



SPROTT

SCHOOL OF BUSINESS

BUSI 2505e - Business Finance

Monday, March 15, 2010

8:45-9:15 quiz #3

§21 international corporate finance

- none

- §21.1 - Terminology
- §21.2 - Foreign Exchange Markets and Exchange Rates
- §21.3 - Purchasing Power Parity
- §21.4 - Interest Rate Parity, Unbiased Forward Rates, and the International Fisher Effect
- §21.5 - International Capital Budgeting
- §21.6 - Financing International Projects
- §21.7 - Exchange Rate Risk
- §21.8 - Political Risk

- Considerations in International Financial Management
 - Have to consider the effect of exchange rates when operating in more than one currency
 - Have to consider the political risk associated with actions of foreign governments
 - More financing opportunities when you consider the international capital markets and this may reduce the firm's cost of capital

- **Cross-rate** - implied exchange rate between two currencies, when both currencies are quoted in terms of a third one
- **Eurobond** - bond sold in more than one country, but denominated in one currency, usually the issuer's domestic currency
- **Eurocurrency** - money deposited in a bank in a country with a different currency; Eurodollars are US dollars deposited in a foreign bank
- **Export Development Canada (EDC)** - federal Crown corporation that promotes Canadian exports by making loans to foreign purchasers

21.1: international finance terminology (cont.)

- **Foreign bonds** - bonds issued in a single foreign country in that country's currency
- **Gilts** - British and Irish government issues
- **London Interbank Offer Rate (LIBOR)** - loan rate on Eurodollars, commonly used as an index for floating rate securities
- **Swaps (interest rate)** - agreement between two parties to pay interest to one another on some notional amount, one party pays a fixed rate, the other pays a floating rate
- **Swaps (currency)** - agreement to periodically swap currencies, with exchange rate based on some prespecified rate

- The number of exchanges in foreign countries continues to increase, as does the liquidity on those exchanges
- Exchanges that allow for the flow of capital are extremely important to developing countries
- The United States has one of the most developed capital markets in the world, but foreign markets are becoming more competitive and are often willing to try more innovative ways to do business

- The price of one country's currency in terms of another
- Most currency is quoted in terms of dollars
- Some currencies are quoted the other way around
- Make sure that you know what the quote means!

- Consider the following quote from Figure 21.1:
 - Canadian Dollar (Canada \$) 1.1129
 - The first number (1.1129) is how many Canadian dollars it takes to buy U\$1
 - You can calculate a second number (0.8986), which is how many U.S. dollars it takes to buy C\$1
 - Notice that the two numbers are reciprocals of each other ($1 / 1.1129 = 0.8986$)

- But be careful! Consider the following quote from Figure 21.1:
 - Euro Zone (euro*) 1.2792
 - The first number (1.2792) is how many U.S. dollars it takes to buy 1 euro
 - You can calculate the reciprocal (0.7818), which is how many euros it takes to buy U\$1
 - The asterisk (*) in the quotation indicates that the quote is inverted

21.2: exchange rates - examples

- Suppose you have U\$10,000. Based on the rates in Figure 21.1, how many Swiss francs can you buy?
 - Exchange rate = 1.2214 francs per US dollar
 - Buy $10,000(1.2214) = 12,214$ francs
- Suppose you are visiting New Delhi and you want to buy a souvenir that costs 1,000 Indian Rupees. How much does it cost in U.S. dollars?
 - Exchange rate = 45.88 rupees per dollar
 - Cost = $1000 / 45.88 = \text{U}\$21.80$

21.2: currency conversion - example

You are planning a trip to Australia. Your hotel will cost you A\$150 per night for five nights. You expect to spend another A\$2,000 for meals, tours, souvenirs, and so forth. How much will this trip cost you in Canadian dollars given the following exchange rates?

