

Homework 1

1.1 (Ch. 3) Cross Exchange Rate. Assume Brazil's real (BRL) is worth USD .45 and the Mexican peso (MXN) is worth USD .076. What is the cross rate BRL/MXN?

1.2 (Ch. 4) Aggregate Effects on Exchange Rates. Assume that the United States invests heavily in government and stocks of the U.K. In addition, residents of the U.K. invest heavily in the United States.

Because your firm exports goods to the U.K., you are assigned to forecast the value of GBP against the USD –i.e., you forecast $S_t(\text{USD/GBP})$. Explain how each of the following conditions will affect the value of the GBP, holding other things equal. Then, aggregate all of these impacts to develop an overall forecast of the GBP's movement against the USD.

- U.S. inflation has suddenly increased substantially, while U.K.'s inflation remains low.
- U.S. interest rates have increased substantially, while U.K.'s interest rates remain low.
- The U.S. income level increased substantially, while the U.K.'s income level has remained unchanged.
- The U.S. is expected to impose a small tariff on goods imported from the U.K.
- Combine all expected impacts to develop an overall forecast.

1.3 (Ch. 4) Speculation. Deacon Bank expects that the Mexican peso (MXN) will depreciate against the USD from its spot rate of USD .08 to USD .072 in 20 days. The following interbank lending and borrowing rates exist:

	<u>Lending Rate</u>	<u>Borrowing Rate</u>
U.S. dollar (USD)	2.0%	2.1%
Mexican peso (MXN)	4.7%	5.0%

Assume that Deacon Bank has a borrowing capacity of either USD 10 million or MXN 70 million in the interbank market, depending on which currency it wants to borrow.

- How could Deacon Bank attempt to capitalize on its expectations without using deposited funds? Estimate the profits that could be generated from this strategy.

1.4 (Ch. 5) Selling Currency Call Options. Farrokh Bulsara sold a call option on Canadian dollars (CAD) for USD.02 per unit. The strike price was USD.86, and the spot rate at the time the option was exercised was USD.82. Assume Mr. Bulsara did not obtain CAD until the option was exercised. Also assume that there are 50,000 units in a CAD option. What was Mr. Bulsara's net profit on the call option?

1.5 (Ch. 5) Selling Currency Put Options. Brian May sold a put option on CAD for USD .04 per unit. The strike price was USD .85, and the spot rate at the time the option was exercised was USD .82. Assume Brian immediately sold off the CAD received when the option was exercised. Also assume that there are 50,000 units in a CAD option. What was Brian's net profit on the put option?

1.6 (Ch. 5) Speculating with Currency Put Options. Queen Co. has purchased CAD options for speculative purposes. Each option was purchased for a premium of USD .02 per unit, with an exercise price of USD .89 per unit. Queen Co. will purchase the CAD just before it exercises the options (if it is feasible to exercise the options). It plans to wait until the expiration date before deciding whether to exercise the options. In the following table, fill in the net profit (or loss) per unit to Queen Co. based on the listed possible spot rates of the CAD on the expiration date.

Possible S_t (USD/CAD) <u>on Expiration Date</u>	Net Profit (Loss) per Unit <u>if Spot Rate Occurs</u>
.81	
.86	
.89	
.92	
.95	
1.01	

1.7 (Ch. 6) Effects on Currencies Tied to the Dollar. The Hong Kong dollar's (HKD) value is tied to the USD. Explain how the following trade patterns would be affected by the appreciation of the Japanese yen against the dollar: (a) Hong Kong exports to Japan and (b) Hong Kong exports to the United States.

1.8 (Ch. 6) Intervention Effects on Bond Prices. U.S. bond prices are normally inversely related to U.S. inflation. If the Fed planned to use intervention to weaken the dollar, how might bond prices be affected?

1.9 (Ch. 6) Effect of High Oil Prices and CB Intervention. During the past decade, oil prices have reached historically high levels, getting to over USD 100 per barrel. Suppose you work for the Central Bank of the UAE, which keeps a fixed FX system ($S_t = 3.6725$ AED/USD). The UAE's economy is dependent on oil exports.

- (a) Describe the pressures the AED faces due to the increase in oil prices? What does the CB of the UAE have to do in order to support the fixed FX exchange rate? Do the FX reserves increase or decrease in the UAE?
- (b) What is the impact on the UAE's domestic money supply and interest rates?
- (c) How can the CB neutralize (sterilize) the effect of high oil prices on the UAE's money supply?

