.10 x 100 million ¥145). At an interest rate of 8%, the $90 million loan used to finance the balance of the building's price will grow by the end of five years to $132,239,527 (1.085 x $90,000,000). Upon selling the building and paying off the loan, the investor will have a dollar loss of $82,239,527 ($132,239,527 - $50,000,000). At the current spot rate of ¥85/$1, this dollar loss translates into a yen loss of ¥6.99 billion. Adding this loss to the investor's initial down payment of ¥1.45 billion yields a total yen loss for the investor of ¥8.44 billion. The $ loss is $92.2 million ($82,239,527 + $10,000,000 down payment)

d. Suppose the investor financed the building with a 10 percent down payment in yen and a 90 percent yen loan accumulating interest at the rate of 3 percent per annum. Since this is a zero-coupon loan, the interest on it (along with the principal) is not due and payable until the building is sold. How much has the investor lost in yen terms? In dollar terms?

**Answer.** If the investor had financed the building with the 90% yen loan, the investor would have had to borrow 100,000,000 x 0.90 x ¥145 = ¥13.05 billion. At an interest rate of 3%, the ¥13.05 billion loan will grow by the end of five years to ¥15.13 billion (1.035 x ¥13.05 billion). The $50 million sale price translates into ¥4.25 billion (50,000,000 x 85). After paying off the loan, the investor has a loss of ¥10.88 billion. Adding to this loss the initial down payment of ¥1.45 billion produces a total loss for the investor of ¥12.33 billion. It can be seen from the answer to part c that the use of dollar financing reduced the investor's loss. The investor, of course, lost anyway because the value of the building declined instead of rising by at least the rate of interest.

10. Over the past year, China has experienced an inflation rate of about 22 percent, in contrast to U.S. inflation of about 3 percent. At the same time, the exchange rate has gone from ¥8.7/U.S.$1 to ¥8.3/U.S.$1.

a. What has happened to the real value of the yuan over the past year? Has it gone up or down? A little or a lot?

**Answer.** The real value of the yuan, relative to its value one year ago, has risen significantly. Specifically, in dollar terms, the nominal exchange rate has appreciated from $0.1149 (1/8.7) to $0.1205 (1/8.3), a 4.9% increase ((0.1205 - 0.1149)/0.1149). In real terms, the yuan has appreciated to $0.1205 x 1.22/1.03 = $0.1427. Thus, the real value of the yuan has risen by 24.2%.
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\[(0.1427 - 0.1149)/0.1149 = 24.2\%\]

If purchasing power parity held, the yuan should have devalued to a new exchange rate of

\[e = 8.7 \times 1.20/1.03 = Y10.3/\$

You can tell this is the PPP rate because at this exchange rate, the real rate remains at Y8.7/:

\[\text{Real rate} = 10.3 \times 1.03/1.22 = Y8.7/\$

b. What are the likely effects of the change in the yuan's real value on the dollar profits of a company like Procter & Gamble that sells almost exclusively in the local market?

**ANSWER.** A reasonable assumption is that P&G's sales, which are generated domestically, have risen at least at the rate of Chinese inflation. Meanwhile, costs are partially denominated in dollars (via imports of various inputs) and partially in yuan (via locally-sourced inputs, including labor). Hence, costs have risen by less than the rate of Chinese inflation (since the inflation-adjusted value of the dollar and, therefore, dollar-denominated costs have fallen). This means that yuan profits, which equal the difference between revenues and costs, have risen by at least 22% over the past year. In turn, given the 4.9% rise in the dollar value of the yuan, dollar profits for P&G should have risen by at least 28% (1.22 x 1.049 - 1). These results just point to the more general truth that an increase in the real value of the local currency should boost dollar profits for those firms selling locally and not subject to import competition.

c. What are the likely effects of the change in the yuan's real value on the dollar profits of a textile manufacturer that exports most of its output to the United States? What can it do to cope with these effects?

**ANSWER.** The impact of the rise in the real value of the yuan on a textile manufacturer that exports most of its output to the U.S. will be the opposite of its impact on P&G. Specifically, the textile manufacturer will find that its costs in dollar terms have risen by about 28% (taking into account the combined effects of Chinese inflation and yuan appreciation) whereas its dollar revenues have risen by about the rate of U.S. inflation, or 3.0%. The combination of a 3.0% rise in revenues and a 28% rise in costs means shrinking margins in dollars. Since the dollar has fallen against the yuan, the result in an even bigger squeeze on the yuan profit margin.

**ADDITIONAL CHAPTER 11 PROBLEMS AND SOLUTIONS**

Problems 1 and 2 are based on the Spectrum Manufacturing AB case (scenarios 1, 2, and 3) presented in the chapter. Calculate Spectrum's economic exposure under the following new scenarios:

1. **Scenario 4**: Sales and import prices rise; domestic materials substituted for imported materials; other variables remain the same.

   a. Spectrum is able to raise the krona price of its sheet plastic to SEK 25 to exactly offset the effect of the devaluation.
   b. Because of domestic materials substitutions, krona operating expenditures rise by only 4% relative to the base case.
   c. Physical sales volume stays at its predevaluation level.

