**CHAPTER 1 GLOBALIZATION AND THE MULTINATIONAL FIRM**

**ANSWERS & SOLUTIONS TO END-OF-CHAPTER QUESTIONS AND PROBLEMS**

QUESTIONS

1. Why is it important to study international financial management?

Answer: We are now living in a world where all the major economic functions, such as consumption, production, investment, and financing, are highly globalized. It is thus essential for financial managers to fully understand vital international dimensions of financial management. This global shift is in marked contrast to a situation that existed when the authors of this book were learning finance a few decades ago. At that time, most professors customarily (and safely, to some extent) ignored international aspects of finance. This mode of operation has become untenable since then.

1. How is international financial management different from domestic financial management?

Answer: There are three major dimensions that set apart international finance from domestic finance. They are:

1. foreign exchange and political risks,

2. market imperfections, and

3. expanded opportunity set.

3. Discuss the major trends that have prevailed in international business during the last two decades.

Answer: The 2000s brought a rapid integration of international capital and financial markets. Impetus for globalized financial markets initially came from the governments of major countries that had begun to deregulate their foreign exchange and capital markets. The economic integration and globalization that began in the eighties and nineties are picking up speed in the 2000s. Trade liberalization and economic integration continued to proceed at both the regional and global levels. Despite sovereign debt crisis in Europe, more EU member countries have adopted the common currency, the euro, that effectively became the second global currency after the U.S. dollar. In the last few years, however, economic nationalism has been gaining some popularity, as exemplified by the Brexit decision of the United Kingdom and the so-called “America First” policies of the Trump Administration. To the extent that economic nationalism is a populist response to the global financial crisis and Great Recession, it may subside as the world economy continues to recover.

4. How is a country’s economic well-being enhanced through free international trade in goods and services?

Answer: According to David Ricardo, with free international trade, it is mutually beneficial for two countries to each specialize in the production of the goods that it can produce *relatively* most efficiently and then trade those goods. By doing so, the two countries can increase their combined production, which allows both countries to consume more of both goods. This argument remains valid even if a country can produce both goods more efficiently in absolute terms than the other country. International trade is not a ‘zero-sum’ game in which one country benefits at the expense of another country. Rather, international trade could be an ‘increasing-sum’ game from which all players become winners.

5. What considerations might limit the extent to which the theory of comparative advantage is realistic?

Answer: The theory of comparative advantage was originally advanced by the nineteenth century economist David Ricardo as an explanation for why nations trade with one another. The theory claims that economic well-being is enhanced if each country produces what it has a comparative advantage in producing relative to other countries, and then trade products. Underlying the theory are the assumptions of free trade between nations and that the factors of production (labor, technological know-how, and capital) are relatively immobile. To the extent that these assumptions do not hold, the theory of comparative advantage may not realistically describe international trade. In addition, free trade produces winners and losers and if the losers are not compensated, free trade may faces political opposition from them.

6. What are multinational corporations (MNCs) and what economic roles do they play?

Answer: A multinational corporation (MNC) can be defined as a business firm incorporated in one country that has production and sales operations in many other countries. Indeed, some MNCs have operations in a few dozens of different countries. MNCs obtain financing from major money centers around the world in many different currencies to finance their operations. Global operations force the treasurer’s office to establish international banking relationships, to place short-term funds in several currency denominations, and to effectively manage foreign exchange risk. By circumventing and also taking advantage of various market imperfections, such as barriers to trade and barriers to flow of people and capital across countries, MNCs contribute to greater integration of the world economy and ing more perfect functioning of global markets.

7. Ross Perot, a former Presidential candidate of the Reform Party, which was a third political party in the United States, had strongly objected to the creation of the North American Trade Agreement (NAFTA), which nonetheless was inaugurated in 1994. Perot feared the loss of American jobs to Mexico where it is much cheaper to hire workers. What are the merits and demerits of Perot’s position on NAFTA? Considering the recent economic developments in North America, how would you assess Perot’s position on NAFTA?

Answer: Since the inception of NAFTA, many American companies indeed have invested heavily in Mexico, sometimes relocating production from the United States to Mexico. Although this might have temporarily caused unemployment of some American workers, they were eventually rehired by other industries often for higher wages. At the same time, Mexico has been experiencing a major economic boom. It seems clear that both Mexico and the U.S. have benefited from NAFTA. Perot’s concern appears to have been ill founded.

8. In 1995, a working group of French chief executive officers was set up by the Confederation of French Industry (CNPF) and the French Association of Private Companies (AFEP) to study the French corporate governance structure. The group reported the following, among other things: “The board of directors should not simply aim at maximizing share values as in the U.K. and the U.S. Rather, its goal should be to serve the company, whose interests should be clearly distinguished from those of its shareholders, employees, creditors, suppliers and clients but still equated with their general common interest, which is to safeguard the prosperity and continuity of the company”. Evaluate the above recommendation of the working group.

Answer: The recommendations of the French working group clearly show that shareholder wealth maximization is not a universally accepted goal of corporate management, especially outside the United States and possibly a few other Anglo-Saxon countries including the United Kingdom and Canada. To some extent, this may reflect the fact that share ownership is not wide spread in most other countries.

9. Emphasizing the importance of voluntary compliance, as opposed to enforcement, in the aftermath of such corporate scandals as those involving Enron and WorldCom, U.S. President George W. Bush stated that while tougher laws might help, “ultimately, the ethics of American business depends on the conscience of America’s business leaders.” Describe your view on this statement.

Answer: There can be different answers to this question. If business leaders always behave with a high ethical standard, many of the corporate scandals we have seen lately might not have happened. Since we cannot fully depend on the ethical behavior on the part of individual business leaders, the society should protect itself by adopting the rules/regulations and governance structure that would induce business leaders to behave in the interest of the society at large. But at the same time, we need to make sure that excessive regulations do not stymy free enterprises, an important engine of economic growth. It is important to strike the right balance.

10. Suppose you are interested in investing in shares of Samsung Electronics of Korea, which is a world leader in mobile phones, TVs, and home appliances. But before you make investment decision, you would like to learn about the company. Visit the website of Yahoo (<http://finance.yahoo.com>) and collect information about Samsung Electronics, including the recent stock price history and analysts’ views of the company. Discuss what you learn about the company. Also discuss how the instantaneous access to information via internet would affect the nature and workings of financial markets.

Answer: As students might have learned from visiting the website, information is readily available even for foreign companies like Samsung Electronics. Ready access to international information helps integrate financial markets, dismantling barriers to international investment and financing. Integration, however, may help a financial shock in one market to be quickly transmitted to other markets.

Mini Case: Nike and Sweatshop labor

Nike, a company headquartered in Beaverton, Oregon, is a major force in the sports footwear and fashion industry, with annual sales exceeding $ 30 billions, more than half of which now come from outside the United States. The company was co-founded in 1964 by Phil Knight, a CPA at Price Waterhouse, and Bill Bowerman, college track coach, each investing $ 500 to start. The company, initially called Blue Ribbon Sports, changed its name to Nike in 1971 and adopted the “Swoosh” logo—recognizable around the world—originally designed by a college student for $35. Nike became highly successful in designing and marketing mass-appealing products such as the Air Jordan, the best selling athletic shoe of all time.

Nike has no production facilities in the United States. Rather, the company manufactures athletic shoes and garments in such Asian countries as India, Indonesia, and Vietnam using subcontractors, and sells the products in the U.S. and international markets. In each of those Asian countries where Nike has production facilities, the rates of unemployment and under-employment are relatively high. The wage rate is very low in those countries by U.S. standards—the hourly wage rate in the manufacturing sector is less than $ 2 in each of those countries, compared with about $ 38 in the United States. In addition, workers in those countries often operate in poor and unhealthy environments and their rights are not particularly well protected. Understandably, host countries are eager to attract foreign investments like Nike’s to develop their economies and raise the living standards of their citizens. Recently, however, Nike came under worldwide criticism for its practice of hiring workers for such a low rate of pay—“next to nothing” in the words of critics—and overlooking poor working conditions in host countries.

Initially, Nike denied the sweatshop charges and lashed out at critics. But later, the company began monitoring the labor practice at its overseas factories and grading the factories in order to improve labor standards. Nike also agreed to random factory inspections by disinterested parties.

Discussion points

1. Do you think the criticism of Nike is fair, considering that the host countries are in dire needs of creating jobs?
2. What do you think Nike’s executives might have done differently to prevent the sensitive charges of sweatshop labor in overseas factories?
3. Do firms need to consider the so-called corporate social responsibilities in making investment decisions?

Suggested Solution to Nike and Sweatshop Labor

Obviously, Nike’s investments in such Asian countries as China, Indonesia, and Vietnam were motivated to take advantage of low labor costs in those countries. While Nike was criticized for the poor working conditions for its workers, the company has recognized the problem and has substantially improved the working environments recently. Although Nike’s workers get paid very low wages by the Western standard, they probably are making substantially more than their local compatriots who are either under- or unemployed. While Nike’s detractors may have valid points, one should not downplay the fact that the company is making contributions to the economic welfare of those Asian countries by creating job opportunities and also helping earn hard currencies that can be used to fund economic growth of those countries.

**APPENDIX 1A. GAIN FROM TRADE: THE THEORY OF COMPARATIVE ADVANTAGE**

PROBLEMS

1. Country C can produce seven pounds of food or four yards of textiles per unit of input. Compute the opportunity cost of producing food instead of textiles. Similarly, compute the opportunity cost of producing textiles instead of food.

Solution: The opportunity cost of producing food instead of textiles is one yard of textiles per 7/4 = 1.75 pounds of food. A pound of food has an opportunity cost of 4/7 = .57 yards of textiles.

2. Consider the no-trade input/output situation presented in the following table for Countries X and Y. Assuming that free trade is allowed, develop a scenario that will benefit the citizens of both countries.

INPUT/OUTPUT WITHOUT TRADE

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Country

X Y Total

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I. Units of Input (000,000)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Food 70 60

Textiles 40 30

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

II. Output per Unit of Input (lbs or yards)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Food 17 5

Textiles 5 2

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

III. Total Output (lbs or yards) (000,000)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Food 1,190 300 1,490

Textiles 200 60 260

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

IV. Consumption (lbs or yards) (000,000)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Food 1,190 300 1,490

Textiles 200 60 260

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Solution:

Examination of the no-trade input/output table indicates that Country X has an absolute advantage in the production of food and textiles. Country X can “trade off” one unit of production needed to produce 17 pounds of food for five yards of textiles. Thus, a yard of textiles has an opportunity cost of 17/5 = 3.40 pounds of food, or a pound of food has an opportunity cost of 5/17 = .29 yards of textiles. Analogously, Country Y has an opportunity cost of 5/2 = 2.50 pounds of food per yard of textiles, or 2/5 = .40 yards of textiles per pound of food. In terms of opportunity cost, it is clear that Country X is relatively more efficient in producing food and Country Y is relatively more efficient in producing textiles. Thus, Country X (Y) has a comparative advantage in producing food (textile) is comparison to Country Y (X).