Country	C\$ Equivalent	Currency per C\$
Australia	.9004	1.1106

answer: \$2,476

- We observe the following quotes
 - 1.15 CAD per U\$1
 - 115 Yen per U\$1
 - 105 Yen per C\$1
- What is the cross rate?
 - $(Y115 / U\$1) / (C\$1.15 / U\$1) = Y100 \text{ per C\$1}$
- Since the implied cross rate is Y100 per C\$1, and the observed cross rate is Y105 per C\$1, there is an arbitrage opportunity

- We have C\$100 to invest; buy low, sell high
 - Buy C\$100($Y105/C\1) = Y10,500, use Y to buy USD
 - Buy Y10,500 / ($Y115/U\$1$) = U\$91.3043, use USD to buy Canadian dollars
 - Buy U\$91.3043 ($C\$1.15/U\1) = C\$105
 - Make C\$5 risk-free

- **Spot trade** - exchange currency immediately
 - **Spot rate** - the exchange rate for an immediate trade
- **Forward trade** - agree today to exchange currency at some future date and some specified price (also called a forward contract)
 - **Forward rate** - the exchange rate specified in the forward contract

- If the forward rate is higher than the spot rate, the foreign currency is selling at a premium (when quoted as \$ equivalents, ie. U\$/C\$)
 - From Figure 21.1, the U.S. dollar is trading at 0.8986 spot against the Canadian dollar and 0.9014 six-months forward
 - Since C\$1 will buy more U.S. dollars in the future, the Canadian dollar is trading at a forward premium

- If the forward rate is lower than the spot rate, the foreign currency is selling at a discount
 - From Figure 21.1, the Canadian dollar is trading at 1.1129 spot against the US dollar and 1.1094 6-months forward
 - Since US\$1 will buy less Canadian dollars in the future, the U.S. dollar is trading at a forward discount

21.3: absolute purchasing power parity

- Price of an item is same regardless of currency used to purchase it
- Requirements for absolute PPP to hold
 - Transaction costs are zero
 - No barriers to trade (no taxes, tariffs, etc.)
 - No difference in the commodity between locations
- Absolute PPP rarely holds in practice for many goods

absolute purchasing power parity (ppp)

$$\underbrace{P_{FC}}_{\text{price in foreign currency}} = \underbrace{S_0}_{\text{spot exchange rate}} \times \underbrace{P_{CDN}}_{\text{price in Canada}}$$

Suppose absolute purchasing power parity holds. The exchange rate quoted in The National Post for Indian rupees 0.02312. If an automobile costs \$35,000 in Canada, how much should the same car cost in India?

answer: Rs 1,513,841

Suppose absolute purchasing power parity holds. The cost of one kilogram of apples in Canada is C\$4.08 and \$3.80 in the United States. What is the exchange rate?

answer: C\$1.074 per \$1 US

21.3: relative purchasing power parity

- Provides information about what causes changes in exchange rates
- Basic result is that exchange rates depend on relative inflation between countries

relative purchasing power parity (ppp)

$$\underbrace{E(S_t)} = \underbrace{S_0} \times [1 + (\underbrace{h_{FC}} - \underbrace{h_{CDN}})]^t$$

expected exchange
rate in t periods

spot exchange
rate

foreign
inflation rate

inflation rate
in Canada

- Exchange rate must be quoted as foreign currency per Canadian dollar for this form of the equation to hold
- Because absolute PPP doesn't hold for many goods, we will focus on relative PPP from here

- Suppose the Japanese spot exchange rate is 130 yen per Canadian dollar. Japanese inflation over the next three years is expected to be 2% per year and Canadian inflation is expected to be 6%.
 - **Do you expect the Canadian dollar to appreciate or depreciate relative to the yen?** - Since inflation is higher in Canada, we would expect the dollar to depreciate relative to the yen.
 - What is the expected exchange in 3 years?

$$E(S_3) = 130 \times [1 + (.02 - .06)]^3 = 115.02$$

Suppose the current spot rate between the British pound and the Canadian dollar is £0.5810 per \$1. Expected inflation in Britain is 8% and expected inflation in Canada is 5%. What is the expected exchange rate in one year from now if relative purchasing power parity holds?

