

**Final Exam**

No points will be given by simply writing down formulas, and writing down definitions or irrelevant statements from the book, or saying "yes," will get you zero points. Justify all your answers. If you cannot prove something give some intuition. Good luck. Reminder: this is an open book exam, but no open notes.

Estimated Time: 2 hrs 30 minutes.

**I. Problems** (10 points each).

1.- Carla Corp., a U.S. firm, considers placing 60% of its excess funds in a one-year Swiss francs (CHF) deposit and the remaining 40% in euros. The forecasts of the appreciation (against the USD) of the CHF and EUR for the next year are as follows:

Currency	Possible $e_f$	Probability
CHF	2%	.20
CHF	3%	.80
EUR	1%	.70
EUR	3%	.30

The annual interest rate on the CHF is 4%, the annual interest rate on the EUR is 5%, and the annual interest rate in the U.S. is 5.50%. Calculate the possible effective yields of the overall portfolio. Would you advise Carla Corp. to place its excess funds abroad or at home? (Justify your answer, considering placing the excess funds in CHF deposit only, EUR only, in the above mentioned 60-40 portfolio of currencies, and in USD only.)

2. Mendy's, a Canadian company, sells wheat to France. Every month Mendy's receives a payment of EUR 15,000,000. The exchange rate is 1.6 CAD/EUR. The mean change in exchange rate is 1%. The volatility (i.e., standard deviation) of changes in CAD/EUR exchange rate is 12%. Calculate the VaR for Mendy's exposure, using a 97.5% confidence interval.

3. Pendant Co., a U.S. publishing house, is receiving an advance of CHF 500,000 from a Swiss distributor. The advance will be paid in mid-March 2011. Pendant wants to hedge its exposure with options. The exchange rate is  $S_t=0.8195$  USD/CHF. You have the following information (taken from the Wall Street Journal).

**PHILADELPHIA OPTIONS**

Wednesday, Dec 8, 2010

		Calls		Puts	
		Vol.	Last	Vol.	Last
<b>Swiss Franc</b>					<b>81.95</b>
<b>62,500 Swiss Francs-cents per unit.</b>					
78	Jan	...	...	4	0.07
80	Mar	20	3.28	10	0.45
82	Mar	...	...	41	0.92
83	Jan	...	...	30	2.48
83	Mar	16	1.36	23	2.02
84	Jan	16	0.99	...	...
84	Mar	7	0.60	15	3.71
85	Jan	2	0.35	3	4.20.

- A. Specify type of option contract (call or put).
- B. Specify number of contracts bought.
- C. Using the information given in the WSJ, construct:
  - i) at-the-money (closest in-the-money) Mar hedge.
  - ii) out-of-the money Mar hedge.

Briefly discuss the advantages and disadvantages of each strategy. Which one would you recommend to Pendant? (Why?)

4. Assume that the following regression model was applied to historical annual data:

$$e_t = \alpha + \beta \text{INT}_t + \tau \text{INC}_t + \delta \text{BOT}_t + \varepsilon_t,$$

where  $e_t$  is the percentage change in exchange rate of the USD/JPY in period  $t$ ,  $\text{INT}_t$  is the interest rate differential between Japan and the U.S. in period  $t$ ,  $\text{INC}_t$  is the income growth rate differential between Japan and the U.S. in period  $t$ ,  $\text{BOT}_t$  is the U.S. balance of trade (in USD billions), and  $\varepsilon_t$  is an error term.

Assume that the regression coefficients were estimated as

$$\alpha = .01$$

$$\beta = -.30$$

$$\tau = .65$$

$$\delta = -.0025$$

In addition, we have the following data:

•  $E_t[\text{INT}_t] = 2\%$ .

• This year  $\text{BOT}_t$  is forecasted as follows:

BOT	Probability
-70	.60
-100	.40

• This year  $\text{INC}_t$  is forecasted as follows:

INC	Probability
2%	.70
3%	.30

Now, you have to answer the following questions:

i. Using the above information, what will be your forecast for  $e_t$ ?

ii. Suppose that  $S_{t-1} = .01$  USD/JPY, provide a confidence interval for  $S_t$

5. Assume the spot rate is 3.6 AUD/GBP (AUD=Australian Dollar). One-year interest rates are:  $i_{\text{GBP}}=5.50\%$  and  $i_{\text{AUD}}=7\%$ . Bank Three quotes the one-year forward rate as 3.4 AUD/GBP.

- (1) Calculate the one-year forward AUD/GBP rate.
- (2) Is arbitrage possible? If yes, design a covered arbitrage strategy.
- (3) Calculate the arbitrage profits.