When there are no restrictions or impediments to free trade the economic-well being of the citizens of both countries is enhanced through trade. Suppose that Country X shifts 20,000,000 units from the production of textiles to the production of food where it has a comparative advantage and that Country Y shifts 60,000,000 units from the production of food to the production of textiles where it has a comparative advantage. Total output will now be (90,000,000 x 17 =) 1,530,000,000 pounds of food and [(20,000,000 x 5 =100,000,000) + (90,000,000 x 2 =180,000,000) =] 280,000,000 yards of textiles. Further suppose that Country X and Country Y agree on a price of 3.00 pounds of food for one yard of textiles, and that Country X sells Country Y 330,000,000 pounds of food for 110,000,000 yards of textiles. Under free trade, the following table shows that the citizens of Country X (Y) have increased their consumption of food by 10,000,000 (30,000,000) pounds and textiles by 10,000,000 (10,000,000) yards.

INPUT/OUTPUT WITH FREE TRADE

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Country

X Y Total

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

I. Units of Input (000,000)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Food 90 0

Textiles 20 90

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

II. Output per Unit of Input (lbs or yards)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Food 17 5

Textiles 5 2

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

III. Total Output (lbs or yards) (000,000)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Food 1,530 0 1,530

Textiles 100 180 280

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

IV. Consumption (lbs or yards) (000,000)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Food 1,200 330 1,530

Textiles 210 70 280

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**CHAPTER 2 INTERNATIONAL MONETARY SYSTEM**

**ANSWERS & SOLUTIONS TO END-OF-CHAPTER QUESTIONS AND PROBLEMS**

QUESTIONS

1. Explain Gresham’s Law.

Answer: Gresham’s law refers to the phenomenon that bad (abundant) money drives good (scarce) money out of circulation. This kind of phenomenon was often observed under the bimetallic standard under which both gold and silver were used as means of payments, with the exchange rate between the two fixed.

2. Explain the mechanism which restores the balance of payments equilibrium when it is disturbed under the gold standard.

Answer: The adjustment mechanism under the gold standard is referred to as the price-specie-flow mechanism expounded by David Hume. Under the gold standard, a balance of payment disequilibrium will be corrected by a counter-flow of gold. Suppose that the U.S. imports more from the U.K. than it exports to the latter. Under the classical gold standard, gold, which is the only means of international payments, will flow from the U.S. to the U.K. As a result, the U.S. (U.K.) will experience a decrease (increase) in money supply. This means that the price level will tend to fall in the U.S. and rise in the U.K. Consequently, the U.S. products become more competitive in the export market, while U.K. products become less competitive. This change will improve U.S. balance of payments and at the same time hurt the U.K. balance of payments, eventually eliminating the initial BOP disequilibrium.

3. Suppose that the pound is pegged to gold at 6 pounds per ounce, whereas the franc is pegged to gold at 12 francs per ounce. This, of course, implies that the equilibrium exchange rate should be two francs per pound. If the current market exchange rate is 2.2 francs per pound, how would you take advantage of this situation? What would be the effect of shipping costs?

Answer: Suppose that you need to buy 6 pounds using French francs. If you buy 6 pounds directly in the foreign exchange market, it will cost you 13.2 francs. Alternatively, you can first buy an ounce of gold for 12 francs in France and then ship it to England and sell it for 6 pounds. In this case, it only costs you 12 francs to buy 6 pounds. It is thus beneficial to ship gold due to the overpricing of the pound. Of course, you can make an arbitrage profit by selling 6 pounds for 13.2 francs in the foreign exchange market. The arbitrage profit will be 1.2 francs. So far, we assumed that shipping costs do not exist. If it costs more than 1.2 francs to ship an ounce of gold, there will be no arbitrage profit.

4. Discuss the advantages and disadvantages of the gold standard.

Answer: The advantages of the gold standard include: (I) since the supply of gold is restricted, countries cannot have high inflation; (2) any BOP disequilibrium can be corrected automatically through cross-border flows of gold. On the other hand, the main disadvantages of the gold standard are: (I) the world economy can be subject to deflationary pressure due to restricted supply of gold; (ii) the gold standard itself has no mechanism to enforce the rules of the game, and, as a result, countries may pursue economic policies (like de-monetization of gold) that are incompatible with the gold standard.

5. What were the main objectives of the Bretton Woods system?

Answer: The main objectives of the Bretton Woods system are to achieve exchange rate stability and promote international trade and development.

6. Comment on the proposition that the Bretton Woods system was programmed to an eventual demise.

Answer: The answer to this question is related to the Triffin paradox. Under the gold-exchange system, the reserve-currency country should run BOP deficits to supply reserves to the world economy, but if the deficits are large and persistent, they can lead to a crisis of confidence in the reserve currency itself, eventually causing the downfall of the system.

7. Explain how special drawing rights (SDR) are constructed. Also, discuss the circumstances under which the SDR was created.

Answer: SDR was created by the IMF in 1970 as a new reserve asset, partially to alleviate the pressure on the U.S. dollar as the key reserve currency. The SDR is a basket currency currently comprised of five major currencies, i.e., the U.S. dollar, euro, Chinese yuan, Japanese yen, and British pound. Currently, the dollar receives a 41.73% weight, euro 30.93%, yuan 10.92, yen 8.33%, and pound 8.09%. The weights for different currencies tend to change over time, reflecting the relative importance of each currency in international trade and finance.

8. Explain the arrangements and workings of the European Monetary System (EMS).

Answer: EMS was launched in 1979 in order to (i) establish a zone of monetary stability in Europe, (ii) coordinate exchange rate policies against the non-EMS currencies, and (iii) pave the way for the eventual European monetary union. The main instruments of EMS are the European Currency Unit (ECU) and the Exchange Rate Mechanism (ERM). Like SDR, the ECU is a basket currency constructed as a weighted average of currencies of EU member countries. The ECU works as the accounting unit of EMS and plays an important role in the workings of the ERM. The ERM is the procedure by which EMS member countries manage their exchange rates. The ERM is based on a parity grid system, with parity grids first computed by defining the par values of EMS currencies in terms of the ECU. If a country’s ECU market exchange rate diverges from the central rate by as much as the maximum allowable deviation, the country has to adjust its policies to maintain its par values relative to other currencies. EMS achieved a complete monetary union in 1999 when the common European currency, the euro, was adopted.

9. There are arguments for and against the alternative exchange rate regimes.

a. List the advantages of the flexible exchange rate regime.

b. Criticize the flexible exchange rate regime from the viewpoint of the proponents of the fixed exchange rate regime.

c. Rebut the above criticism from the viewpoint of the proponents of the flexible exchange rate regime.

Answer: a. The advantages of the flexible exchange rate system include: (I) automatic achievement of balance of payments equilibrium and (ii) maintenance of national policy autonomy.

b. If exchange rates are fluctuating randomly, that may discourage international trade and encourage market segmentation. This, in turn, may lead to suboptimal allocation of resources.

c. Economic agents can hedge exchange risk by means of forward contracts and other techniques. They don’t have to bear it if they choose not to. In addition, under a fixed exchange rate regime, governments often restrict international trade in order to maintain the exchange rate. This is a self-defeating measure. What’s good about having the fixed exchange rate if international trade need to be restricted?

10. In an integrated world financial market, a financial crisis in a country can be quickly transmitted to other countries, causing a global crisis. What kind of measures would you propose to prevent the recurrence of an Asia-type crisis.

Answer: First, there should be a multinational safety net to safeguard the world financial system from the Asia-type crisis. Second, international institutions like IMF and the World Bank should monitor problematic countries more closely and provide timely advice to those countries. Countries should be required to fully disclose economic and financial information so that devaluation surprises can be prevented. Third, countries should depend more on domestic savings and long-term foreign investments, rather than short-term portfolio capital. There can be other suggestions.

11. Discuss the criteria for a ‘good’ international monetary system.

Answer: A good international monetary system should provide (i) sufficient liquidity to the world economy, (ii) smooth adjustments to BOP disequilibrium as it arises, and (iii) safeguard against the crisis of confidence in the system.

12. Once capital markets are integrated, it is difficult for a country to maintain a fixed exchange rate. Explain why this may be so.

Answer: Once capital markets are integrated internationally, vast amounts of money may flow in and out of a country in a short time period. This will make it very difficult for the country to maintain a fixed exchange rate.

13. Assess the possibility for the euro to become another global currency rivaling the U.S. dollar. If the euro really becomes a global currency, what impact will it have on the U.S. dollar and the world economy?

Answer: In light of the large transactions domain of the euro, which is comparable to that of the U.S. dollar, and the mandate for the European Central Bank (ECB) to guarantee the monetary stability in Europe, the euro may potentially become another global currency over time. A major uncertainty about this prospect is the lack of political and fiscal integration of Europe. If Europe becomes politically more integrated, the euro is more likely to become a global currency. If the euro becomes a global currency, it will come at the expense of the dollar. Currently, the U.S. derives substantial benefits from the dollar’s status as the dominant global currency – for instance, the U.S. can run trade deficits without having to maintain substantial foreign exchange reserves, can carry out international commercial and financial transactions in dollars without bearing exchange risk, etc. If the euro is to be used as a major denomination, reserve, and invoice currency in the world economy, dollar-based agents will start to bear more exchange risk, among other things.

MINI CASE: Grexit or Not?

When the euro was introduced in 1999, Greece was conspicuously absent from the list of the European Union member countries adopting the common currency. The country was not ready. In a few short years, however, European leaders, probably motivated by their political agenda, allowed Greece to join the euro club in 2001 although it was not entirely clear if the country satisfied the entry conditions. In any case, joining the euro club allowed the Greek government, households, and firms to gain easy access to plentiful funds at historically low interest rates, ushering in a period of robust credit growth. For a while, Greeks enjoyed what seemed to be the fruits of becoming a full-fledged member of Europe. In December 2009, however, the new Greek government revealed that the government budget deficit would be 12.7% for 2009, not 3.7% as previously announced by the outgoing government, far exceeding the EU’s convergence guideline of keeping the budget deficit below 3.0% of the GDP. As the true picture of the government finance became known, the prices of Greek government bonds began to fall sharply, prompting panic selling among international investors, threatening the sovereign defaults.

Several years into the crisis, the Greek government debt stands at around 180% of GDP and the jobless rate among youth is above 50%. The country’s GDP declined by about 25%. Severe austerity measures, such as sharply raised taxes and much reduced pension benefits, were imposed on Greece as conditions for the bailouts arranged by the EU, IMF, and the European Central Bank. In addition, people were allowed to have only restricted access to their bank deposits, to prevent bank runs. Opinion polls indicate that the majority of people in Germany, the main creditor nation for Greece, prefer the Greek exit from the euro-zone, popularly called Grexit, while some people in Greece are demanding Grexit themselves and restoration of the national currency, the drachma.

Discussion points: (i) the root causes of the Greek predicaments; (ii) the costs and benefits of staying in the euro-zone for Greece, (iii) the measures that need to be taken to keep Greece in the euro-zone in the long run if that is desirable, (iv) If you were a disinterested outside advisor for the Greek government, would you advise Grexit or not? Why or why not ?

Suggested Solution to Grexit or Not?