**Scenario 4 Answer:** Under this scenario the post-devaluation operating cash flow will be $1,268,000 annually. The calculations are shown in Exhibit 1. Spectrum's first year gain from operations is:
First year cash flow (SEK 4 = $1)  
First year cash flow (SEK 5 = $1)

Net gain from devaluation
$900,000  
1,268,000  
$368,000 

The present value of the economic gain associated with a krona devaluation in this case, based on a three-year adjustment period, is $939,212, as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Post-Devaluation Cash Flow</th>
<th>Pre-Devaluation Cash Flow</th>
<th>Change in Cash Flow</th>
<th>15% Present Value Factor</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1,268,000</td>
<td>$900,000</td>
<td>$368,000</td>
<td>.870</td>
<td>$320,160</td>
</tr>
<tr>
<td>2</td>
<td>1,268,000</td>
<td>900,000</td>
<td>368,000</td>
<td>.756</td>
<td>278,208</td>
</tr>
<tr>
<td>3</td>
<td>1,418,000</td>
<td>900,000</td>
<td>518,000</td>
<td>.658</td>
<td>340,844</td>
</tr>
</tbody>
</table>

Net Gain $939,212

This gain occurs because the sales price increase keeps dollar revenues constant while dollar costs of production fall. If krona production costs rise, much, if not all, of this gain will be dissipated. The year 3 figure of $1,418,000 includes a $150,000 gain on repayment of the krona loan.

Exhibit 1. Summary of Projected Operations for Spectrum Manufacturing AB: Scenario 4

<table>
<thead>
<tr>
<th>Units (hundred thousand)</th>
<th>Unit Price (SEK)</th>
<th>Total (SEK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic sales 6</td>
<td>25</td>
<td>15,000,000</td>
</tr>
<tr>
<td>Export sales 4</td>
<td>25</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Total revenue</td>
<td></td>
<td>25,000,000</td>
</tr>
<tr>
<td>Total operating expenses</td>
<td></td>
<td>11,232,000</td>
</tr>
<tr>
<td>Overhead expenses</td>
<td></td>
<td>3,500,000</td>
</tr>
<tr>
<td>Interest on krona debt (@ 10%)</td>
<td></td>
<td>300,000</td>
</tr>
<tr>
<td>Depreciation</td>
<td></td>
<td>900,000</td>
</tr>
<tr>
<td>Net profit before tax</td>
<td>SEK 9,068,000</td>
<td></td>
</tr>
<tr>
<td>Income tax (@ 40%)</td>
<td></td>
<td>3,627,000</td>
</tr>
<tr>
<td>Profit after tax</td>
<td>SEK 5,441,000</td>
<td></td>
</tr>
<tr>
<td>Add back depreciation</td>
<td></td>
<td>900,000</td>
</tr>
<tr>
<td>Net cash flow in kroner</td>
<td>SEK 6,341,000</td>
<td></td>
</tr>
<tr>
<td>Net cash flow in dollars (SEK 5 = $1)</td>
<td></td>
<td>$1,268,000</td>
</tr>
</tbody>
</table>

2. Scenario 5: Volume and import prices rise; other variables remain the same.
   a. The krona sales price remains at SEK 20.
   b. Unit sales volume rises by 50%, both domestically and abroad, owing to the lower dollar price.
c. Because krona costs of local labor and materials stay the same, krona unit operating expenditures rise by only 5.6%.

d. The firm's various overhead expenses do not change.

**Scenario 5 Answer:** The net result of the assumptions in scenario 5 is a yearly post-devaluation operating cash flow of $1,163,000—an increase of $263,000 over the pre-devaluation level of $900,000 (see Exhibit 2). Note that a 50% increase in sales volume leads to an 82% increase in profit after tax but to only a 62% increase in krona cash flow. The latter effect is due to the fixed depreciation charge which causes taxes to rise more rapidly than profits. This tax factor combined with the krona devaluation results in a rise in annual U.S. dollar operating cash flow of only 29%. The resulting post-devaluation cash flows for the following three years and consequent change in economic value are:

<table>
<thead>
<tr>
<th>Year</th>
<th>Post-Deval. Cash Flow</th>
<th>Pre-Deval. Cash Flow</th>
<th>Change in Cash Flow</th>
<th>15% PV Factor</th>
<th>PV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1,163,000</td>
<td>$900,000</td>
<td>$263,000</td>
<td>.870</td>
<td>$228,810</td>
</tr>
<tr>
<td>2</td>
<td>1,163,000</td>
<td>900,000</td>
<td>263,000</td>
<td>.756</td>
<td>198,828</td>
</tr>
<tr>
<td>3</td>
<td>1,313,000*</td>
<td>900,000</td>
<td>413,000</td>
<td>.658</td>
<td>271,754</td>
</tr>
</tbody>
</table>

Net gain $699,392

* Includes a gain of $150,000 on repayment of the krona loan.

**Exhibit 2. Summary of Projected Operations for Spectrum Manufacturing AB: Scenario 5**

<table>
<thead>
<tr>
<th>Units (hundred thousand)</th>
<th>Unit Price (SEK)</th>
<th>Total (SEK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic sales 9</td>
<td>20</td>
<td>18,000,000</td>
</tr>
<tr>
<td>Export sales 6</td>
<td>20</td>
<td>12,000,000</td>
</tr>
<tr>
<td>Total revenue</td>
<td></td>
<td>30,000,000</td>
</tr>
<tr>
<td>Total operating expenses</td>
<td></td>
<td>17,017,000</td>
</tr>
<tr>
<td>Overhead expenses</td>
<td></td>
<td>3,500,000</td>
</tr>
<tr>
<td>Interest on krona debt (@ 10%)</td>
<td></td>
<td>300,000</td>
</tr>
<tr>
<td>Depreciation</td>
<td></td>
<td>900,000</td>
</tr>
<tr>
<td>Net profit before tax</td>
<td>SEK 8,193,000</td>
<td></td>
</tr>
<tr>
<td>Income tax (@ 40%)</td>
<td>3,277,000</td>
<td></td>
</tr>
<tr>
<td>Profit after tax</td>
<td>SEK 4,916,000</td>
<td></td>
</tr>
<tr>
<td>Add back depreciation</td>
<td>900,000</td>
<td></td>
</tr>
<tr>
<td>Net cash flow in kroner</td>
<td>SEK 5,816,000</td>
<td></td>
</tr>
<tr>
<td>Net cash flow in dollars (SEK 5 = $1)</td>
<td>$1,163,000</td>
<td></td>
</tr>
</tbody>
</table>

