Department of Economics | Spring 2000
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Economics 136
Solutions to Problem Set #5
(Due in lecture: Thursday, April 27th)

1. On May 15th Company X has negotiated a contract to sell 1 million barrels of crude oil. The price in the sales contract is the spot price on August 15th, the day when the delivery is scheduled. May 15th spot price of crude oil is \$23 per barrel. August oil futures price is \$21.50 per barrel. Oil futures contract is written for 1,000 barrels.

a) How can the company X protect itself against the uncertainties of price of crude oil? Explain in detail the company's hedging strategy.

ANSWER: May 15th: Short 1,000 August futures contracts on crude oil
August 15th: Close out futures position
August 15th: Sell the oil at the spot price according to the terms of the sales contract.

b) What happens to company X profits (as a result of hedging) if the price of oil on AugUSt 15th happens to be:

i. \$19

ANSWER: Company receives \$19 mil from the sales contract (\$19 x 1 mil barrels)
Company gains \$2.5 mil from the futures contract ((\$21.5-\$19) x 1,000 contracts x 1,000 barrels per contract). Total profit: \$21.5 mil

ii. \$24

ANSWER: Company receives \$24 mil from the sales contract (\$24 x 1 mil barrels)
Company looses \$2.5 mil from the futures contract ((\$21.5-\$24) x 1,000 contracts x 1,000 barrels per contract). Total profit: \$21.5 mil

2. Suppose the one-year forward \$/DM exchange rate is \$0.73 per DM and the spot exchange rate is \$0.695 per DM. What is the forward premium on DM (the forward discount on dollars)? What is the approximate difference between the risk free interest rate on one-year dollar deposits and DM deposits?

ANSWER: Covered Interest Parity tells US that $F_{\$/DM}=E_{\$/DM}(1+r_{US})/(1+r_{DM})$. Hence, the forward premium on DM is $F_{\$/DM}/E_{\$/DM}=1.05$ or 5%.

Taking natural logarithms of both sides of the equation we get:

$$\ln(F_{\$/DM}/E_{\$/DM})=\ln((1+r_{US})/(1+r_{DM}))=\ln(1+r_{US})-\ln(1+r_{DM}).$$

Since normally interest rates and the forward premiums are very small, we can take the advantage of the rule that says: for a small x, $\ln(1+x) \approx x$. Hence:

$$0.05 \approx r_{US}-r_{DM}$$

3. Company A wants to borrow £10 million at a fixed rate of interest for 5 years. Company B wants to borrow \$16.7 million at a fixed rate of interest for 5 years. (Spot exchange rate is 1.67\$/£). The companies have been offered the following rates:

	DOLLARS	POUNDS
Company A	8%	11.60%
Company B	10%	12%

a) Which company do you think has a better credit rating?

ANSWER: Obviously company A has a better credit rating since it is offered a better interest rate on both dollar and pound denominated loans.

b) Design a swap strategy for both companies that will make them both better off.
Note: There are many possible arrangements here and the gains from the swap do not have to be fair.

ANSWER: The problem is similar to the comparative advantage scenarios that lead to trade in goods and services. Notice that A faces relatively much lower interest rate in dollars than in pounds (2% vs. 0.4%). In other words A has a comparative advantage in the dollar loan market and B has a comparative advantage in the pound loan market. Intuitively, it makes sense for the companies to exploit their respective comparative advantages. Thus, A should take a loan in dollars at 8% interest and B should take a loan in pounds at 12% interest (By the way, it is impossible for A to take both loans and then resell one of them to B. No bank would go for it). Now, both companies will be better off if A ends up with a pound loan at an interest rate lower than 11.6% and B ends up with a dollar loan at the interest rate better than 10%. In order to achieve this the companies can swap their loans at the following terms: A pays B 12% on the pound loan, and B pays A 9% on the dollar loan.

Here is how the situation looks after the swap:

A pays to the bank	8%
A pays to B	12%
A receives from B	-9%
Total interest rate A has to pay:	**11%**

B pays to the bank	12%
B pays to A	9%
B receives from A	-12%
Total interest rate B has to pay:	**9%**