As is often the case with many sovereign debt crises in history, the Greek sovereign debt crisis, which raises the possibility of Grexit from the euro-zone, is attributable to the excessive borrowing and spending on the part of the government which cannot be adequately financed by the government revenues. As is well known, tax evasion is widely spread in Greece while pension benefits and other welfare services are lavish compared with the country’s economic resources. And the lack of transparency of the government finance also contributed to the steep decline in the Greek government bond prices in late 2009 and 2010. Greece is still not completely out of crisis in part because the country now doesn’t have its own monetary policy that can be tailored to address its dire economic conditions, like easy monetary policy and depreciation of the national currency to help the country recover from the crisis quickly. The lack of policy independence thus is a very major cost of remaining in the euro-zone. If Greece is to remain in the euro-zone in the long run, it has to reduce the government expenditures, cut business costs, and boost labor productivity, among other things. If it is difficult to implement the above and other measures to strengthen the competitiveness of the Greek economy, the country then may seriously consider getting out of the euro-zone and recovering national policy autonomy with its own currency.

**CHAPTER 3 BALANCE OF PAYMENTS**

**ANSWERS & SOLUTIONS TO END-OF-CHAPTER QUESTIONS AND PROBLEMS**

QUESTIONS

1. Define *balance of payments*.

Answer: The balance of payments (BOP) can be defined as the statistical record of a country’s international transactions over a certain period of time presented in the form of double-entry bookkeeping.

2. Why would it be useful to examine a country’s balance of payments data?

Answer: It would be useful to examine a country’s BOP for at least two reasons. First, BOP provides detailed information about the supply and demand of the country’s currency. Second, BOP data can be used to evaluate the performance of the country in international economic competition. For example, if a country is experiencing perennial BOP deficits, it may signal that the country’s industries lack competitiveness.

3. The United States has experienced continuous current account deficits since the early 1980s. What do you think are the main causes for the deficits? What would be the consequences of continuous U.S. current account deficits?

Answer: The current account deficits of U.S. may be attributable to (i) the strong dollar and undervalued currencies of trading partners such as China, Japan, and euro-zone (ii) high consumption and low savings in the U.S. and low consumption and high savings in major trading partners, (iii) weak competitiveness of U.S. industries, especially manufacturing sector. If U.S. deficits continue, the dollar may eventually depreciate substantially and the confidence in dollar may suffer.

4. In contrast to the United States, Japan has realized continuous current account surpluses. What could be the main causes for these surpluses? Is it desirable to have continuous current account surpluses?

Answer: Japan’s continuous current account surpluses may have reflected a weak yen and high competitiveness of Japanese industries. Massive capital exports by Japan prevented yen from appreciating more than it did. At the same time, foreigners’ exports to Japan were hampered by closed nature of Japanese markets. Continuous current account surpluses disrupt free trade by promoting protectionist sentiment in the deficit country. It is not desirable especially when it is brought about by the mercantilist policies.

5. Comment on the following statement: “Since the United States imports more than it exports, it is necessary for the United States to import capital from foreign countries to finance its current account deficits.”

Answer: The statement presupposes that the U.S. current account deficit causes its financial account surplus. In reality, the causality can be running in the opposite direction: U.S. financial account surplus may cause the country’s current account deficit. Suppose foreigners find the U.S. a great place to invest and send their capital to the U.S., resulting in U.S. financial account surplus. This capital inflow will strengthen the dollar, hurting the U.S. export and encouraging imports from foreign countries, causing current account deficits.

6. Explain how a country can run an overall deficit or surplus on its balance of payments.

Answer: A country can run an overall BOP deficit or surplus by engaging in the official reserve transactions. For example, an overall BOP deficit can be supported by drawing down the central bank’s reserve holdings. Likewise, an overall BOP surplus can be absorbed by adding to the central bank’s reserve holdings.

7. Explain *official reserve assets* and its major components.

Answer: Official reserve assets are those financial assets that can be used as international means of payments. Currently, official reserve assets comprise: (i) gold, (ii) foreign exchanges, (iii) special drawing rights (SDRs), and (iv) reserve positions with the IMF. Foreign exchanges are by far the most important official reserves.

8. Explain how to compute the overall balance and discuss its significance.

Answer: The overall balance is determined by computing the cumulative balance of payments including the current account, capital account, financial account, and the statistical discrepancies. The overall balance is significant because it indicates a country’s international payment gap that must be financed by the government’s official reserve transactions.

9. Since the early 1980s, foreign portfolio investors have purchased a significant portion of U.S. treasury bond issues. Discuss the short-term and long-term effects of foreigners’ portfolio investment on the U.S. balance of payments.

Answer: As foreigners purchase U.S. Treasury bonds, U.S. BOP will improve in the short run. But in the long run, U.S. BOP may deteriorate because the U.S. should pay interests and principals to foreigners. If foreign funds are used productively and contributes to the competitiveness of U.S. industries, however, U.S. BOP may improve in the long run.

10. Describe the *balance of payments identity* and discuss its implications under the fixed and flexible exchange rate regimes.

Answer: The balance of payments identity holds that the combined balance on the current, capital, and financial accounts should be equal in size, but opposite in sign, to the change in the official reserves: BCA + BKA + BFA = - BRA. Under the pure flexible exchange rate regime, central banks do not engage in official reserve transactions and, as a result, BRA would be close to zero. Thus, the overall balance must balance, i.e., BCA + BFA = - BKA. Under the fixed exchange rate regime, however, a country can have an overall BOP surplus or deficit as the central bank will accommodate it via official reserve transactions.

11. Exhibit 3.6 indicates that in 2013, China had a current account surplus and at the same time a financial account surplus. Explain how this can happen?

Answer: In 2013, China experienced a current account surplus since it exported more to the rest of the world than it imported from the rest of the world. At the same time, China also attracted financial inflows that exceed its financial outflows. As a result, China experienced an overall surplus on its BOP in 2013, which must have increased its reserve holdings.

12. Explain how each of the following transactions will be classified and recorded in the debit and credit of the U.S. balance of payments:

(1) A Japanese insurance company purchases U.S. Treasury bonds and pays out of its bank account kept in New York City.

(2) A U.S. citizen consumes a meal at a restaurant in Paris and pays with her American Express card.

(3) A Indian immigrant living in Los Angeles sends a check drawn on his L.A. bank account as a gift to his parents living in Mumbai.

(4) A U.S. computer programmer is hired by a British company for consulting and gets paid from the U.S. bank account maintained by the British company.

Answer:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Transactions Credit Debit

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Japanese purchase of U.S. T bonds √

Japanese payment using NYC account √

U.S. citizen having a meal in Paris √

Paying the meal with American Express √

Gift to parents in Bombay √

Receipts of the check by parents (goodwill) √

Export of programming service √

British payment out of its account in U.S. √

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13. Construct the balance of payment table for Germany for year 2018 which is comparable in format to Exhibit 3.1, and interpret the numerical data. You may consult *International Financial Statistics* published by IMF or search for useful websites for the data yourself.

Answer: A summary of the German Balance of Payments for 2018 (in $ billion)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Credits** | **Debits** |
| *Current Account* | |  |  |
| [1] Exports | | 1,869.9 |  |
|  | [1.1] Goods | 1,527.1 |  |
|  | [1.2] Services | 342.8 |  |
| [2] Imports | |  | -1,630.3 |
|  | [2.1] Goods |  | -1,264.6 |
|  | [2.2] Services |  | -365.7 |
| [3] | Primary income | 257.3 | -149.5 |
| [4] | Secondary income | 80.8 | -136.9 |
|  | Balance on current account | 291.3 |  |
|  | [[1]+[2]+[3]+[4]] |  |  |
|  |  |  |  |
| *Capital Account* | | 51.3 | -48.9 |
|  | Balance on capital account | 2.4 |  |
|  |  |  |  |
| *Financial Account* | | |  |
| [5] Direct investment | | 105.3 | -159.1 |
| [6] Portfolio investment | | -51.4 | -110.0 |
|  | [6.1] Equity securities | 1.1 | -34.0 |
|  | [6.2] Debt securities | -52.5 | -48.5 |
|  | [6.3] Derivatives, net |  | -27.5 |
| [7] Other investment | | 99.4 | -154.7 |
|  | Balance on financial account |  | -270.5 |
|  | [[5]+[6]+[7]] |  |  |
| [8] Statistical discrepancies | |  | -22.7 |
|  | Overall balance | 0.5 |  |
|  |  |  |  |
| *Official Reserve Account* | |  | -0.5 |

**Source:** Balance of Payments and International Investment Position Statistics, IMF

Note: It is noted that Germany experienced ‘divestment’ by foreigners in portfolio investment in 2018. It is also noted that the above numbers may be affected somewhat by the government updating of the economic data. One salient feature of the above table is that Germany realized a significant merchandise trade surplus but a deficit in service trade, suggesting that Germany’s comparative advantage may be in the manufacturing sector, not in service sector.

14. Discuss the possible strengths and weaknesses of SDRs versus the dollar as the main reserve currency. Do you think the SDR should or could replace the U.S. dollar as the main global reserve currency?

Answer: Being a basket currency, SDR has a relatively stable exchange value. However, IMF, that issues SDRs, has no mandate to function as the world central bank. In addition, there is no liquid bond market for SDR. The U.S. dollar, on the other hand, has deep, liquid markets and is backed by the most powerful country in the world. The dollar’s credibility as the dominant global currency, however, is being hurt by fiscal and trade deficits and the declining share of the U.S. in the world output.

PROBLEMS

1. The U.S. Balance of Payments for year 2017.

Solution:

Goods -2,360.9

Balance on current account -449.2

Balance on financial account 330.2

Statistical discrepancies 92.5

MINI CASE: MEXICO’S BALANCE OF PAYMENTS PROBLEM

Recently, Mexico experienced large-scale trade deficits, depletion of foreign reserve holdings and a major currency devaluation in December 1994, followed by the decision to freely float the peso. These events also brought about a severe recession and higher unemployment in Mexico. Since the devaluation, however, the trade balance has improved.

Investigate the Mexican experiences in detail and write a report on the subject. In the report, you may:

(a) document the trend in Mexico’s key economic indicators, such as the balance of payments, the exchange rate, and foreign reserve holdings, during the period 1994.1 through 1995.12.;

(b) investigate the causes of Mexico’s balance of payments difficulties prior to the peso devaluation;

(c) discuss what policy actions might have prevented or mitigated the balance of payments problem and the subsequent collapse of the peso; and

(d) derive lessons from the Mexican experience that may be useful for other developing countries.

In your report, you may identify and address any other relevant issues concerning Mexico’s balance of payment problem. *International Financial Statistics* published by IMF provides basic macroeconomic data on Mexico.

Suggested Solution to Mexico’s Balance of payments Problem

To solve this case, it is useful to review Chapter 2, especially the section on the Mexican peso crisis. Despite the fact that Mexico had experienced continuous trade deficits until December 1994, the country’s currency was not allowed to depreciate for political reasons. The Mexican government did not want the peso devaluation before the Presidential election held in 1994. If the Mexican peso had been allowed to gradually depreciate against the major currencies, the peso crisis could have been prevented.

The key lessons that can be derived from the peso crisis are: First, Mexico depended too much on short-term foreign portfolio capital (which is easily reversible) for its economic growth. The country perhaps should have saved more domestically and depended more on long-term foreign capital. This can be a valuable lesson for many developing countries. Second, the lack of reliable economic information was another contributing factor to the peso crisis. The Salinas administration was reluctant to fully disclose the true state of the Mexican economy. If investors had known that Mexico was experiencing serious trade deficits and rapid depletion of foreign exchange reserves, the peso might have been gradually depreciating, rather than suddenly collapsed as it did. The transparent disclosure of economic data can help prevent the peso-type crisis. Third, it is important to safeguard the world financial system from the peso-type crisis. To this end, a multinational safety net needs to be in place to contain the peso-type crisis in the early stage.