3. On January 1, the U.S. dollar: Japanese yen exchange rate is $1 = ¥250. During the year, U.S. inflation is 4% and Japanese inflation is 2%. On December 31, the exchange rate is $1 = ¥235. What are the likely competitive effects of this exchange rate change on Caterpillar Tractor, the American earth-moving manufacturer, whose toughest competitor is Japan's Komatsu?
ANSWER. The real value of the yen changed from \$0.004000 (1/250) at the start of the year to \$0.004339 (1/235 \times 1.04/1.02) at the end of the year, an increase of 8.47%. Caterpillar Tractor should benefit from this increase in the real value of the yen since Komatsu does most of its manufacturing in Japan. The inflation-adjusted dollar cost of Japanese-supplied components and labor will rise in line with the increase in the real value of the yen. Komatsu's raw materials and energy prices should not rise in dollar terms because these resources are imported.

4. You are asked to lend money for a major commercial real estate development in the town of Calexico, which is on the California side of the Mexican border. There is some talk about a further devaluation of the Mexican peso. What information do you need to assess the creditworthiness of this project?

ANSWER. The economic viability of a shopping mall largely determined by the number of shoppers who frequent the development and the amount of money they spend there. In the case of a shopping center in Calexico, the odds are that many of the potential customers are Mexican. If the Mexican government has been artificially propping up the value of the peso, which it is has done consistently, then Mexicans will find that their pesos have more purchasing power in the United States. The result will be more traffic for a shopping mall in a U.S. border town and higher profits. However, this situation is one of artificial prosperity that will not last long; when the peso is devalued, Mexican shoppers will stay home and profits will decline.

This analysis is based on historical experience. Prior to 1982, the rising real value of the Mexican peso meant that border areas in Texas and California were popular markets for Mexican citizens and a large portion of the retail sales in these border areas were to Mexican citizens. Laredo and other American border towns used to bustle with free-spending Mexican shoppers come north for the day. U.S. goods were cheaper and easier to find than at home. But after Mexico's two peso devaluations in 1982 quadrupled the price of dollar from 25 pesos to over 100, the lucrative traffic was washed out. Business activity was off by as much as 80% in some Texas border communities and nearly a third of the small businesses in the Rio Grande Valley were threatened with bankruptcy.

Returning to the shopping center project, the more dependent it is on Mexican customers and the higher the real value of the peso is currently, the more exchange risk the project faces.

5. About two-thirds of all California almonds are exported. The ups and downs of the U.S. dollar, therefore, cause headaches for almond growers. To avoid these problems, a grower decides to concentrate on domestic sales. Does that grower bear exchange risk? Why and how?

ANSWER. A grower who sells only in the United States still bears exchange risk because the price at which he can sell his almonds varies with the exchange rate. For example, when the dollar appreciates, foreigners will demand fewer almonds at the current dollar price. This will cause the dollar price at which almonds are sold overseas to fall. Hence, almond growers who previously sold overseas will now find it more profitable to sell in the United States. This will drive down the price of almonds in the U.S. until it just equals the price of almonds in Japan and other foreign markets minus transportation costs. If the dollar depreciates, the foreign demand for almonds at the current dollar price will increase, raising almond prices at home and abroad. This is just another illustration of the law of one price. It holds because growers will arbitrage between domestic and foreign markets in the search for higher profits.

6. Aldridge Washmon Co. is one of the largest distributors of heavy farming equipment in Brownsville, Texas, located on the border with Mexico. The time is late 1981. Sales have increased dramatically over the past two years, and Aldridge is requesting an expansion of its credit line. What information would you as a banker need before you accede to its request?

ANSWER. The key to this question is to recognize that the real value of the Mexican peso rose dramatically over this time period. Thus, the rise in Aldridge Washmon's sales was due almost exclusively to the rising real value of the Mexican peso, which made it less and less expensive for Mexican farmers to buy its farming equipment. By 1982, Mexican farmers accounted for 80% of its business. But the company experienced artificial prosperity. Once the peso devalued, as it had to, Aldridge's sales plummeted because Mexican farmers could no longer afford its machines. According to an Aldridge manager, "Business just stopped flat, like running a car into a brick wall."
Aldridge plans to use the expanded line of credit to finance additional working capital, primarily accounts receivable on Mexican sales and additional inventory. When the peso devalues, Mexican buyers will have trouble repaying their dollar debts and Aldridge will have a difficult time repossessing its tractors in Mexico. Thus, its receivables will be worth much less than 100 cents on the dollar. In addition, Aldridge will be stuck with a large inventory of tractors and other equipment that will be gathering dust. The value of this inventory will drop since the major market for farm equipment will have disappeared. Hence, even if the bank secures its loan with Aldridge's inventory and receivables, the value of this collateral will drop following peso devaluation.