answer: £0.5984 per \$1

Suppose the current spot rate between a foreign country and Canada is $Fc54.2$ per \$1. Expected inflation in the foreign country is 57% and expected inflation in Canada is 4%. If relative PPP holds, what is the expected percentage change in the exchange rate over the next year?

answer: 53%

- Examine the relationship between spot rates, forward rates and nominal rates between countries
- Canadian risk-free rate is assumed to be the T-bill rate

21.4: example: covered interest arbitrage

- Consider the following information
 - $S_0 = 2 \text{ GBP} / \text{C\$}$; $R_{CAD} = 10\%$
 - $F_1 = 1.8 \text{ GBP} / \text{C\$}$; $R_B = 5\%$
- What is the arbitrage opportunity?
 - Borrow C\$100 at 10%
 - Buy C\$100(2 GBP/\$) = 200 GBP and invest at 5% for 1 year. Enter into a forward agreement to lock-in your future exchange rate.
 - In 1 year, receive $200(1.05) = 210 \text{ GBP}$ and convert back to Canadian dollars via the forward agreement
 - $210 \text{ GBP} / (1.8 \text{ GBP} / \$) = \text{C\$}116.67$ and repay loan
 - Profit = $\text{C\$}116.67 - \text{C\$}100(1.1) = \text{C\$}6.67$ risk free

21.4: interest rate parity

- Based on the previous example, there must be a forward rate that would prevent the arbitrage opportunity.
- Interest rate parity defines what that forward rate should be

interest rate parity (exact)

$$\frac{F_1}{S_0} = \frac{1 + R_{FC}}{1 + R_{CAD}}$$

interest rate parity (approx.)

$$F_1 = S_0 \times [1 + (R_{FC} - R_{CAD})]$$

The 1-year forward rate for Hong Kong dollars HK\$7.27 per \$1. The rate on a risk-free Hong Kong asset is 5%. The spot rate is HK\$7.98 per \$1. Approximately what rate can you earn by investing in the Canadian risk-free security for one year?

answer: 13.90%

The current spot rate between Australian dollars and Canadian dollars is A\$1.015 per \$1. The rate on Canadian T-bills is 5% and the rate on an Australian risk-free security is 10%. What is the one-year forward rate if interest rate parity holds?

answer: A\$1.0633 per \$1

- The current forward rate is an unbiased estimate of the future spot exchange rate
- This means that on average the forward rate will equal the future spot rate

- If the forward rate is consistently too high
 - Those who want to exchange **yen for dollars** would only be willing to transact in the future spot market
 - The forward price would have to come down for trades to occur
- If the forward rate is consistently too low
 - Those who want to exchange **dollars for yen** would only be willing to transact in the future spot market
 - The forward price would have to come up for trades to occur

21.4: uncovered interest parity (uip)

- What we know so far:

- purchasing power parity (ppp)

$$E(S_1) = S_0 \times [1 + (h_{FC} - h_{CAD})]$$

- interest rate parity (irp)

$$F_1 = S_0 \times [1 + (R_{FC} - R_{CAD})]$$

- unbiased forward rate (ufr)

$$F_1 = E(S_1)$$

- Combining the formulas we get:

uncovered interest parity (UIP)

$$E(S_1) = S_0 \times [1 + (R_{FC} - R_{CAD})] \quad \text{for one period}$$

$$E(S_t) = S_0 \times [1 + (R_{FC} - R_{CAD})]^t \quad \text{for } t \text{ periods}$$

You are expecting a payment of 500,000PLN three years from now. The risk-free rate of return is 4% in Canada and 2% in Poland. The inflation rate is 4% in Canada and 1% in Poland. Currently, you can buy 380PLN for \$100. How much will the payment 3 years from now be worth in dollars?

answer: \$139,800

- Combining PPP and UIP we can get:

international fisher effect

$$R_{CAD} - h_{CAD} = R_{FC} - h_{FC}$$

- The International Fisher Effect tells us that the real rate of return must be constant across countries
- If it is not, investors will move their money to the country with the higher real rate of return