**CHAPTER 5 THE MARKET FOR FOREIGN EXCHANGE**

**ANSWERS & SOLUTIONS TO END-OF-CHAPTER QUESTIONS AND PROBLEMS**

QUESTIONS

1. Give a full definition of the market for foreign exchange.

Answer: Broadly defined, the *foreign exchange (FX) market* encompasses the conversion of purchasing power from one currency into another, bank deposits of foreign currency, the extension of credit denominated in a foreign currency, foreign trade financing, and trading in foreign currency options and futures contracts.

2. What is the difference between the retail or client market and the wholesale or interbank market for foreign exchange?

Answer: The market for foreign exchange can be viewed as a two-tier market. One tier is the *wholesale* or *interbank market* and the other tier is the *retail* or *client market*. International banks provide the core of the FX market. They stand willing to buy or sell foreign currency for their own account. These international banks serve their retail clients, corporations or individuals, in conducting foreign commerce or making international investment in financial assets that requires foreign exchange. Retail transactions account for only about 14 percent of FX trades. The other 86 percent is interbank trades between international banks, or non-bank dealers large enough to transact in the interbank market.

3. Who are the market participants in the foreign exchange market?

Answer: The market participants that comprise the FX market can be categorized into five groups: international banks, bank customers, non-bank dealers, FX brokers, and central banks. *International banks* provide the core of the FX market. Approximately 100 to 200 banks worldwide make a market in foreign exchange, i.e., they stand willing to buy or sell foreign currency for their own account. These international banks serve their retail clients, the *bank customers*, in conducting foreign commerce or making international investment in financial assets that requires foreign exchange. *Non-bank dealers* are large non-bank financial institutions, such as investment banks, mutual funds, pension funds, and hedge

funds, whose size and frequency of trades make it cost- effective to establish their own dealing rooms to trade directly in the interbank market for their foreign exchange needs.

Most interbank trades are *speculative* or *arbitrage* transactions where market participants attempt to correctly judge the future direction of price movements in one currency versus another or attempt to profit from temporary price discrepancies in currencies between competing dealers.

*FX brokers* match dealer orders to buy and sell currencies for a fee, but do not take a position themselves. Interbank traders use a broker primarily to disseminate as quickly as possible a currency quote to many other dealers.

*Central banks* sometimes intervene in the foreign exchange market in an attempt to influence the price of its currency against that of a major trading partner, or a country that it “fixes” or “pegs” its currency against. Intervention is the process of using foreign currency reserves to buy one’s own currency in order to decrease its supply and thus increase its value in the foreign exchange market, or alternatively, selling one’s own currency for foreign currency in order to increase its supply and lower its price.

4. How are foreign exchange transactions between international banks settled?

Answer: The interbank market is a network of *correspondent banking relationships*, with large commercial banks maintaining demand deposit accounts with one another, called correspondent bank accounts. The correspondent bank account network allows for the efficient functioning of the foreign exchange market. As an example of how the network of correspondent bank accounts facilities international foreign exchange transactions, consider a U.S. importer desiring to purchase merchandise invoiced in guilders from a Dutch exporter. The U.S. importer will contact his bank and inquire about the exchange rate. If the U.S. importer accepts the offered exchange rate, the bank will debit the U.S. importer’s account for the purchase of the Dutch guilders. The bank will instruct its correspondent bank in the Netherlands to debit its correspondent bank account the appropriate amount of guilders and to credit the Dutch exporter’s bank account. The importer’s bank will then debit its books to offset the debit of U.S. importer’s account, reflecting the decrease in its correspondent bank account balance.

5. What is meant by a currency trading at a discount or at a premium in the forward market?

Answer: The forward market involves contracting today for the future purchase or sale of foreign exchange. The forward price may be the same as the spot price, but usually it is higher (at a premium) or lower (at a discount) than the spot price.

6. Why does most interbank currency trading worldwide involve the U.S. dollar?

Answer: Trading in currencies worldwide is against a common currency that has international appeal. That currency has been the U.S. dollar since the end of World War II. However, the euro and Japanese yen have started to be used much more as international currencies in recent years. More importantly, trading would be exceedingly cumbersome and difficult to manage if each trader made a market against all other currencies.

7. Banks find it necessary to accommodate their clients’ needs to buy or sell FX forward, in many instances for hedging purposes. How can the bank eliminate the currency exposure it has created for itself by accommodating a client’s forward transaction?

Answer: Swap transactions provide a means for the bank to mitigate the currency exposure in a forward trade. A **swap transaction** is the simultaneous sale (or purchase) of spot foreign exchange against a forward purchase (or sale) of an approximately equal amount of the foreign currency. To illustrate, suppose a bank customer wants to buy dollars three months forward against British pound sterling. The bank can handle this trade for its customer and simultaneously neutralize the exchange rate risk in the trade by selling (borrowed) British pound sterling spot against dollars. The bank will lend the dollars for three months until they are needed to deliver against the dollars it has sold forward. The British pounds received will be used to liquidate the sterling loan.

8. A CAD/$ bank trader is currently quoting a *small figure* bid-ask of 35-40, when the rest of the market is trading at CAD1.3436-CAD1.3441. What is implied about the trader’s beliefs by his prices?

Answer: The trader must think the Canadian dollar is going to appreciate against the U.S. dollar and therefore he is trying to increase his inventory of Canadian dollars by discouraging purchases of U.S. dollars by standing willing to buy $ at only CAD1.3435/$1.00 and offering to sell from inventory at the slightly lower than market price of CAD1.3440/$1.00.

9. What is triangular arbitrage? What is a condition that will give rise to a triangular arbitrage opportunity?

Answer: *Triangular arbitrage* is the process of trading out of the U.S. dollar into a second currency, then trading it for a third currency, which is in turn traded for U.S. dollars. The purpose is to earn an arbitrage

profit via trading from the second to the third currency when the direct exchange between the two is not in alignment with the cross exchange rate.

Most, but not all, currency transactions go through the dollar. Certain banks specialize in making a direct market between non-dollar currencies, pricing at a narrower bid-ask spread than the cross-rate spread. Nevertheless, the implied cross-rate bid-ask quotations impose a discipline on the non-dollar market makers. If their direct quotes are not consistent with the cross exchange rates, a triangular arbitrage profit is possible.

10. Over the past five years, the exchange rate between British pound and U.S. dollar, $/£, has changed from about 1.69 to about 1.31. Would you agree that over this five-year period that British goods have become cheaper for buyers in the United States?

CFA Guideline Answer:

The value of the British pound in U.S. dollars has gone down from about 1.69 to about 1.31. Therefore, the dollar has appreciated relative to the British pound, and the dollars needed by Americans to purchase British goods have decreased. Thus, the statement is correct.

PROBLEMS

1. Using the American term quotes from Exhibit 5.7, calculate a cross-rate matrix for the euro, Swiss franc, Japanese yen, and the British pound so that the resulting triangular matrix is similar to the portion above the diagonal in Exhibit 5.8.

Solution: Because we are using the American term quotes, the cross-rate formula we want to use is:

*S(j/k)* = *S($/k)/S($/j)*.

The triangular matrix will contain 4 x (4-1)/2 = 6 cross-rates among these currencies in addition to their USD exchange rates in European terms copied from Exhibit 5.7 in the first column.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | $ | SF | ¥ | £ |
| Euro | 0.8903 | 0.8918 | 0.00799 | 1.1714 |
| Switzerland | 0.9982 |  | 0.00895 | 1.3134 |
| Japan | 111.49 |  |  | 146.69 |
| U.K | 0.7600 |  |  |  |

2. Using the American term quotes from Exhibit 5.7, calculate the one-, three-, and six-month forward cross-exchange rates between the Australian dollar and the Swiss franc. State the forward cross-rates in “Australian” terms.

Solution: The formulas we want to use are:

*FN(AUD/SFr)* = *FN($/SFr)/FN($/AUD)*

or

*FN(AUD/SFr)* = *FN(AUD/$)/FN(SFr/$)*.

We will use the top formula that uses American term forward exchange rates.

*F1(AUD/SFr)*  = 1.0047/.7117 = 1.4117

*F3(AUD/SFr)* = 1.0104/.7125 = 1.4181

*F6(AUD/SFr)* = 1.0193/.7139 = 1.4278

3. A foreign exchange trader with a U.S. bank took a short position of £5,000,000 when the $/£ exchange rate was 1.55. Subsequently, the exchange rate has changed to 1.61. Is this movement in the exchange rate good from the point of view of the position taken by the trader? By how much has the bank’s liability changed because of the change in the exchange rate?

CFA Guideline Answer:

The increase in the $/£ exchange rate implies that the pound has appreciated with respect to the dollar. This is unfavorable to the trader since the trader has a short position in pounds.

Bank’s liability in dollars initially was 5,000,000 x 1.55 = $7,750,000

Bank’s liability in dollars now is 5,000,000 x 1.61 = $8,050,000

4. Restate the following one-, three-, and six-month outright forward European term bid-ask quotes in forward points.

Spot 1.3431-1.3436

One-Month 1.3432-1.3442

Three-Month 1.3448-1.3463

Six-Month 1.3488-1.3508

Solution:

One-Month 01-06

Three-Month 17-27

Six-Month 57-72

5. Using the spot and outright forward quotes in problem 4, determine the corresponding bid-ask spreads in points.

Solution:

Spot 5

One-Month 10

Three-Month 15

Six-Month 20

6. Using Exhibit 5.7, calculate the one-, three-, and six-month forward premium or discount for the Japanese yen versus the U.S. dollar using American term quotations. For simplicity, assume each month has 30 days. What is the interpretation of your results?

Solution: The formula we want to use is:

*fN,JPY = [(FN($/*¥*) - S($/*¥*)/S($/*¥*)] x 360/N*

*f1,JPY* = [(.00899 - .00897)/.00897] x 360/30 = .02676

*f3,JPY* = [(.00903 - .00897)/.00897] x 360/90 = .02676

*f6,JPY* = [(.00910 - .00897)/.00897] x 360/180 = .02899

The pattern of forward premiums indicates that the Japanese yen is trading at a premium versus the U.S. dollar. That is, it becomes more expensive to buy a Japanese yen forward for U.S. dollars (in absolute and percentage terms) the further into the future one contracts.

7. Using Exhibit 5.7, calculate the one-, three-, and six-month forward premium or discount for the U.S. dollar versus the British pound using European term quotations. For simplicity, assume each month has 30 days. What is the interpretation of your results?

Solution: The formula we want to use is:

*fN,$ = [(FN (£/$) - S(£/$))/S(£/$)] x 360/N*

*f1,$* = [(.7588 - .7600)/.7600] x 360/30 = -.01895

*f3,$* = [(.7565 - .7600)/.7600] x 360/90 = -.01842

*f6,$* = [(.7532 - .7600)/.7600] x 360/180 = -.01789

The pattern of forward premiums indicates that the dollar is trading at a discount versus the British pound. That is, it becomes less expensive to buy a dollar forward for British pounds (in absolute and percentage terms). However, the forward discount decreases slightly as one contracts further into the future.