1.10 (Ch. 6) Direct ECB Intervention. If most countries in Europe experience a recession, how might the European Central Bank (ECB) use direct intervention in FX markets to stimulate economic growth? What is the effect of this ECB intervention on European Money Markets?

1.11 (Ch. 7) Triangular Arbitrage. Assume the following information:

- $S_t = .9$ USD/CAD
- $S_t = 1.70$ USD/GBP
- $S_t = 2$ CAD/GBP

Is triangular arbitrage possible? If so, explain the steps that would reflect triangular arbitrage, and compute the profit from this strategy (expressed as a % per unit borrowed). What market forces would occur to eliminate any further possibilities of triangular arbitrage?

1.12 (Ch. 7) Covered Interest Arbitrage. Assume the following information:

$$S_t = 1.50 \text{ USD/EUR}$$

$$F_{t,90} = 1.48 \text{ USD/EUR}$$

$$i_{\text{EUR}} = 5.50\%$$

$$i_{\text{USD}} = 3.75\%$$

$$T = 90 \text{ days}$$

Given this information, is covered interest arbitrage possible? Design a covered arbitrage strategy and calculate its profits.

1.13 (Ch. 7) Covered Interest Arbitrage. Assume the following information:

$$S_t = 6 \text{ ARS/EUR}$$

$$F_{t,180} = 6.25 \text{ ARS/EUR}$$

$$i_{\text{EUR}} = 2\%$$

$$i_{\text{ARS}} = 7\%$$

$$T = 180 \text{ days}$$

Given this information, is covered interest arbitrage possible? Design a covered arbitrage strategy and calculate its profits.

1.14 (Ch. 8) Interpreting Inflationary Expectations. If investors in the United States and Canada require the same real interest rate, and the nominal rate of interest is 2 percent higher in Canada, what does this imply about expectations of U.S. inflation and Canadian inflation? What do these inflationary expectations suggest about future exchange rates?

1.15 (Ch. 8) Estimating Depreciation Due to PPP. Assume that the spot exchange rate of the British pound is USD 1.60. How will this spot rate adjust according to PPP if the United Kingdom experiences an inflation rate of 5 percent while the United States experiences an inflation rate of 3 percent?

1.16 (Ch. 8) Forecasting the Future Spot Rate Based on IFE. Assume that the spot exchange rate of the Singapore dollar (SGD) is USD .80. The 180-day interest rate is 3 percent in the United States and 7 percent in Singapore. What will the spot rate be in 6 months according to the IFE? (You may use the approximate formula to answer this question.)

1.17 (Ch. 8) Deriving Forecasts of the Future Spot Rate. As of today, assume the following information is available:

	<u>U.S.</u>	<u>Mexico</u>
Real rate of interest required by investors	2%	2%
Nominal interest rate	3%	9%
Spot Rate (S_t)	.13 USD/MXN	
One-year forward rate ($F_{t,1-yr}$)	.115 USD/MXN	

- Use the forward rate to forecast the percentage change in the USD/MXN over the next year.
- Use the differential in expected inflation to forecast the percentage change in the USD/MXN over the next year. (Hint: you can get the expected inflation using Fisher's formula –i.e., the nominal interest rate is equal to the real interest rate plus expected inflation.)
- Use the spot rate to forecast the percentage change in the USD/MXN over the next year.

1.18. (Ch. 8) Testing Relative PPP. You have data on the SEK/USD and CPI indexes for Sweden and the US from January 1970 to November 1007. You run the following regression: changes in the SEK/USD exchange rate against inflation rate differentials ($I_{\text{Swed}} - I_{\text{US}}$). Below, you have the excel regression output. Let $\text{SSR}(H_0) = 0.37515$. Using individual t-tests and a joint F-test, test relative PPP.

REGRESSION RESULTS

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.081063264
R Square	0.006571253
Adjusted R Square	0.00431346
Standard Error	0.02901674
Observations	442

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.002450538	0.002450538	2.910476709	0.088711535
Residual	440	0.370467333	0.000841971		
Total	441	0.372917871			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0.00063769	0.001387156	0.459710491	0.645951097	-0.00208858	0.003364	-0.00208858	0.003364
X Variable 1	0.42083281	0.246676358	1.706011931	0.088711535	-0.06397751	0.905643	-0.06397751	0.905643

1.19 (Ch. 9) Forecasting with a Forward Rate. Assume that the four-year annualized interest rate in the United States is 9 percent and the four-year annualized interest rate in Singapore is 6 percent. Assume interest rate parity holds for a four-year horizon. Assume that the spot rate of the Singapore dollar is USD .60. If the forward rate is used to forecast exchange rates, what will be the forecast for the Singapore dollar's spot rate in four years? What percentage appreciation or depreciation does this forecast imply over the four-year period?

