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Financial Engineering

Problem set 2

Covering: Hall Textbook, chapters: 5,7

- Due date is Monday (99/9/3) midnight at 23:55.
- You should upload a file in CW, the names of which should be in the format of "FE-HW2-Student Number". If you also have an excel file compress both files and send a .zip or .rar file named with aforementioned format. Note that the only accepted format for your assignments is word or pdf, and any handwritten reports should be delivered in these formats.
- Score Reduction Policy:
  You are allowed a maximum of 7 days delay (in total) for the submission of all your assignments and your project. Note that the delay will be calculated "daily", not hourly (meaning that a 5-minute delay for a given assignment will be considered as 1 day).
- For the questions needing Excel (if any), also copy the tables of final answers (if it is not too big) in the Word/pdf file as well. Therefore, the Word/pdf file will have everything for all questions but the calculations will be in Excel. In other words, the Word file should be a standalone file.
- Personal integrity is the key to your success in career and life. Any cheating, dishonesty, or plagiarism will NOT be tolerated. If a student is found guilty of academic dishonesty, the student will receive an 'F' for the course in addition to any punishment determined by the university. You are allowed to consult with other students in solving the questions. However, all the work including problem sets and exams should reflect your effort only. **Too similar assignments will get zero, therefore, do not copy the result of others' efforts.**

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1. Briefly explain the following concepts. In the cases of comparison, mentioning the difference is obligatory. (Sources such as: the textbook, various websites, and other textbooks could be used. Please write the references in the footnote.)
   a. Short Selling
   b. Convenience Yields
   c. The Cost of Carry
   d. Bootstrapping LIBOR Forward Rates
   e. Fixed-for-Fixed Currency Swaps

2. In early 2012, the spot exchange rate between the Swiss Franc and U.S. dollar was 1.0404 ($ per franc). Interest rates in the U.S. and Switzerland were 0.25% and 0% per annum, respectively, with continuous compounding. The three-month forward exchange rate was1.0300 ($ per franc). What arbitrage strategy was possible? How does your answer change if the exchange rate is 1.0500 ($ per franc).

3. A bank offers a corporate client a choice between borrowing cash at 11% per annum and borrowing gold at 2% per annum. (If gold is borrowed, interest must be repaid in gold. Thus, 100 ounces borrowed today would require 102 ounces to be repaid in one year.) The risk-free interest rate is 9.25% per annum, and storage costs are 0.5% per annum. Discuss whether the rate of interest on the gold loan is too high or too low in relation to the rate of interest on the cash loan. The interest rates on the two loans are expressed with annual compounding. The risk-free interest rate and storage costs are expressed with continuous compounding.

4. When a known future cash outflow in a foreign currency is hedged by a company using a forward contract, there is no foreign exchange risk. When it is hedged using futures contracts, the daily settlement process does leave the company exposed to some risk. Explain the nature of this risk. In particular, consider whether the company is better off using a futures contract or a forward contract when
   a) The value of the foreign currency falls rapidly during the life of the contract
   b) The value of the foreign currency rises rapidly during the life of the contract
   c) The value of the foreign currency first rises and then falls back to its initial value
   d) The value of the foreign currency first falls and then rises back to its initial value

Assume that the forward price equals the futures price.

5. Under the terms of an interest rate swap, a financial institution has agreed to pay 10% per annum and receive three-month LIBOR in return on a notional principal of $100 million with payments being exchanged every three months. The swap has a remaining life of 14 months. The average of the bid and offer fixed rates currently being swapped for three-month LIBOR is 12% per annum for all maturities. The three-month LIBOR rate one month ago was 11.8% per annum. All rates are compounded quarterly. What is the value of the swap?

6. Company X is based in the United Kingdom and would like to borrow $50 million at a fixed rate of interest for five years in U.S. funds. Because the company is not well known in the United States, this has proved to be impossible. However, the company has been quoted 12% per annum on fixed-rate five-year sterling funds. Company Y is based in the United States and would like to borrow the equivalent of $50 million in sterling funds for five years at a fixed rate of interest. It has been unable to get a quote but has been offered U.S. dollar funds at 10.5% per annum. Five-year government bonds currently yield 9.5% per annum in the United States and 10.5% in the United Kingdom. Suggest an appropriate currency swap that will net the financial intermediary 0.5% per annum.

7. "Companies with high credit risks are the ones that cannot access fixed-rate markets directly. They are the companies that are most likely to be paying fixed and receiving floating in an interest rate swap." Assume that this statement is true. Do you think it increases or decreases the risk of a financial institution's swap portfolio? Assume that companies are most likely to default when interest rates are high.