8. A bank is quoting the following exchange rates against the dollar for the Swiss franc and the Australian dollar:

SFr/$ = 1.5960--70

A$/$ = 1.7225--35

An Australian firm asks the bank for an A$/SFr quote. What cross-rate would the bank quote?

CFA Guideline Answer:

The SFr/A$ quotation is obtained as follows. In obtaining this quotation, we keep in mind that SFr/A$ = SFr/$/A$/$, and that the price (bid or ask) for each transaction is the one that is more advantageous to the bank.

The SFr/A$ bid price is the number of SFr the bank is willing to pay to buy one A$. This transaction (buy A$—sell SFr) is equivalent to selling SFr to buy dollars (at the bid rate of 1.5960 and the selling those dollars to buy A$ (at an ask rate of 1.7235). Mathematically, the transaction is as follows:

bid SFr/A$ = (bid SFr/$)/(ask A$/$) = 1.5960/1.7235 = 0.9260

The SFr/A$ ask price is the number of SFr the bank is asking for one A$. This transaction (sell A$—buy SFr) is equivalent to buying SFr with dollars (at the ask rate of 1.5970 and then simultaneously purchasing these dollars against A$ (at a bid rate of 1.7225). This may be expressed as follows:

ask SFr/A$ = (ask SFr/$)/(bid A$/$) = 1.5970/1.7225 = 0.9271

The resulting quotation by the bank is

SFr/A$ = 0.9260—0.9271

9. Given the following information, what are the NZD/SGD currency against currency bid-ask quotations?

*American Terms European Terms*

*Bank Quotations*  Bid Ask Bid Ask

New Zealand dollar .7265 .7272 1.3751 1.3765

Singapore dollar .6135 .6140 1.6287 1.6300

Solution: Equation 5.12 from the text implies *Sb(NZD/SGD)* = *Sb($/SGD)* x *Sb(NZD/$)* = .6135 x 1.3751 = .8436. The reciprocal, *1/Sb(NZD/SGD)* = *Sa(SGD/NZD)* = 1.1854. Analogously, it is implied that *Sa(NZD/SGD)* = *Sa($/SGD)* x *Sa(NZD/$)* = .6140 x 1.3765 = .8452. The reciprocal, *1/Sa(NZD/SGD)* = *Sb(SGD/NZD)* = 1.1832. Thus, the NZD/SGD bid-ask spread is NZD0.8436-NZD0.8452 and the SGD/NZD spread is SGD1.1832-SGD1.1854.

10. Doug Bernard specializes in cross-rate arbitrage. He notices the following quotes:

Swiss franc/dollar = SFr1.5971?$

Australian dollar/U.S. dollar = A$1.8215/$

Australian dollar/Swiss franc = A$1.1440/SFr

Ignoring transaction costs, does Doug Bernard have an arbitrage opportunity based on these quotes? If there is an arbitrage opportunity, what steps would he take to make an arbitrage profit, and how would he profit if he has $1,000,000 available for this purpose.

CFA Guideline Answer:

A. The implicit cross-rate between Australian dollars and Swiss franc is A$/SFr = A$/$ x $/SFr = (A$/$)/(SFr/$) = 1.8215/1.5971 = 1.1405. However, the quoted cross-rate is higher at A$1.1.1440/SFr. So, triangular arbitrage is possible.

B. In the quoted cross-rate of A$1.1440/SFr, one Swiss franc is worth A$1.1440, whereas the cross-rate based on the direct rates implies that one Swiss franc is worth A$1.1405. Thus, the Swiss franc is overvalued relative to the A$ in the quoted cross-rate, and Doug Bernard’s strategy for triangular arbitrage should be based on selling Swiss francs to buy A$ as per the quoted cross-rate. Accordingly, the steps Doug Bernard would take for an arbitrage profit is as follows:

1. Sell dollars to get Swiss francs: Sell $1,000,000 to get $1,000,000 x SFr1.5971/$ = SFr1,597,100.
2. Sell Swiss francs to buy Australian dollars: Sell SFr1,597,100 to buy SFr1,597,100 x A$1.1440/SFr = A$1,827,082.40.
3. Sell Australian dollars for dollars: Sell A$1,827,082.40 for A$1,827,082.40/A$1.8215/$ = $1,003,064.73.

Thus, your arbitrage profit is $1,003,064.73 - $1,000,000 = $3,064.73.

11. Assume you are a trader with Deutsche Bank. From the quote screen on your computer terminal, you notice that Dresdner Bank is quoting €0.7627/$1.00 and Credit Suisse is offering SFr1.1806/$1.00. You learn that UBS is making a direct market between the Swiss franc and the euro, with a current €/SFr quote of .6395. Show how you can make a triangular arbitrage profit by trading at these prices. (Ignore bid-ask spreads for this problem.) Assume you have $5,000,000 with which to conduct the arbitrage. What happens if you initially sell dollars for Swiss francs? What €/SFr price will eliminate triangular arbitrage?

Solution: To make a triangular arbitrage profit the Deutsche Bank trader would sell $5,000,000 to Dresdner Bank at €0.7627/$1.00. This trade would yield €3,813,500= $5,000,000 x .7627. The Deutsche Bank trader would then sell the euros for Swiss francs to Union Bank of Switzerland at a price of €0.6395/SFr1.00, yielding SFr5,963,253 = €3,813,500/.6395. The Deutsche Bank trader will resell the Swiss francs to Credit Suisse for $5,051,036 = SFr5,963,253/1.1806, yielding a triangular arbitrage profit of $51,036.

If the Deutsche Bank trader initially sold $5,000,000 for Swiss francs, instead of euros, the trade would yield SFr5,903,000 = $5,000,000 x 1.1806. The Swiss francs would in turn be traded for euros to UBS for €3,774,969= SFr5,903,000 x .6395. The euros would be resold to Dresdner Bank for $4,949,481 = €3,774,969/.7627, or a loss of $50,519. Thus, it is necessary to conduct the triangular arbitrage in the correct order.

The *S(*€*/SFr)* cross exchange rate should be .7627/1.1806 = .6460. This is an equilibrium rate at which a triangular arbitrage profit will not exist. (The student can determine this for himself.) A profit results from the triangular arbitrage when dollars are first sold for euros because Swiss francs are purchased for euros at too low a rate in comparison to the equilibrium cross-rate, i.e., Swiss francs are purchased for only €0.6395/SFr1.00 instead of the no-arbitrage rate of €0.6460/SFr1.00. Similarly, when dollars are first sold for Swiss francs, an arbitrage loss results because Swiss francs are sold for euros at too low a rate, resulting in too few euros. That is, each Swiss franc is sold for €0.6395/SFr1.00 instead of the higher no-arbitrage rate of €0.6460/SFr1.00.

12. The current spot exchange rate is $1.95/£ and the three-month forward rate is $1.90/£. Based on your analysis of the exchange rate, you are pretty confident that the spot exchange rate will be $1.92/£ in three months. Assume that you would like to buy or sell £1,000,000.

a. What actions do you need to take to speculate in the forward market? What is the expected dollar profit from speculation?

b. What would be your speculative profit in dollar terms if the spot exchange rate actually turns out to be $1.86/£.

Solution:

a. If you believe the spot exchange rate will be $1.92/£ in three months, you should buy £1,000,000 forward for $1.90/£. Your expected profit will be:

$20,000 = £1,000,000 x ($1.92 -$1.90).

b. If the spot exchange rate actually turns out to be $1.86/£ in three months, your loss from the long position will be:

-$40,000 = £1,000,000 x ($1.86 -$1.90).

13. Omni Advisors, an international pension fund manager, plans to sell equities denominated in Swiss Francs (CHF) and purchase an equivalent amount of equities denominated in South African rands (ZAR).

Omni will realize net proceeds of 3 million CHF at the end of 30 days and wants to eliminate the risk that the ZAR will appreciate relative to the CHF during this 30-day period. The following exhibit shows current exchange rates between the ZAR, CHF, and the U.S. dollar (USD).

Currency Exchange Rates

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ZAR/USD | ZAR/USD | CHF/USD | CHF/USD |
| Maturity | Bid | Ask | Bid | Ask |
| Spot | 6.2681 | 6.2789 | 1.5282 | 1.5343 |
| 30-day | 6.2538 | 6.2641 | 1.5226 | 1.5285 |
| 90-day | 6.2104 | 6.2200 | 1.5058 | 1.5115 |

1. Describe the currency transaction that Omni should undertake to eliminate currency risk over the 30-day period.
2. Calculate the following:

• The CHF/ZAR cross-currency rate Omni would use in valuing the Swiss equity portfolio.

• The current value of Omni’s Swiss equity portfolio in ZAR.

• The annualized forward premium or discount at which the ZAR is trading versus the CHF.

CFA Guideline Answer:

1. To eliminate the currency risk arising from the possibility that ZAR will appreciate against the CHF over the next 30-day period, Omni should sell 30-day forward CHF against 30-day forward ZAR delivery (sell 30-day forward CHF against USD and buy 30-day forward ZAR against USD).
2. The calculations are as follows:

• Using the currency cross rates of two forward foreign currencies and three currencies (CHF, ZAR, USD), the exchange would be as follows:

--30 day forward CHF are sold for USD. Dollars are bought at the forward selling price of CHF1.5285 = $1 (done at ask side because going from currency into

dollars)

--30 day forward ZAR are purchased for USD. Dollars are simultaneously sold to purchase ZAR at the rate of 6.2538 = $1 (done at the bid side because going from dollars into currency)

--For every 1.5285 CHF held, 6.2538 ZAR are received; thus the cross currency rate is 1.5285 CHF/6.2538 ZAR = 0.244411398.

• At the time of execution of the forward contracts, the value of the 3 million CHF equity portfolio would be 3,000,000 CHF/0.244411398 = 12,274,386.65 ZAR.

• To calculate the annualized premium or discount of the ZAR against the CHF requires comparison of the spot selling exchange rate to the forward selling price of CHF for ZAR.

Spot rate = 1.5343 CHF/6.2681 ZAR = 0.244779120

30 day forward ask rate 1.5285 CHF/6.2538 ZAR = 0.244411398

The premium/discount formula is:

[(forward rate – spot rate) / spot rate] x (360 / # day contract) =

[(0.244411398 – 0.24477912) / 0.24477912] x (360 / 30) =

-1.8027126 % = -1.80% discount ZAR to CHF

MINI CASE: SHREWSBURY HERBAL PRODUCTS, LTD.

Shrewsbury Herbal Products, located in central England close to the Welsh border, is an old-line producer of herbal teas, seasonings, and medicines. Its products are marketed all over the United Kingdom and in many parts of continental Europe as well.

Shrewsbury Herbal generally invoices in British pound sterling when it sells to foreign customers in order to guard against adverse exchange rate changes. Nevertheless, it has just received an order from a large wholesaler in central France for £320,000 of its products, conditional upon delivery being made in three months’ time and the order invoiced in euros.

Shrewsbury’s controller, Elton Peters, is concerned with whether the pound will appreciate versus the euro over the next three months, thus eliminating all or most of the profit when the euro receivable is paid. He thinks this is an unlikely possibility, but he decides to contact the firm’s banker for suggestions about hedging the exchange rate exposure.