6. Elaine Corporation sold equipment to an Argentine firm. Elaine Corp. will receive ARS 2,000,000 in 180 days (ARS=Argentine peso). It considers using (1) a forward hedge, (2) an option hedge, (3) a money market hedge, or (4) no hedge. Its analysts develop the following information, which can be used to assess the alternative solutions:

- Spot rate .30 USD/ARS
- 180-day forward rate .32 USD/ARS.
- Annual interest rates are as follows:
  - deposit rate: 10% in Argentina, and 5% in the U.S.
  - borrowing rate: 12 5% in Argentina, and 5.5% in the U.S.
- A call option on ARS that expires in 180 days has an exercise price of USD .32 and a premium of USD .02.
- A put option on ARS that expires in 180 days has an exercise price of USD .31 and a premium of USD .03.
- Elaine Corporation forecasted the future spot rate in 180 days as follows:

Possible Outcomes	Probability
.28 USD/ARS	10%
.31 USD/ARS	60%
.35 USD/ARS	30%

Which strategy would you recommend to Elaine Corporation? Why? Be explicit.

7. The Indian rupee (INR) interest rate is 12% (s.a.), while the USD interest rate is 5% (s.a.). Tortelli Co., a U.S. firm, entered into a currency swap with a swap dealer, where Tortelli pays 6.0% semi-annually in USD and receives 10% semi-annually in INR. The principals in the two currencies are USD 4 million and INR 120 million. The swap will last for another two years. The exchange rate is .027 USD/INR. For simplicity, assume the term structure in India and in the U.S. is flat.

A. Draw a diagram showing the semi-annual swap cash flows (in INR and in USD).

B. Value this currency swap for Tortelli Co.

C. Suppose the USD depreciates against the INR. Without doing any calculations, does the value of the swap increase or decrease for Tortelli?

D. A year from now, the exchange rate is .025 USD/INR. Assuming that nothing else has changed, calculate the new value of the swap for Tortelli.

8. Vandelay Corporation presently has an existing business in Singapore but is considering an additional plant there. The following information has been gathered to assess this project:

- The initial investment required is SGD 10 million. The current spot rate is .73 USD/SGD.
- The project will be terminated at the end of Year 2, when the subsidiary will be sold.
- The price, demand, and variable cost of the product in the Singapore are as follows:

Year	Price	Demand	Variable cost
1	SGD 25	550,000	SGD 10
2	SGD 20	600,000	SGD 8

- The exchange rate is forecasted to be .71 USD/SGD at the end of Year 1, and .70 USD/SGD at the end of year 2.
- The Singapore government will impose an income tax of 20% on income. In addition, the U.S. government will impose a tax of 10% on earnings remitted by the subsidiary (ignore tax credits). Singapore imposes a 10% withholding tax on all remittances to foreign countries.
- All cash flows received by the subsidiary are sent to the parent at the end of each year.
- The annual depreciation expense is 15% of initial outlay.
- In two years the subsidiary is to be sold. Vandelay expects to receive SGD 1.5 million. This amount will be taxed at the usual withholding rate in Singapore. (But, it will not be taxed in the U.S. at the 10% rate.)
- Vandelay requires a 12% rate of return on this project.

- (i) Calculate the NPV from the perspective of the subsidiary.
- (ii) Calculate the NPV from the perspective of the parent.
- (iii) Should Vandelay accept this project?



## **II. CASE (30 points)**

Read the attached Bloomberg article (May 11, 2010) and briefly answer the following questions:

Note: No points will be given by simply writing lines from the article.

1) According to the linearized version of relative PPP, which currency (EUR, JPY, or AUD) had the highest daily inflation rate differential (in absolute value) against the USD?

2) According to the article, Chinese inflation has been higher than expected. What is the effect of the higher Chinese inflation on the CNY/USD exchange rate? Draw a graph.

3) Suppose the Central Bank of China decides to increase interest rates. What is the effect of an increase in Chinese interest rates on the CNY/USD exchange rate? Draw a graph.

4) According to the article, the USD weakened against major currencies because of the government budget deficit implications of the tax-cut package considered by the U.S. Senate. The budget deficits can raise long term interest rates and, then, decrease growth rates. Which theory, discussed in class, supports the view of Bloomberg's article?

5) The yield on the 2-year U.S. Treasuries is 0.6%, while the yield on similar Australian government bonds is 4.99%. Using the linearized version of IFE, forecast the 6-month AUD/USD exchange rate.

6) Suppose China National Petroleum Corporation (CNPC) has matching inflows and outflows in USD and JPY –i.e., overall net TE=0. According to the article, should CNPC worry about its exposure?