One other consideration is worth mentioning. If peso devaluation makes Mexican agriculture more competitive in world markets, then Mexican farmers will gain from devaluation and will demand more farm equipment. This is a plausible scenario but is unlikely to hold here because we already know that the Mexican farmers benefitted from a real appreciation of the peso; hence, a real peso devaluation should have the opposite effects. Evidently, Mexican farmers are selling in a protected domestic market. If they were exporting or competing against imports, they would have been hurt by the rising real value of the peso. As we saw in the chapter, companies selling in the local market and facing minimal import competition will gain from real LC appreciation and lose from LC devaluation. The opposite effects would be experienced by companies dealing in traded goods.

This discussion suggests the information that Aldridge Washmon's bankers should gather: Who is it selling to? How will these customers be affected by peso depreciation? What has happened to the real value of the peso and what is likely to happen to its value in the future? What will happen to the value of collateral if the peso devalues?

7. Assess the likely consequences of a declining dollar on Fluor Corporation, the international construction-engineering contractor based in Irvine, California. Most of Fluor's value-added involves project design and management; most of its costs are for U.S. labor in design, engineering, and construction-management services.

**Answer.** Fluor will benefit from a falling dollar since it will be more cost competitive vis-a-vis foreign contractors both at home and abroad. Its costs are primarily denominated and determined in dollars. Thus, when the dollar declines, these costs fall relative to those of its foreign competitors. Although many of the costs incurred on foreign projects are set in the local currency, these costs are the same for all potential competitors. Hence, in competing against foreign firms, Fluor will find that some of its costs are the same while other of its costs, particularly for the labor involved in design, engineering, and construction management services, are now lower. This is analogous to the situation confronting the U.S. chemical industry in problem #12.

8. The European chemical industry pays for an estimated 79% of its oil-based feedstock in dollars. Thus, its costs are declining sharply because of the drop in the price of oil combined with the sharp decline in the value of the dollar. What is the likely impact on the European chemical industry's profits of the dollar decline? Will it now be more competitive relative to the American chemical industry?

**Answer.** The implication that lower dollar oil prices combined with the lower value of the dollar, by sharply cutting the costs of European chemical companies, will make them more competitive vis-à-vis American chemical companies is fallacious. Whether measured in dollars, DM, French francs, or British pounds, the price of oil is the same to all chemical companies worldwide. Thus, although a drop in the price of oil is likely to increase chemical industry profits, it will not disproportionately favor firms in one country over those in another. But when it comes to labor and other goods and services sourced locally, U.S. chemical companies will now enjoy a competitive cost advantage. Whether measured in dollars, DM, or ECUs the price of labor and other non-oil inputs will now be lower for American firms than for European firms. The net result is that the decline in oil prices is neutral in terms of national competitiveness but the depreciation of the dollar will give U.S. chemical firms a competitive advantage. This prediction has been borne out: Companies like Du Pont, Dow Chemical, and Hercules have benefited greatly from dollar depreciation. By contrast, dollar depreciation has hurt European chemical companies.

9. Cooper Industries is a maker of compressors, pneumatic tools, and electrical equipment. It does not face much foreign competition in the United States, and exports account for only 7% of its sales. Does it face exchange risk?
ANSWER. As a supplier to industrial customers who compete against imports and that sell overseas, Cooper Industries benefits from a weaker dollar and is hurt by a stronger dollar. Customer sales rise with a weak dollar and fall with a strong dollar and these changes translate into more or less sales for Cooper. This is analogous to the case of Nippon Steel discussed in problem #16 below.

10. The Edmonton Oilers (Canada) of the National Hockey League are two-time defending Stanley Cup champions. (The Stanley Cup playoff is hockey's equivalent of football's Super Bowl or baseball's World Series.) As is true of all NHL teams, most of the Oilers' players are Canadian. How are the Oilers affected by changes in the Canadian dollar/U.S. dollar exchange rate?

ANSWER. The fact that the Oilers are paid in Canadian dollars does not affect the answer to this question very much. While the C$ is the currency of denomination, the U.S.$ is the currency of determination. That is, the Canadian dollar salaries paid to the Oilers' players are just equal to what the players' salaries would be in U.S. dollars converted into Canadian dollars. Thus, the Edmonton Oilers are hurt by appreciation of the U.S.$ vis-a-vis the C$ and benefitted by U.S. dollar depreciation. Consider what would happen, for example, if the U.S.$ appreciates against the C$. If the Oilers' C$ salaries are not raised, they will find they are being paid less than players on U.S. hockey teams. The Oilers will be forced to raise the Canadian dollar equivalent of its players' salaries to keep them on a par with their U.S. rivals. Otherwise, the Edmonton Oilers will either lose players to U.S. teams or have a hostile team. Player nationality is irrelevant. Canadian teams compete in a world market for talent and must pay the market price.

11. South Korean companies such as Goldstar, Samsung, and Daewoo have captured more than 10% of the U.S. color TV market with their small, low-priced TV sets. They are also becoming more significant exporters of videocassette recorders and small microwave ovens. What currency risk do these firms face?

ANSWER. These firms have benefitted greatly from the appreciation of the Japanese yen against the U.S. dollar because the won has not risen by nearly the same extent against the dollar. They have used their cost advantage vis-à-vis Japanese competitors to boost sales of low-end consumer electronics products by cutting prices below the level at which the Japanese could make money. Yen depreciation or won appreciation would reduce their cost advantage. Similarly, they face currency risk because competitors in other nations, such as Taiwan or Thailand, might devalue their currencies against the won.

12. A common complaint leveled against the Japanese government is that it deliberately holds down the value of the yen to boost exports of Japanese products. American steelmakers have been particularly vocal in their complaints. As a remedy, steelmakers in 1985 asked President Reagan to curtail Japanese steel imports further and to impose a 25% tariff to offset what they describe as the "artificial" undervaluation of the yen. Does Nippon Steel profit from a weak yen? What are the likely consequences of the recent appreciation of the yen?