Mr. Peters learns from the banker that the current spot exchange rate is €/£ is €1.4537, thus the invoice amount should be €465,184. Mr. Peters also learns that the three-month forward rates for the pound and the euro versus the U.S. dollar are $1.8990/£1.00 and $1.3154/€1.00, respectively. The banker offers to set up a forward hedge for selling the euro receivable for pound sterling based on the €/£ forward cross-exchange rate implicit in the forward rates against the dollar.

What would you do if you were Mr. Peters?

Suggested Solution to Shrewsbury Herbal Products, Ltd.

(Note to Instructor: This elementary case provides an intuitive look at hedging exchange rate exposure. Students should not have difficulty with it even though hedging will not be formally discussed until Chapter 8. The case is consistent with the discussion that accompanies Exhibit 5.9 of the text. Professor of Finance, Banikanta Mishra, of Xavier Institute of Management – Bhubaneswar, India contributed to this solution.)

Suppose Shrewsbury sells at a twenty percent markup. Thus the cost to the firm of the £320,000 order is £256,000. Thus, the pound could appreciate to €465,184/£256,000 = €1.8171/1.00 before all profit was eliminated. This seems rather unlikely. Nevertheless, a ten percent appreciation of the pound (€1.4537 x 1.10) to €1.5991/£1.00 would only yield a profit of £34,904 (= €465,184/1.5991 - £256,000). Shrewsbury can hedge the exposure by selling the euros forward for British pounds at F3(€/£) = F3($/£) ÷ F3($/€) = 1.8990 ÷ 1.3154 = 1.4437. At this forward exchange rate, Shrewsbury can “lock-in” a price of £322,217 (= €465,184/1.4437) for the sale. The forward exchange rate indicates that the euro is trading at a premium to the British pound in the forward market. Thus, the forward hedge allows Shrewsbury to lock-in a greater amount (£2,217) than if the euro receivable was converted into pounds at the current spot

If the euro was trading at a forward discount, Shrewsbury would end up locking-in an amount less than £320,000. Whether that would lead to a loss for the company would depend upon the extent of the discount and the amount of profit built into the price of £320,000. Only if the forward exchange rate is even with the spot rate will Shrewsbury receive exactly £320,000.

Obviously, Shrewsbury could ensure that it receives exactly £320,000 at the end of three-month accounts receivable period if it could invoice in £. That, however, is not acceptable to the French wholesaler. When invoicing in euros, Shrewsbury could establish the euro invoice amount by use of the forward exchange rate instead of the current spot rate. The invoice amount in that case would be €461,984 = £320,000 x 1.4437. Shrewsbury can now lock-in a receipt of £320,000 if it simultaneously hedges its euro exposure by selling €461,984 at the forward rate of 1.4437. That is, £320,000 = €461,984/1.4437.

**CHAPTER 6 INTERNATIONAL PARITY RELATIONSHIPS AND FORECASTING FOREIGN EXCHANGE RATES**

**ANSWERS & SOLUTIONS TO END-OF-CHAPTER QUESTIONS AND PROBLEMS**

QUESTIONS

1. Give a full definition of *arbitrage.*

Answer:Arbitrage can be defined as the act of simultaneously buying and selling the same or equivalent assets or commodities for the purpose of making certain, guaranteed profits.

2. Discuss the implications of the interest rate parity for the exchange rate determination.

Answer: Assuming that the forward exchange rate is roughly an unbiased predictor of the future spot rate, IRP can be written as:

S = [(1 + i£)/(1 + i$)]E[St+1|It].

The exchange rate is thus determined by the relative interest rates, and the expected future spot rate, conditional on all the available information, It, as of the present time. One thus can say that expectation is self-fulfilling. Since the information set will be continuously updated as news hit the market, the exchange rate will exhibit a highly dynamic, random behavior.

3. Explain the conditions under which the forward exchange rate will be an unbiased predictor of the future spot exchange rate.

Answer: The forward exchange rate will be an unbiased predictor of the future spot rate if (i) the forward risk premium is insignificant and (ii) foreign exchange markets are informationally efficient.

4. Explain the purchasing power parity, both the absolute and relative versions. What causes the deviations from the purchasing power parity?

Answer: The absolute version of purchasing power parity (PPP):

S = P$/P£.

The relative version is:

e = π$ - π£.

PPP can be violated if there are barriers to international trade or if people in different countries have different consumption taste. PPP is the law of one price applied to a standard consumption basket.

5. Discuss the implications of the deviations from the purchasing power parity for countries’ competitive positions in the world market.

Answer: If exchange rate changes satisfy PPP, competitive positions of countries will remain unaffected following exchange rate changes. Otherwise, exchange rate changes will affect relative competitiveness of countries. If a country’s currency appreciates (depreciates) by more than is warranted by PPP, that will hurt (strengthen) the country’s competitive position in the world market.

6. Explain and derive the international Fisher effect.

Answer: The international Fisher effect can be obtained by combining the Fisher effect and the relative version of PPP in its expectational form. Specifically, the Fisher effect holds that

E(π$) = i$ - ρ$,

E(π£) = i£ - ρ£.

Assuming that the real interest rate is the same between the two countries, i.e., ρ$ = ρ£, and substituting the above results into the PPP, i.e., E(e) = E(π$)- E(π£), we obtain the international Fisher effect: E(e) = i$ - i£.

7. Researchers found that it is very difficult to forecast the future exchange rates more accurately than the forward exchange rate or the current spot exchange rate. How would you interpret this finding?

Answer: This implies that exchange markets are informationally efficient. Thus, unless one has private information that is not yet reflected in the current market rates, it would be difficult to beat the market.

8. Explain the random walk model for exchange rate forecasting. Can it be consistent with the technical analysis?

Answer: The random walk model predicts that the current exchange rate will be the best predictor of the future exchange rate. An implication of the model is that past history of the exchange rate is of no value in predicting future exchange rate. The model thus is inconsistent with the technical analysis which tries to utilize past history in predicting the future exchange rate.

\*9. Derive and explain the monetary approach to exchange rate determination.

Answer: The monetary approach is associated with the Chicago School of Economics. It is based on two tenets: purchasing power parity and the quantity theory of money. Combing these two theories allows for stating, say, the *$/£* spot exchange rate as:

*S($/£) = (M$/M£)(V$/V£)(y£/y$)*,

where *M* denotes the money supply, *V* the velocity of money, and *y* the national aggregate output. The theory holds that what matters in exchange rate determination are:

1. The relative money supply,

2. The relative velocities of monies, and

3. The relative national outputs.

10. Explain the following three concepts of purchasing power parity (PPP):

a. The law of one price.

1. b. Absolute PPP.

c. Relative PPP.

Answer:

a. The law of one price (LOP) refers to the international arbitrage condition for the standard consumption basket. LOP requires that the consumption basket should be selling for the same price in a given currency across countries.

b. Absolute PPP holds that the price level in a country is equal to the price level in another country times the exchange rate between the two countries.

c. Relative PPP holds that the rate of exchange rate change between a pair of countries is about equal to the difference in inflation rates of the two countries.

11. Evaluate the usefulness of relative PPP in predicting movements in foreign exchange rates on:

* 1. Short-term basis (for example, three months)
  2. Long-term basis (for example, six years)

Answer.

a. PPP is not useful for predicting exchange rates on the short-term basis mainly because

international commodity arbitrage is a time-consuming and costly process.

b. PPP is more useful for predicting exchange rates on the long-term basis.

PROBLEMS

1. Suppose that the treasurer of IBM has an extra cash reserve of $100,000,000 to invest for six months. The six-month interest rate is 8 percent per annum in the United States and 7 percent per annum in Germany. Currently, the spot exchange rate is €1.01 per dollar and the six-month forward exchange rate is €0.99 per dollar. The treasurer of IBM does not wish to bear any exchange risk. Where should he/she invest to maximize the return?

Solution: The market conditions are summarized as follows:

i$ = 4%; i€ = 3.5%; S = €1.01/$; F = €0.99/$.

If $100,000,000 is invested in the U.S., the maturity value in six months will be

$104,000,000 = $100,000,000 (1 + .04).

Alternatively, $100,000,000 can be converted into euros and invested at the German interest rate, with the euro maturity value sold forward. In this case the dollar maturity value will be

$105,590,909 = ($100,000,000 x 1.01)(1 + .035)(1/0.99)

Clearly, it is better to invest $100,000,000 in Germany with exchange risk hedging.

2. While you were visiting London, you purchased a Jaguar for £35,000, payable in three months. You have enough cash at your bank in New York City, which pays 0.35% interest per month, compounding monthly, to pay for the car. Currently, the spot exchange rate is $1.45/£ and the three-month forward exchange rate is $1.40/£. In London, the money market interest rate is 2.0% for a three-month investment. There are two alternative ways of paying for your Jaguar.

(a) Keep the funds at your bank in the U.S. and buy £35,000 forward.

(b) Buy a certain pound amount spot today and invest the amount in the U.K. for three months so that the maturity value becomes equal to £35,000.

Evaluate each payment method. Which method would you prefer? Why?

Solution: The problem situation is summarized as follows:

A/P = £35,000 payable in three months

iNY = 0.35%/month, compounding monthly

iLD = 2.0% for three months

S = $1.45/£; F = $1.40/£.

Option a:

When you buy £35,000 forward, you will need $49,000 in three months to fulfill the forward contract. The present value of $49,000 is computed as follows:

$49,000/(1.0035)3 = $48,489.

Thus, the cost of Jaguar as of today is $48,489.

Option b:

The present value of £35,000 is £34,314 = £35,000/(1.02). To buy £34,314 today, it will cost $49,755 = 34,314x1.45. Thus the cost of Jaguar as of today is $49,755.

You should definitely choose to use “option a”, and save $1,266, which is the difference between $49,755 and $48489.

3. Currently, the spot exchange rate is $1.50/£ and the three-month forward exchange rate is $1.52/£. The three-month interest rate is 8.0% per annum in the U.S. and 5.8% per annum in the U.K. Assume that you can borrow as much as $1,500,000 or £1,000,000.

a. Determine whether the interest rate parity is currently holding.

b. If the IRP is not holding, how would you carry out covered interest arbitrage? Show all the steps and determine the arbitrage profit.

c. Explain how the IRP will be restored as a result of covered arbitrage activities.

Solution: Let’s summarize the given data first:

S = $1.5/£; F = $1.52/£; i$ = 2.0%; i£ = 1.45%

Credit = $1,500,000 or £1,000,000.

a. (1+i$) = 1.02

(1+i£)(F/S) = (1.0145)(1.52/1.50) = 1.0280

Thus, IRP is not holding exactly.

b. (1) Borrow $1,500,000; repayment will be $1,530,000.

(2) Buy £1,000,000 spot using $1,500,000.

(3) Invest £1,000,000 at the pound interest rate of 1.45%;

maturity value will be £1,014,500.

(4) Sell £1,014,500 forward for $1,542,040

Arbitrage profit will be $12,040 (=$1,542,040 - $1,530,000).

c. Following the arbitrage transactions described above,

The dollar interest rate will rise;

The pound interest rate will fall;

The spot exchange rate will rise;

The forward exchange rate will fall.