Suppose that the nominal risk-free rate of interest in Canada is 5%. The nominal risk-free rate in Germany is 8% with inflation of 6%. What is the approximate inflation rate in Canada?

answer: 3.0%

The Canadian risk-free rate is 5%. The British risk-free rate is 9%. Expected inflation in Canada is 3%. What is the expected inflation rate in Britain?

answer: 7%

- There are two approaches for evaluating international capital budgeting projects:
 - Home Currency Approach
 - Foreign Currency Approach

- Estimate cash flows in foreign currency
- Estimate future exchange rates using UIP
- Convert future cash flows to dollars
- Discount using domestic required return

- Your company is looking at a new project in Mexico. The project will cost 9 million pesos. The cash flows are expected to be 2.25 million pesos per year for 5 years. The current spot exchange rate is 9.08 pesos per Canadian dollar. The risk-free rate in the Canada is 4% and the risk-free rate in Mexico 8%. The dollar required return is 15%.
 - Should the company make the investment?

21.5: home currency approach - example

You are analyzing a project with an initial cost of £45,000. The project is expected to return £8,000 the first year, £22,000 the second year and £20,000 the third and final year. The current spot rate is £.57. The nominal risk-free return is 5.5% in the U.K. and 4.5% in Canada. The return relevant to the project is 9% in the U.K. and 10.5% in Canada. Assume that uncovered interest rate parity exists. What is the net present value of this project in Canadian dollars?

answer: -\$10,144

- Estimate cash flows in foreign currency
- Use the IFE to convert domestic required return to foreign required return
- Discount using foreign required return
- Convert NPV to dollars using current spot rate

21.5: foreign currency approach - example

You want to invest in a project in Australia. The project has an initial cost of A\$2.3 million and is expected to produce cash inflows of A\$950,000 a year for 3 years. The project will be worthless after the first 3 years. The expected inflation rate in Australia is 5% while it is only 2% in Canada. The applicable interest rate in Australia is 9%. The current spot rate is A\$1 = C\$.86. What is the net present value of this project in Australian dollars using the foreign currency approach?

answer: A\$104,730

- Often some of the cash generated from a foreign project must remain in the foreign country due to restrictions on repatriation
- Repatriation can occur in several ways:
 - Dividends to parent company
 - Management fees for central services
 - Royalties on the use of trade names and patents

- Risk from day-to-day fluctuations in exchange rates and the fact that companies have contracts to buy and sell goods in the short-run at fixed prices
- Managing risk
 - Enter into a exchange forward agreement to guarantee the rate
 - Use foreign currency options to lock in exchange rates if they move against you but benefit from rates if they move in your favour

- Long-run fluctuations come from unanticipated changes in relative economic conditions
- Could be due to changes in labour markets or governments
- More difficult to hedge
- Try to match long-run inflows and outflows in the currency
- Borrowing in the foreign country may mitigate some of the problems

21.7: translation exposure

- Income from foreign operations has to be translated back to U.S. dollars for accounting purposes, even if foreign currency is not actually converted back to dollars
- If gains and losses from this translation flowed through directly to the income statement, there would be significant volatility in EPS
- Current accounting regulations require that all cash flows be converted at the prevailing exchange rates with currency gains and losses accumulated in a special account within shareholders equity

- Large multinational firms may need to manage the exchange rate risk associated with several different currencies
- The firm needs to consider its net exposure to currency risk instead of just looking at each currency separately
- Hedging individual currencies could be expensive and may actually increase exposure

- Changes in value due to political actions in the foreign country
- Investment in countries that have unstable governments should require higher returns
- The extent of political risk depends on the nature of the business
 - The more dependent the business is on other operations within the firm, the less valuable it is to others
 - Natural resource development can be very valuable to others, especially if much of the ground work in developing the resource has already been done
- Local financing can often reduce political risk