ANSWER. The initial response is that Nippon Steel gains more on the cost side than it loses on the revenue side from yen appreciation since it is not selling much overseas anyway. However, this analysis is misleading. Specifically, the demand for Japanese steel is driven largely by the demand for Japanese exports, such as cars and machine tools that embody that steel. Other things being equal, as the yen appreciates, Japanese companies become less competitive abroad and they export less. This cuts their demand for Japanese steel. Meanwhile, other Japanese steel companies have access to the same lower-cost raw materials as does Nippon Steel. Competition among Japanese steel companies forces them to cut their yen prices in line with the decline in their yen costs. Thus, the benefit on the cost side is competed away and Nippon Steel is stuck with a loss of sales. The result: Nippon Steel is hurt by yen appreciation and is helped by yen depreciation.

13. Monsanto Co., the St. Louis chemical firm, is a major seller of herbicides. Its two brand-name herbicides, Roundup and Lasso, have a large share of the U.S. and foreign markets. Its major competitors are other U.S. chemical companies. How are sales and profits of these products, as well as Monsanto's other chemicals, likely to be affected by changes in the value of the dollar?
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ANSWER. Monsanto will be hurt by dollar appreciation and helped by dollar depreciation. However, because it sells brand name products, the demand for its products is less price elastic than if it sold commodities. Thus, Monsanto will not be affected as much by currency changes as it would be if it were in a pure commodity business. The impact of currency changes will be greater on those of its product lines that are commodities.

14. Black & Decker Manufacturing Co. of Towson, Maryland, has roughly 45% of its assets and 40% of its sales overseas. How does a soaring dollar affect its profitability, both at home and abroad?

ANSWER. Black & Decker has a rough balance between foreign sales and costs. Thus, as the dollar appreciates, both its sales revenue and its costs decline approximately in line with each other. This means that its profits will decline roughly in line with the rise of the dollar. (If both revenues and costs fall, say, 10%, then profit must also fall by 10%.) Dollar depreciation leads to corresponding increases in dollar revenues and costs. The bottom line is that B&D's profits fall as the dollar rises and rise as the dollar falls. If B&D didn't produce overseas, but instead exported from its U.S. plants, then currency changes would lead to much greater swings in its profits. Note that B&D's domestic profitability is also affected by currency changes since it faces competition in the U.S. from foreign companies such as Japan's Makita.

15. The shipbuilding industry is facing a worldwide capacity surplus. Although Japan currently controls about 50% of the world market, it is facing severe competition from the South Koreans. Japanese shipyards are extraordinarily productive, but at current price levels were just about breaking even with an exchange rate of ¥240 = $1. What are the likely effects on Japanese shipbuilders of a yen appreciation to ¥180 = $1? The South Korean won has maintained its dollar value.

ANSWER. The statement that "Japanese shipyards are extraordinarily productive" tells you that there is not much room for cost cutting by Japanese shipyards. Hence, Japanese shipyards will be devastated by a rise in the yen, as they were. As the yen appreciates against the won, South Korean shipyards gained a substantial cost advantage vis-à-vis the Japanese. According to a story in the Wall Street Journal, "Japanese industry officials say ship buyers now automatically bypass Japanese makers, turning instead to Hyundai Corp. and other South Korean shipbuilders, which enjoy comparative reprieve on the currency front."

The only degree of freedom to adjust Japanese shipbuilder costs took place on the wage side. Japanese firms typically pay a substantial fraction of workers' wages in the form of a semi-annual bonus that is tied to corporate profits. Thus, during hard times, labor costs fall automatically. However, this decrease in labor costs was not nearly enough and many Japanese shipyards went bankrupt. A spokesman for the Japan Ship Exporters Association said that they couldn't lower prices further. "They're already at the bottom. We can do nothing but watch competitors take away orders."

Japanese shipyards have responded by designing innovative ships for which demand is price inelastic. They are no longer competitive in the commodity ship business.

16. Nissho Iwai American Corporation is the American arm of a large Japanese trading company that deals in everything from steel to tuna fish. Assess the credit-risk implications for Nissho Iwai of a 30% rise in the dollar value of the yen.

ANSWER. Yen appreciation makes Nissho Iwai's products less competitive in the U.S. market. The greater the extent to which Nissho deals in commodity products (like steel and tuna fish), the more its sales and profits will be hurt by an appreciating yen. Conversely, if Nissho shifts its mix toward more technically sophisticated and more differentiated products, it will be less affected by the rising yen. The firm could in fact benefit from the strong yen by using its intelligence gathering system to find newly cost competitive American products that it can now export to Japan.

17. Thomasville Plastics Corp. has contracted to buy $1.1 million worth of Japanese plastic-injection molding machines. The contract price is set in dollars. Does Thomasville bear any currency risk associated with this purchase? Explain.
ANSWER. Thomasville bears exchange risk because a falling dollar might push up spare parts prices. This assumes that the parts are unique and cannot be gotten from domestic producers. It will also have to pay higher prices when it goes to replace machines that wear out, assuming that it doesn't want to mix and match machines from different manufacturers.

18. Middle American Corporation (MAC) produces a line of corn silk cosmetics. All of the inputs are purchased domestically and processed at the factory in Des Moines, Iowa. Sales are only in the United States, primarily west of the Mississippi.

a. Is there any sense in which MAC is exposed to the risk of foreign exchange rate changes that effect large multinational firms? If yes, how could MAC protect itself from these risks?