These adjustments will continue until IRP is restored.

4. Currently, the spot exchange rate is $0.85/A$ and the one-year forward exchange rate

is $0.81/A$. One-year interest is 3.5% in the United States and 4.2% in Australia.

You may borrow up to $1,000,000 or A$1,176,471, which is equivalent to $1,000,000

at the current spot rate.

1. Determine if IRP is holding between Australia and the United States.
2. If IRP is not holding, explain in detail how you would realize certain profit in U.S. dollar terms.
3. Explain how IRP will be restored as a result of arbitrage transactions you carry out above.

Solution:

1. (1+i$) = 1.035

(1+iA$)(F/S) = (1.042)(0.81/0.85) = 0.9930

Thus, IRP is not holding exactly.

1. (1) Borrow A$1,176,471 and repay A$1,225,883 in one year.

(2) Sell spot A$1,176,471 for $1,000,000.

(3) Invest $1,000,000 in the US. The maturity value will be $1,035,000.

(4) Buy A$1,225,883 forward for $992,965.

Arbitrage profit = $1,035,000 - $992,965 = $42,035.

5. Suppose that the current spot exchange rate is €0.80/$ and the three-month forward exchange rate is €0.7813/$. The three-month interest rate is 5.60 percent per annum in the United States and 5.40 percent per annum in France. Assume that you can borrow up to $1,000,000 or €800,000.

a. Show how to realize a certain profit via covered interest arbitrage, assuming that you want to realize profit in terms of U.S. dollars. Also determine the size of your arbitrage profit.

b. Assume that you want to realize profit in terms of euros. Show the covered arbitrage process and determine the arbitrage profit in euros.

Solution:

1. (1+ i$) = 1.014 < (F/S) (1+ i €) = 1.0378. Thus, one has to borrow dollars and invest in euros to make arbitrage profit.
2. Borrow $1,000,000 and repay $1,014,000 in three months.
3. Sell $1,000,000 spot for €800,000.
4. Invest €800,000 at the euro interest rate of 1.35 % for three months and receive €810,800 at maturity.
5. Sell €810,800 forward for $1,037,758.

Arbitrage profit = $1,037,758 - $1,014,000 = $23,758.

1. Follow the first three steps above. But the last step, involving exchange risk hedging, will be different. Specifically, for the euro-based investor, the source of currency risk is the dollar payable, $1,014,000. Thus, he/she needs to buy $1,014,000 forward for €792,238.

Arbitrage profit = €810,800 - €792,238 = €18,562.

6. In the October 23, 1999 issue, the *Economist* reports that the interest rate per annum is 5.93% in the United States and 70.0% in Turkey. Why do you think the interest rate is so high in Turkey? Based on the reported interest rates, how would you predict the change of the exchange rate between the U.S. dollar and the Turkish lira?

Solution: A high Turkish interest rate must reflect a high expected inflation in Turkey. According to international Fisher effect (IFE), we have

E(e) = i$ - iLira

= 5.93% - 70.0% = -64.07%

The Turkish lira thus is expected to depreciate against the U.S. dollar by about 64%.

7. As of November 1, 1999, the exchange rate between the Brazilian real and U.S. dollar is R$1.95/$. The consensus forecast for the U.S. and Brazil inflation rates for the next 1-year period is 2.6% and 20.0%, respectively. What would you forecast the exchange rate to be at around November 1, 2000?

Solution: Since the inflation rate is quite high in Brazil, we may use the purchasing power parity to forecast the exchange rate.

E(e) = E(π$) - E(πR$)

= 2.6% - 20.0%

= -17.4%

R$ is expected to depreciate by about 17.4% against the US dollar. Thus, the expected exchange rate would be

E(ST) = So(1 + E(e))

= (R$1.95/$) (1 + 0.174)

= R$2.29/$

8. (CFA question) Omni Advisors, an international pension fund manager, uses the concepts of purchasing power parity (PPP) and the International Fisher Effect (IFE) to forecast spot exchange rates. Omni gathers the financial information as follows:

Base price level 100

Current U.S. price level 105

Current South African price level 111

Base rand spot exchange rate $0.175

Current rand spot exchange rate $0.158

Expected annual U.S. inflation 7%

Expected annual South African inflation 5%

Expected U.S. one-year interest rate 10%

Expected South African one-year interest rate 8%

Calculate the following exchange rates (ZAR and USD refer to the South African rand and U.S. dollar, respectively).

a. The current ZAR spot rate in USD that would have been forecast by PPP.

b. Using the IFE, the expected ZAR spot rate in USD one year from now.

c. Using PPP, the expected ZAR spot rate in USD four years from now.

Solution:

a. ZAR spot rate under PPP = [1.05/1.11](0.175) = $0.1655/rand.

b. Expected ZAR spot rate = [1.10/1.08] (0.158) = $0.1609/rand.

c. Expected ZAR under PPP = [(1.07)4/(1.05)4] (0.158) = $0.1704/rand.

9. Suppose that the current spot exchange rate is €1.50/₤ and the one-year forward exchange rate is €1.60/₤. The one-year interest rate is 5.4% in euros and 5.2% in pounds. You can borrow at most €1,000,000 or the equivalent pound amount, i.e., ₤666,667, at the current spot exchange rate.

1. Show how you can realize a guaranteed profit from covered interest arbitrage. Assume that you are a euro-based investor. Also determine the size of the arbitrage profit.
2. Discuss how the interest rate parity may be restored as a result of the above

transactions.

1. Suppose you are a pound-based investor. Show the covered arbitrage process and

determine the pound profit amount.

Solution:

a. First, note that (1+i €) = 1.054 is less than (F/S)(1+i €) = (1.60/1.50)(1.052) = 1.1221.

You should thus borrow in euros and lend in pounds.

1. Borrow €1,000,000 and promise to repay €1,054,000 in one year.
2. Buy ₤666,667 spot for €1,000,000.
3. Invest ₤666,667 at the pound interest rate of 5.2%; the maturity value will be ₤701,334.
4. To hedge exchange risk, sell the maturity value ₤701,334 forward in exchange for €1,122,134. The arbitrage profit will be the difference between €1,122,134 and €1,054,000, i.e., €68,134.

b. As a result of the above arbitrage transactions, the euro interest rate will rise, the pound

interest rate will fall. In addition, the spot exchange rate (euros per pound) will rise and the forward rate will fall. These adjustments will continue until the interest rate parity is restored.

c. The pound-based investor will carry out the same transactions 1), 2), and 3) in a. But to hedge, he/she will buy €1,054,000 forward in exchange for ₤658,750. The arbitrage profit will then be ₤42,584 = ₤701,334 - ₤658,750.

10. Due to the integrated nature of their capital markets, investors in both the U.S. and U.K. require the same real interest rate, 2.5%, on their lending. There is a consensus in capital markets that the annual inflation rate is likely to be 3.5% in the U.S. and 1.5% in the U.K. for the next three years. The spot exchange rate is currently $1.50/£.

1. Compute the nominal interest rate per annum in both the U.S. and U.K., assuming that the Fisher effect holds.
2. What is your expected future spot dollar-pound exchange rate in three years from now?
3. Can you infer the forward dollar-pound exchange rate for one-year maturity?

Solution.

a. Nominal rate in US = (1+ρ) (1+E(π$)) – 1 = (1.025)(1.035) – 1 = 0.0609 or 6.09%.

Nominal rate in UK= (1+ρ) (1+E(π₤)) – 1 = (1.025)(1.015) – 1 = 0.0404 or 4.04%.

b. E(ST) = [(1.0609)3/(1.0404)3] (1.50) = $1.5904/₤.

c. F = [1.0609/1.0404](1.50) = $1.5296/₤.

11. After studying Iris Hamson’s credit analysis, George Davies is considering whether he can increase the holding period return on Yucatan Resort’s excess cash holdings (which are held in pesos) by investing those cash holdings in the Mexican bond market. Although Davies would be investing in a peso-denominated bond, the investment goal is to achieve the highest holding period return, measured in U.S. dollars, on the investment.

Davies finds the higher yield on the Mexican one-year bond, which is considered to be free of credit risk, to be attractive but he is concerned that depreciation of the peso will reduce the holding period return, measured in U.S. dollars. Hamson has prepared selected economic and financial data, given in Exhibit 3-1, to help Davies make the decision.

Selected Economic and Financial Data for U.S. and Mexico

Expected U.S. Inflation Rate 2.0% per year

Expected Mexican Inflation Rate 6.0% per year

U.S. One-year Treasury Bond Yield 2.5%

Mexican One-year Bond Yield 6.5%

Nominal Exchange Rates

Spot 9.5000 Pesos = U.S. $ 1.00

One-year Forward 9.8707 Pesos = U.S. $ 1.00

Hamson recommends buying the Mexican one-year bond and hedging the foreign currency exposure using the one-year forward exchange rate. She concludes: “This transaction will result in a U.S. dollar holding period return that is equal to the holding period return of the U.S. one-year bond.”

1. Calculate the U.S. dollar holding period return that would result from the transaction recommended by Hamson. Show your calculations. State whether Hamson’s conclusion about the U.S. dollar holding period return resulting from the transaction is correct or incorrect. After conducting his own analysis of the U.S. and Mexican economies, Davies expects that both the U.S. inflation rate and the real exchange rate will remain constant over the coming year. Because of favorable political developments in Mexico, however, he expects that the Mexican inflation rate (in annual terms) will fall from 6.0 percent to 3.0 percent before the end of the year. As a result, Davies decides to invest Yucatan Resorts’ cash holdings in the Mexican one-year bond but not to hedge the currency exposure.
2. Calculate the expected exchange rate (pesos per dollar) one year from now. Show your calculations. Note: Your calculations should assume that Davies is correct in his expectations about the real exchange rate and the Mexican and U.S. inflation rates.
3. Calculate the expected U.S. dollar holding period return on the Mexican one-year bond. Show your calculations. Note: Your calculations should assume that Davies is correct in his expectations about the real exchange rate and the Mexican and U.S. inflation rates.

Solution:

1. The U.S. dollar holding period return that would result from the transaction recommended by Hamson is 2.5%. The investor can buy “x” amount of pesos at the (indirect) spot exchange rate, invest these “x” pesos in the Mexican bond market and have “x × (1 + YMEX)” pesos in one year, and convert these pesos back into dollars using the (indirect) forward exchange rate. Interest rate parity asserts that the two holding period returns must be equal, which can be represented by the formula:

(1 + YUS) = Spot × (1 + YMEX) × (1 / Forward)

where “Spot” and “Forward” are in indirect terms. The left side of the equation represents the holding period return for a U.S. dollar-denominated bond. If interest rate parity holds, the “YUS” term also corresponds to the U.S. dollar holding period return for the currency-hedged Mexican one-year bond. The right side of the equation is the holding period return, in dollar terms, for a currency-hedged peso-denominated bond.

Solving for YUS:

(1 + YUS) = 9.5000 × (1 + 0.065) × (1 / 9.8707)

(1 + YUS) = 9.5000 × 1.065 × 0.1013

(1 + YUS) = 1.0249

YUS = 1.0249 – 1.0000 = 0.0249 = 2.5%

Thus YUS = 2.5%, which is the same yield as on the one-year U.S. bond. Hamson’s conclusion about the U.S. dollar holding period return is correct.