1.20 (Ch. 9) Probability Distribution of Forecasts. Assume that the following regression model was applied to historical quarterly data:

$$e_{f,t} = a_0 + a_1 \text{INT}_t + a_2 \text{INF}_{t-1} + \varepsilon_t$$

where $e_{f,t}$ = percentage change in the USD/JPY exchange rate in period t

INT_t = interest rate differential between U.S. and Japan ($i_{\text{US}} - i_{\text{JAP}}$) over period t

INF_{t-1} = inflation differential between U.S. and Japan ($I_{\text{US}} - I_{\text{JAP}}$) in the previous period

a_0, a_1, a_2 = regression coefficients

ε_t = error term

Assume that the regression coefficients were estimated as follows:

$$a_0 = 0.0, \quad a_1 = 0.9, \quad a_2 = 0.8$$

Also assume that the inflation differential in the most recent period was 3%. The real interest rate differential in the upcoming period is forecasted as follows:

$(i_{US} - i_{JAP})$	Probability
0%	30%
1	60%
2	10%

If Stillwater, Inc., uses this information to forecast the Japanese yen's exchange rate, what will be the probability distribution of the yen's percentage change over the upcoming period?

1.21 (Ch. 10) Assessing Transaction Exposure. Your employer, a large MNC, has asked you to assess its transaction exposure. Its projected cash flows are as follows for the next year:

Currency	Total Inflow	Total Outflow	S_t (USD/FC)
Danish krone (DKK)	DKK 50,000,000	DKK 40,000,000	USD .15
British pound (GBP)	GBP 1,000,000	GBP 2,000,000	USD 1.50

Calculate the Net Transaction Exposure (NTE).

- Assume that the movements in the DKK and the GBP are highly correlated. Provide your assessment as to your firm's degree of transaction exposure (as to whether the exposure is high or low). Substantiate your answer.
- Suppose the correlation is equal to 1 –i.e., perfect positive correlation. Suppose the GBP appreciates to 1.65 USD/GBP. What is the new NTE? What is the change in NTE?
- Suppose the correlation is equal to -11 –i.e., perfect negative correlation. Suppose the GBP appreciates to 1.65 USD/GBP. What is the new NTE?

1.22 (Ch. 10) Transaction Exposure. Vegas Corp. is a U.S. firm that exports most of its products to Canada. It historically invoiced its products in CAD to accommodate the importers. However, it was adversely affected when the CAD weakened against the U.S. dollar. Since Vegas did not hedge, its CAD receivables were converted into a relatively small amount of USD. After a few more years of continual concern about possible exchange rate movements, Vegas called its customers and requested that they pay for future orders with USD instead of CAD. At this time, the Canadian dollar was valued at .81 USD/CAD. The customers decided to oblige, since the number of CAD to be converted into USD when importing the goods from Vegas was still slightly smaller than the number of CAD that would be needed to buy the product from a Canadian manufacturer. Based on this situation, has transaction exposure changed for Vegas Corp.? Has economic exposure changed? Explain.

1.23 (Ch. 10) Measuring Economic Exposure. Using the following cost and revenue information shown for DeKalb, Inc., determine how the costs, revenue, and earnings items would be affected by three possible exchange rate scenarios for the New Zealand dollar (NZD): (1) .50 USD/NZD (2) .55 USD/NZD, and (3) .60 USD/NZD. (Assume U.S. sales will be unaffected by the exchange rate.) Assume that NZD earnings will be remitted to the U.S. parent at the end of the period.

Revenue and Cost Estimates: DeKalb Inc.

(in millions of USD and NZD)

	<u>U.S. Business</u>	<u>NZ Business</u>
Sales	USD 800	NZD 800
Cost of Goods Sold	<u>500</u>	<u>100</u>
Gross Profit	USD 300	NZD 700
Operating Expenses	<u>300</u>	<u>0</u>
Earnings Before Interest and Taxes (EBIT)	USD 0	NZD 700
Interest Expense	<u>100</u>	<u>0</u>
EBT	-USD 100	NZD 700

Does DeKalb behave like an exporter or an importer?

1.24 (Ch. 10) Lagged Effects of Exchange Rate Movements. Cornhusker Co. is an exporter of products to Singapore. It wants to know how its stock price is affected by changes in the Singapore dollar's exchange rate. It believes that the impact may occur with a lag of one to three quarters. How could regression analysis be used to assess the impact?