ANSWER. MAC is exposed to the risk that the French franc/U.S. dollar exchange rate may change and alter the price of French cosmetics relative to U.S. cosmetics. The problem is analogous to problem #1. If the exchange rate change is real, or if tastes change toward French cosmetics (another real disturbance), the market value of MAC shares should fall. The firm could protect itself against the exchange rate change by having net French franc liabilities. A couple of questions to ponder are: How could MAC protect itself against the possible change in consumer tastes? What is the cost to MAC of establishing and maintaining the French franc liability position? What are the benefits?

b. If MAC opens a sales office in Paris, will this move increase its exposure to exchange rate risks? Explain.

ANSWER. Your immediate reaction may be that the risks increase because MAC has more foreign currency operations on the books. However, exposure depends on the relative magnitudes of asset and liability positions in the foreign currencies. MAC may find ways to hedge the exchange risks associated with the French franc and incur no additional risks. In fact, we could look at the Paris venture as a way to diversify and therefore reduce several of the business risks faced by MAC.

19. Gizmo, U.S.A. is investigating medium-term financing of $10 million in order to build an addition to its factory in Toledo, Ohio. Gizmo's bank has suggested the following alternatives:

<table>
<thead>
<tr>
<th>Type of loan</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-year U.S. dollar loan</td>
<td>14</td>
</tr>
<tr>
<td>3-year euro loan</td>
<td>8</td>
</tr>
<tr>
<td>3-year Swiss franc loan</td>
<td>4</td>
</tr>
</tbody>
</table>

a. What information does Gizmo require to decide among the three alternatives?

ANSWER. It is useful to divide this problem into two issues: what is the expected cost and what is the risk of each alternative. Defining the terms "cost" and "risk" requires careful thought.

If we assume that (1) the international money markets are efficient and (2) the international Fisher effect holds (these are separate issues) then the expected cost of each loan is the same. If the market is anticipating that for the next three years the euro and the Swiss franc will appreciate 6% and 10% annually, respectively, then the expected U.S. dollar cost of each loan is the same. If we are unwilling to make assumptions (1) and (2), then we need to use independent forecasts of the euro and Swiss franc exchange rates to calculate the loan whose expected U.S. dollar cost is the lowest.

Even if the expected cost of each loan is the same, the risk associated with each loan may be different for Gizmo. This risk will depend on the currency denomination of assets that Gizmo holds as well as on the markets in which Gizmo buys its inputs and sells its outputs. For example, if Gizmo sells many products in Germany, then it probably has accounts receivable denominated in euros. It can use these receivables to pay off a euro-denominated loan and avoid the risks that are associated with an uncertain $/€ rate. If Gizmo desires a particular risk level, then it may rationally prefer a particular currency denomination for the loan. It may also be that forward markets are more
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developed in one currency or that unanticipated exchange rate changes are smaller in one currency, and therefore, the risks associated with that currency are smaller even if the expected costs are the same.

b. Suppose the factory will be built in Geneva, Switzerland, rather than Toledo. How does this affect your answer in part a?

**Answer.** If the factory in Geneva sells in Switzerland, then Gizmo has an asset which is essentially denominated in Swiss francs. This may establish a natural hedge against a Swiss franc loan and reduce the risk of this particular alternative. If the expected cost of each loan alternative if the same, and if the firm seeks to reduce total risk, then this information would suggest a Swiss franc loan.

But if the Swiss factory is exporting to the U.S., or is selling in the Swiss market and facing import competition, then some dollar financing or financing in the currency of the country in which its main competitors are located might be appropriate. If the objective is to minimize currency risk, the relative amount of financing to do in each currency will also depend on the sources of Gizmo's inputs, particularly the extent to which it uses Swiss labor. The more labor-intensive the production process, the less useful Swiss franc financing will be in reducing Gizmo's exposure (since by using Swiss labor it already has Swiss franc outflows).

20. In September 1992, Dow Chemical reacted to the currency chaos in Europe by switching to DM pricing for all its products in Europe. The purpose, said a Dow executive, was to shift currency risk from Dow to its European customers. Moreover, said the Dow executive, the policy was fairer: By setting the same DM price throughout Europe, Dow's new policy would nullify any advantage that a Dow customer in one company might have over competitors in another country based on currency swings.

a. What is Dow really trying to accomplish with its new pricing policy?

**Answer.** Dow was really trying to raise its prices in those European counties whose currencies devalued so as to preserve its dollar margins, which were eroding from the devaluations.

b. What is the likelihood that this new policy will reduce Dow's currency risk?

**Answer.** Not very likely. Unless all its leading competitors go along with DM pricing (its U.S. and foreign competitors said that they wouldn't follow Dow but would continue doing business in local currencies), Dow will have to cut its DM price every time the DM appreciates or else lose market share. In other words, Dow can't use DM pricing to avoid margin erosion when European currencies devalue against the dollar unless it is willing to sacrifice market share.

c. How are Dow's customers likely to respond to this new policy?

**Answer.** They will simply demand lower DM prices if their currencies devalue. If Dow doesn't cut its DM prices, many of them will buy from those of Dow's competitors who are willing to cut their dollar or DM prices.

21. Boeing Commercial Airplane Co. manufactures all its planes in the United States and prices them in dollars, even the 50% of its sales destined for overseas markets. Assess Boeing's currency risk. How can it cope with this risk?