1. The expected exchange rate one year from now is 9.5931. The rate can be calculated by using the formula:

(1 + %Δ RUS) = (1 + %Δ SUS) × [(1 + %Δ PUS) / (1 + %Δ PMEX)]

= (S1 / S0) × [(1 + %Δ PUS) / (1 + %Δ PMEX)]

where RUS is the real U.S. dollar exchange rate, Si is the nominal spot exchange rate in period i, and %Δ P is the inflation rate. Note that the currency quotes are in indirect form. Solving for S1 (the expected exchange rate one year from now):

(1 + 0.0000) = (S1 / 9.5000) × [(1 + 0.02) / (1 + 0.03)]

1.0000 = (S1 / 9.5000) × 0.9903

1.0098 = S1 / 9.5000

S1 = 9.5931

1. The expected U.S. dollar holding period return on the Mexican one-year bond is 5.47%. The return can be calculated as shown below, using the formula in Part A and the current spot exchange rate and expected one-year spot exchange rate calculated in Part B.

Holding period return = [(1 + YMEX) × (1 + %Δ peso’s value)] – 1

= [(1 + YMEX) × (S0 / S1)] – 1

= [(1 + 0.065) × (9.5000 / 9.5931)] – 1

= (1.065 × 0.9903) – 1

= 5.47%

12. James Clark is a foreign exchange trader with Citibank. He notices the following quotes.

Spot exchange rate SFr1.2051/$

Six-month forward exchange rate SFr1.1922/$

Six-month $ interest rate 2.5% per year

Six-month SFr interest rate 2.0% per year

1. Is the interest rate parity holding? You may ignore transaction costs.
2. Is there an arbitrage opportunity? If yes, show what steps need to be taken to make arbitrage profit. Assuming that James Clark is authorized to work with $1,000,000, compute the arbitrage profit in dollars.

Solution:

1. For six months, iSFr = 1.0% and i$ = 1.25%. the spot exchange rate is $0.8298/SFr and the

forward rate is $0.8388/SFr. Thus,

(1+ i$ ) = 1.0125 and (F/s) (1 + iSFr) = (0.8388/0.8298) (1.01) = 1.02095

Because the left and right sides of IRP are not equal, IRP is not holding.

b. Because IRP is not holding, there is an arbitrage possibility: Because 1.0125 < 1.02095, we can say that the SFr interest rate quote is more than what it should be as per the quotes for the other three variables. Equivalently, we can also say that the $ interest rate quote is less than what it should be as per the quotes for the other three variables. Therefore, the arbitrage strategy should be based on borrowing in the $ market and lending in the SFr market. The steps would be as follows:

* Borrow $1,000,000 for six months at 1.25%. Need to pay back $1,000,000 × (1 + 0.0125) = $1,012,500 six months later.
* Convert $1,000,000 to SFr at the spot rate to get SFr 1,205,100.
* Lend SFr 1,205,100 for six months at 1.0%. Will get back SFr 1,205,100 × (1 + 0.01) = SFr 1,217,151 six months later.
* Sell SFr 1,217,151 six months forward. The transaction will be contracted as of the current date but delivery and settlement will only take place six months later. So, six months later, exchange SFr 1,217,151 for SFr 1,217,151/SFr 1.1922/$ = $1,020,929.

The arbitrage profit six months later is $1,020,929 – $1,012,500 = $8,429.

13. Suppose you conduct currency carry trade by borrowing $1 million at the start of each year and investing in New Zealand dollar for one year. One-year interest rates and the exchange rate between the U.S. dollar ($) and New Zealand dollar (NZ$) are provided below for the period 2000 – 2009. Note that interest rates are one-year interbank rates on January 1st each year, and that the exchange rate is the amount of New Zealand dollar per U.S. dollar on December 31 each year. The exchange rate was NZ$1.9088/$ on January 1, 2000. Fill out the columns (4) – (7) and compute the total dollar profits from this carry trade over the ten-year period. Also, assess the validity of uncovered interest rate parity based on your solution of this problem. You are encouraged to use Excel program to tackle this problem.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Year | *i*NZ$ | *i*$ | *S*NZ$/$ | *i*NZ$ - *i*$ | *e*NZ$/$ | (4)-(5) | $ Profit |
| 2000 | 6.53 | 6.50 | 2.2599 |  |  |  |  |
| 2001 | 6.70 | 6.00 | 2.4015 |  |  |  |  |
| 2002 | 4.91 | 2.44 | 1.9117 |  |  |  |  |
| 2003 | 5.94 | 1.45 | 1.5230 |  |  |  |  |
| 2004 | 5.88 | 1.46 | 1.3845 |  |  |  |  |
| 2005 | 6.67 | 3.10 | 1.4682 |  |  |  |  |
| 2006 | 7.28 | 4.84 | 1.4182 |  |  |  |  |
| 2007 | 8.03 | 5.33 | 1.2994 |  |  |  |  |
| 2008 | 9.10 | 4.22 | 1.7112 |  |  |  |  |
| 2009 | 5.10 | 2.00 | 1.3742 |  |  |  |  |

Data source: Datastream.

Solution:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Year | *i*NZ$ | *i*$ | *S*NZ$/$ | *i*NZ$ - *i*$ | *e*NZ$/$ | (4)-(5) | $ Profit |
| 2000 | 6.53 | 6.50 | 2.2599 | 0.03 | 18.40 | -18.37 | -183655 |
| 2001 | 6.70 | 6.00 | 2.4015 | 0.7 | 6.27 | -5.57 | -55680 |
| 2002 | 4.91 | 2.44 | 1.9117 | 2.47 | -20.40 | 22.87 | 228676 |
| 2003 | 5.94 | 1.45 | 1.5230 | 4.49 | -20.33 | 24.82 | 248220 |
| 2004 | 5.88 | 1.46 | 1.3845 | 4.42 | -9.10 | 13.52 | 135159 |
| 2005 | 6.67 | 3.10 | 1.4682 | 3.57 | 6.05 | -2.48 | -24790 |
| 2006 | 7.28 | 4.84 | 1.4182 | 2.44 | -3.40 | 5.84 | 58438 |
| 2007 | 8.03 | 5.33 | 1.2994 | 2.7 | -8.38 | 11.08 | 110810 |
| 2008 | 9.10 | 4.22 | 1.7112 | 4.88 | 31.69 | -26.81 | -268106 |
| 2009 | 5.10 | 2.00 | 1.3742 | 3.1 | -19.69 | 22.79 | 227922 |

Notes:

1. Interest rates are interbank 1-year rates on January 1st of each year and measured in percent terms.

2. Spot exchange rates, *S*NZ$/$, are measured on December 31st of each year and spot exchange rates was

NZ$1.9088 per US$ on January 1, 2000.

3. All data are from Datastream.

If uncovered interest rate parity holds, profit from carry trade should be insignificantly different from zero. But since the profit in column (7) substantially differs from zero each year, uncovered IRP does not appear to hold.

Mini Case: Turkish Lira and the Purchasing Power Parity

Veritas Emerging Market Fund specializes in investing in emerging stock markets of the world. Mr. Henry Mobaus, an experienced hand in international investment and your boss, is currently interested in Turkish stock markets. He thinks that Turkey will eventually be invited to negotiate its membership in the European Union. If this happens, it will boost the stock prices in Turkey. But, at the same time, he is quite concerned with the volatile exchange rates of the Turkish currency. He would like to understand what drives the Turkish exchange rates. Since the inflation rate is much higher in Turkey than in the U.S., he thinks that the purchasing power parity may be holding at least to some extent. As a research assistant for him, you were assigned to check this out. In other words, you have to study and prepare a report on the following question: Does the purchasing power parity hold for the Turkish lira-U.S. dollar exchange rate? Among other things, Mr. Mobaus would like you to do the following:

1. Plot past annual exchange rate changes against the differential inflation rates between

Turkey and the U.S. for the last 20 years.

2. Regress the annual rate of exchange rate changes on the annual inflation rate differential to estimate the intercept and the slope coefficient, and interpret the regression results.

Data source: You may download the annual inflation rates for Turkey and the U.S., as well as the exchange rate between the Turkish lira and US dollar from the following source: <http://data.un.org>. For the exchange rate, you are advised to use the variable code 186 AE ZF.

Solution:

Data obtained from <http://data.un.org>

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Inf\_TK (%)  (1) | Inf\_US (%)  (2) | ∆Inf  (1)-(2) | S(TL/$)  End-of-year rate | ∆St/St-1 (%)  := et |
| 1989 |  |  |  | 0.0023 |  |
| 1990 | 60.3127 | 5.3980 | 54.9147 | 0.0029 | 26.6406 |
| 1991 | 65.9694 | 4.2350 | 61.7344 | 0.0051 | 73.3720 |
| 1992 | 70.0728 | 3.0288 | 67.0440 | 0.0086 | 68.5938 |
| 1993 | 66.0971 | 2.9517 | 63.1454 | 0.0145 | 68.9838 |
| 1994 | 106.2630 | 2.6074 | 103.6556 | 0.0387 | 167.5833 |
| 1995 | 88.1077 | 2.8054 | 85.3023 | 0.0597 | 54.0309 |
| 1996 | 80.3469 | 2.9312 | 77.4157 | 0.1078 | 80.6790 |
| 1997 | 85.7332 | 2.3377 | 83.3955 | 0.2056 | 90.7724 |
| 1998 | 84.6413 | 1.5523 | 83.0890 | 0.3145 | 52.9457 |
| 1999 | 64.8675 | 2.1880 | 62.6795 | 0.5414 | 72.1660 |
| 2000 | 54.9154 | 3.3769 | 51.5385 | 0.6734 | 24.3785 |
| 2001 | 54.4002 | 2.8262 | 51.5740 | 1.4501 | 115.3493 |
| 2002 | 44.9641 | 1.5860 | 43.3781 | 1.6437 | 13.3485 |
| 2003 | 25.2964 | 2.2701 | 23.0263 | 1.3966 | -15.0307 |
| 2004 | 10.5842 | 2.6772 | 7.9070 | 1.3395 | -4.0912 |
| 2005 | 10.1384 | 3.3928 | 6.7457 | 1.3451 | 0.4143 |
| 2006 | 10.5110 | 3.2259 | 7.2851 | 1.4090 | 4.7545 |
| 2007 | 8.7562 | 2.8527 | 5.9035 | 1.1708 | -16.9056 |
| 2008 | 10.4441 | 3.8391 | 6.6050 | 1.5255 | 30.2913 |
| 2009 | 6.2510 | -0.3555 | 6.6065 | 1.4909 | -2.2649 |

Solution:

1. In the current solution, we use the annual data from 1990 to 2009.

2. We regress the rate of exchange rate changes (e) on the inflation rate differential and estimate the intercept () and slope coefficient ():



= −12.760 (Standard Error=11.555; t=−1.10)



= 1.219 (Standard Error=0.203; t=6.02)



The estimated intercept is insignificantly different from zero, whereas the slope coefficient is positive and significantly different from zero. In fact, the slope coefficient is insignificantly different from unity. [Note that t-statistics for =1 is 1.08=(1.219-1)/0.203] In other words, we cannot reject the hypothesis that the intercept is zero and the slope coefficient is one. The results are thus supportive of purchasing power parity.