**Answer.** Boeing would have currency risk even in the absence of foreign competition since currency fluctuations will translate its dollar prices into varying amounts of foreign currency to its foreign customers. Given that foreign demand is somewhat responsive to price, and that Boeing prices in dollars, dollar appreciation will reduce foreign demand. Alternatively, to maintain sales volume, Boeing will be forced to cut its dollar price. Dollar depreciation benefits Boeing since it can either raise its dollar price, while keeping its foreign currency prices constant, or keep its dollar price constant and thereby cut its foreign currency prices and boost sales overseas.

In reality, Boeing does face a major foreign competitor--Airbus Industrie, a European consortium. The existence of Airbus increases Boeing's price elasticity of demand and, hence, its exchange risk (i.e., Boeing is hurt more by
dollar appreciation and helped more by dollar depreciation). Boeing can cope with this currency risk by sourcing some of its parts and components abroad, possibly from foreign firms with whom it forms strategic alliances.

22. Fire King International, an Indiana manufacturer of fire-resistant filing cabinets and disk storage units, has sought to protect itself from currency risk by pricing its export sales in dollars and holding firm on price. What currency risk does Fire King face from a rising dollar? How can Fire King manage that risk?

**ANSWER.** This question is similar to the one involving U.S. Farm-Raised Fish Trading Co. (Chapter 9, #8). As before, the answer is no. What Fire King has done is to eliminate its transaction exposure, but it still faces operating exposure. The competitiveness of its products overseas is affected by the changing value of the dollar.

The strong dollar caused export sales to plunge more than 60% in 1983. Unlike most small exporters, Fire King decided to do more than wait out the dollar. The company stopped promoting items that were available at a lower price from foreign competitors. Instead, Fire King began to promote quality, emphasizing such top-of-the-line items as a fancy wood-covered cabinet. It also shifted its emphasis away from such difficult markets as Europe to those where the strong dollar was having less of an impact, including the Far East, the Middle East, the Caribbean countries, and Canada. And within those markets, the company began selectively to target buyers, such as banks, that were favorably disposed to U.S. goods.

At the same time, Fire King saw the strength of the dollar as an opportunity to boost its own imports. The company added a line of such complementary products as fire-resistant safes from Japan and data storage units from Sweden to sell in the United States. Finally, officials from Fire King attended more trade shows and increased their contact with foreign distributors and customers.

23. Cost Plus Imports is a West Coast chain specializing in low-cost imported goods, principally from Japan. It has to put out its semiannual catalogue with prices that are good for six months. Advise Cost Plus Imports on how it can protect itself against currency risk.

**ANSWER.** A company such as Cost Plus will typically negotiate purchase contracts with the suppliers of its catalogue merchandise in advance. Cost Plus could hedge these purchases using forward contracts. A problem, though, is that if the foreign currencies devalue during the life of the catalogue, prices of substitute products for the items in the catalogue will likely come down somewhat. In this case, some customers who might have bought from Cost Plus will decide to buy the cheaper substitutes, costing Cost Plus sales. This is very likely here given the nature of Cost-Plus products: low-cost goods presumably bought by a price-sensitive clientele. The existence of quantity risk in addition to price risk suggests that Cost Plus should hedge less than 100% of its projected sales. As an alternative, Cost Plus could buy call options to cover its foreign purchases. If the foreign currencies drop below the call option price, the firm won't exercise its options; if they rise above the call price, Cost Plus will exercise them.

24. Matsushita exports about half of its TV set production to the United States under its Panasonic, Quasar, and Technics brand names. It prices its products in yen. Suppose the yen moves from ¥130 = $1 to ¥110 = $1. What currency risk is Matsushita facing? How can it cope with this currency risk?

**ANSWER.** As the yen rises against the dollar, Japanese producers such as Matsushita become less competitive in the United States. We have good evidence on what Matsushita is doing to cope with the strong yen. Matsushita has raised prices in the U.S., although not to the extent of yen appreciation. Like other Japanese firms, Matsushita is willing to accept lower profits rather than give up market share that it has acquired. Typically, price increases are made in conjunction with the introduction of new models.

Matsushita is also facing more competition from Korean exporters like Goldstar and Samsung. These firms are using the opportunity presented by the yen's rise to sell more inexpensive televisions, microwave ovens, VCRs, and stereos. This means that Matsushita's ability to raise price varies among products. It will have a difficult time getting price increases to stick on inexpensive products facing competition from Korean firms. By contrast, it will have an easier time raising price on the more expensive end of the consumer spectrum: the better stereos, cameras, TVS, and VCRs. The greater pricing latitude in this segment reflects that fact that most competitors in upmarket
products are also Japanese firms with a similar cost structure. To bolster this strategy, Matsushita is investing more money in R&D to come up with higher quality, more technologically sophisticated products.

Matsushita has also launched a crash effort to cut its costs through overhauls of products and factories in Japan as well as by shifting some production to lower-cost manufacturing facilities in countries like Taiwan or South Korea as well as the United States. In many cases, parts produced abroad are shipped back to Japan to be incorporated in finished products. For example, Matsushita now produces car audio systems and VCRs in the U.S., printers, electronic typewriters and microwave ovens in the U.K., motors and copiers in Germany, and VCRs in France. It has also stepped up its purchases from foreign suppliers. The next stage has already begun: Matsushita is exporting finished products from offshore plants for sale to Japanese consumers. It is also trying to cut manufacturing costs at home by increased automation and better product design and material use.

Another approach taken by Matsushita and other Japanese firms is to diversify out of consumer electronics and home appliances and into industrial markets, such as factory automation, where quality is more important and price less so. It hopes to sell fewer TVs and stereos and more robots, semiconductors, and office equipment. This involves hiring more technical people, more R&D spending, and retraining engineers as industrial salespeople. To be successful here, Matsushita must cut the time between laboratory development of new equipment and their commercial application. The chapter points out Matsushita and other Japanese companies are pruning their product lines after a decade of product proliferation. Perhaps 50% to 80% of the product lines of many Japanese companies account for no more than about 20% of sales yet require major investments in design, capital equipment, and working capital. By eliminating low volume, low margin products, Matsushita and other Japanese companies can boost their profits.

25. Lyle Shipping, a British company, has chartered out ships at fixed-U.S.-dollar freight rates. How can Lyle use financing to hedge against its exposure? How will your recommendation affect Lyle's translation exposure? Lyle uses the current rate method to translate foreign currency assets and liabilities. However, the charters are off-balance-sheet items.

**ANSWER.** Since Lyle has chartered out its ships in dollars, it has fixed dollar revenues. By financing its ship purchases with dollars, Lyle can offset these contractual dollar inflows with contractual dollar outflows.

Accountants will note that Lyle bears significant translation exposure. As the dollar rises against the pound, Lyle will show losses on its dollar debt and vice versa when the dollar falls. But gains or losses on the debts will be canceled out over time by changes in its operating cash flows. In 1984, when the dollar rose, its chairman pointed out that "Although foreign exchange losses have now been provided for in full on all loans and leases as if they had been repayable at 30 June 1984, it must be borne in mind that these are secured against ships chartered out at fixed freight rates, the U.S. dollar income from which will be sufficient to service both the interest and capital on the underlying loans. This future income will offset the exchange losses now provided for."

26. Texas Instruments (TI) manufactures integrated circuits and memory chips that it sells around the world. It has major markets in Europe. TI's primary competitors are Japanese companies.

a. What factors will influence TI's exposure to movements in the dollar value of European currencies?

**ANSWER.** Since TI's main competitors worldwide are Japanese companies, one critical factor affecting its exposure is the dollar/yen exchange rate. If the dollar appreciates relative to, say, the euro, but the $/¥ exchange rate remains constant, then TI should be able to raise its euro prices without suffering a loss of competitive advantage. However, changes in the dollar value of the euro that are not offset by changes in the dollar value of the yen, or changes in the $/¥ rate (even if the dollar value of the euro has not changed), expose TI to currency risk. Here we must ask how price-sensitive the European demand for TI chips is. The more price sensitive the demand, the more currency risk TI faces. Memory chips, being commodities, are likely to be more price-sensitive than microprocessors. TI's currency risk also depends on the value-added work performed in Europe. The more value added done in Europe, or that can be done in Europe, the less currency risk TI faces since its local currency inflows will be offset by local currency outflows.

b. Does TI's European business have yen exposure? Explain.
**ANSWER.** As mentioned in the answer to part a, TI has significant yen exposure.

c. How can TI use financing to reduce its yen exposure, to the extent this exposure exists?

**ANSWER.** TI should finance itself to a significant extent with Japanese yen, so the same event (e.g., yen depreciation) that reduces TI's dollar cash inflows will simultaneously reduce the dollar amount of its yen debt servicing costs.

27. South Korea's Korean Air Lines (KAL) is the world's 12th largest passenger airline and its second-largest cargo carrier. It has borrowed $5 billion (much of it denominated in dollars) to finance its fleet of planes.

a. In what ways is KAL affected by depreciation of the won against the dollar?

**ANSWER.** The won's depreciation against the dollar harms KAL in three ways. (1) Its dollar-denominated debt service payments rise in won terms because more won are needed to buy the dollars to pay interest and principal on its loans. (2) Its won cost of fuel rises since fuel prices are set in dollars. (3) Its won revenue growth slows down and may even fall as Asian fliers try to conserve their falling incomes. There are other considerations as well in assessing KAL's currency risk. To the extent that KAL can replace Asian customers with U.S. and European customers attracted by the lower cost of visiting Asia, then KAL can boost its won operating income. However, KAL is unlikely to be able to fully recoup the lost income from its lost Asian customers. This prediction has been borne out by KAL's actual experience following the won's plunge in 1997.

b. How can KAL use financing to reduce its currency risk?

**ANSWER.** KAL should finance its planes in won, so as to balance its revenues with its expenses. Such a policy is unlikely to eliminate KAL's currency risk but at least it will not exacerbate it. Financing its fleet in dollars will add a transaction exposure to its operating exposure.

c. KAL argues that its jet fleet naturally hedges its currency exposure. Do you agree or disagree? Explain.

**ANSWER.** There is some truth to KAL's claim. The jet fleet is easy to sell and is likely to retain most of its dollar value. But this natural hedge only exists if KAL intends to sell off its fleet. To the extent that KAL continues to operate its fleet, then the fleet's value is based on the cash flows generated by its operations. As we saw, KAL's won operating cash flow is unlikely to keep up with the won cost of servicing its dollar debts.

d. At the end of 1997, KAL decided to sell off its older planes, use the proceeds to pay down some of its debt, and replace the sold planes with aircraft it leases through a subsidiary in Ireland. Will this strategy lower KAL's high debt ratio?

**ANSWER.** All KAL is doing here is substituting lease payments for debt payments. The two are equivalent. KAL's Irish subsidiary must borrow to finance the planes. On a consolidated basis, therefore, KAL is still responsible for these debts. To the extent that the Irish subsidiary borrows without recourse to its parent, then KAL must inject enough equity into the subsidiary to maintain its credit rating. At the same time, even though KAL can keep the subsidiary's debts off its book through nonrecourse financing, it will also lose its assets (the planes, since they are leased and not owned). Hence, KAL does not lower its debt:equity ratio by leasing planes through an Irish subsidiary.