Chapter 2

Mechanics of Futures Markets

Practice Questions

Consolidate

Problem 2.8
Explain how margins protect investors against the possibility of default.

A margin is a sum of money deposited by an investor with his or her broker. It acts as a guarantee that the investor can cover any losses on the futures contract. The balance in the margin account is adjusted daily to reflect gains and losses on the futures contract. If losses are above a certain level, the investor is required to deposit a further margin. This system makes it unlikely that the investor will default. A similar system of margins makes it unlikely that the investor's broker will default on the contract it has with the clearinghouse member and unlikely that the clearinghouse member will default with the clearinghouse.

Problem 2.9
A trader buys two July futures contracts on frozen orange juice. Each contract is for the delivery of 15,000 pounds. The current futures price is 160 cents per pound, the initial margin is $6,000 per contract and the maintenance margin is $4,500 per contract. What price change would lead to a margin call? Under what circumstances could $2,000 be withdrawn from the margin account?

Gain(Loss) per contract = Contract Size * the change in the futures price

There is a margin call if more than $1,500 is lost on one contract. This happens if the futures price of frozen orange juice falls by more than 10 cents to below 150 cents per lb.

4,500-6,000=15,000* (F2-F1)
The change in the futures price=$0.1 or 10 cents. F2=1.6-0.1=$1.50, that is, 150 cents per lb.

$2,000 can be withdrawn from the margin account if there is a gain on one contract of $1,000. This will happen if the futures price rises by 6.67 cents to 166.67 cents per lb.

1,000=15,000*(F2-F1)
The change in the futures price=$0.0667 or 6.67 cents. F2=1.6+0.0667=$1.6667, that is, 166.67 cents per lb.

Problem 2.10
Explain the difference between a market-if-touched order and a stop order.

A market-if-touched order is executed at the best available price after a trade occurs at a specified price or at a price more favourable than the specified price. A stop order is executed at the best available price after there is a bid or offer at the specified price or at a price less favourable than the specified price.

Problem 2.11
Explain what a stop-limit order to sell at 20.30 with a limit of 20.10 means.

A stop-limit order to sell at 20.30 with a limit of 20.10 means that as soon as there is a bid at 20.30 the contract should be sold providing this can be done at 20.10 or a higher price.

Problem 2.12
The forward price on the Swiss franc for delivery in 45 days is quoted as 1.1000. The futures price for a contract that will be delivered in 45 days is 0.9000. Explain these two quotes. Which is more favourable for an investor wanting to sell Swiss francs?

The 1.1000 forward quote is the number of Swiss francs per dollar. The 0.9000 futures quote is the number of dollars per Swiss franc. When quoted in the same way as the futures price, the forward price is $1/1.1000 = 0.9091$. The Swiss franc is therefore more valuable in the forward market than in the futures market. The forward market is therefore more attractive for an investor wanting to sell Swiss francs.

Problem 2.13
An Australian wool exporter expects to receive USD 10 million worth of wool in 30 days. The forward price of the Australian dollar for delivery in 30 days is quoted as 1.0150. The futures price for a contract that will be delivered in 30 days is 0.9950. Explain these two quotes. Which is more favourable for the exporter?

For Australian dollars, the forward quote shows the number of US dollars per unit of the foreign currency and is directly comparable with futures quotes. That is, the 1.0150 forward quote is the number of US dollars per Australian dollar; the 0.9950 futures quote is also the number of US dollars per Australian dollar. The wool exporter may lock in a 30-day forward or future contract to buy Australian dollars with the USD payment. Through a forward contract, the exporter would receive AUD 9,852,216 (=USD 10,000,000/1.0150). On the other hand, the future will allow the exporter to obtain AUD 10,050,251 (=USD 10,000,000/0.9950) in 30 days. The US dollar is therefore more valuable in the future market than in the forward market. The future market is therefore more attractive for an investor wanting to sell US dollars.

Problem 2.14
Suppose you call your broker and issue instructions to sell one October greasy wool contract. Describe what happens.

Greasy wool futures are traded on the Australian Stock Exchange (ASX). The broker will request some initial margin. The order will be relayed by telephone to your broker's trading desk on the floor of the exchange (or to the trading desk of another broker).

It will be sent by messenger to a commission broker who will execute the trade according to your instructions. Confirmation of the trade eventually reaches you. If there are adverse movements in the futures price your broker may contact you to request additional margin.

Problem 2.15
Identify the three futures contracts in Table 2.2 which have the highest open position/open interest.

Based on the contracts listed, the answer is the 3 Year Bonds, the 10 Year Bonds and SPI 200, all of which are of December 2010 maturity.

Development

Problem 2.16
The party with a short position in a futures contract sometimes has options as to the precise asset that will be delivered, where delivery will take place, when delivery will take place and so on. Do these options increase or decrease the futures price? Explain your reasoning.

These options make the contract less attractive to the party with the long position and more attractive to the party with the short position. They therefore tend to reduce the futures price.

Problem 2.17
What are the most important aspects of the design of a new futures contract?

The most important aspects of the design of a new futures contract are the specification of the underlying asset, the size of the contract, the delivery arrangements and the delivery months.

Problem 2.18
Show that, if the futures price of a commodity is greater than the spot price during the delivery period, then there is an arbitrage opportunity. Does an arbitrage opportunity exist if the futures price is less than the spot price? Explain your answer.

If the futures price is greater than the spot price during the delivery period, an arbitrageur buys the asset, shorts a futures contract and makes delivery for an immediate profit. If the futures price is less than the spot price during the delivery

period, there is no similar perfect arbitrage strategy. An arbitrageur can take a long futures position but cannot force immediate delivery of the asset. The decision on when delivery will be made is made by the party with the short position. Nevertheless companies interested in acquiring the asset will find it attractive to enter into a long futures contract and wait for delivery to be made.

Problem 2.19
At the end of one day a clearinghouse member is long 100 contracts and the settlement price is $50,000 per contract. The original margin is $2,000 per contract. On the following day the member becomes responsible for clearing an additional 20 long contracts, entered into at a price of $51,000 per contract. The settlement price at the end of this day is $50,200. How much does the member have to add to its margin account with the exchange clearinghouse?

The clearinghouse member is required to provide $20 \times \$2,000 = \$40,000$ as initial margin for the new contracts. There is a gain of $(50,200 - 50,000) \times 100 = \$20,000$ on the existing contracts. There is also a loss of $(51,000 - 50,200) \times 20 = \$16,000$ on the new contracts. The member must therefore add
$$40,000 - 20,000 + 16,000 = \$36,000$$
to the margin account.

Problem 2.20
On 1 July 2012, a US company enters into a forward contract to buy AUD 1 million with US dollars on 1 January 2013. On 1 September 2012, it enters into a forward contract to sell AUS 1 million on 1 January 2013. Describe the profit or loss the company will make in dollars as a function of the forward exchange rates on 1 July 2012 and 1 September 2012.

Suppose F_1 and F_2 are the forward exchange rates for the contracts entered into 1 July 2012 and 1 September 2012, and S is the spot rate on 1 January 2013. (All exchange rates are measured as US dollar per Australian dollar.) The payoff from the contract to buy entered on 1 July 2012 is $(S - F_1)$ million US dollars and the payoff from the second to sell entered on 1 September 2012 contract is $(F_2 - S)$ million US dollars. The total payoff is therefore $(S - F_1) + (F_2 - S) = (F_2 - F_1)$ million US dollars.

Problem 2.21
'Speculation in futures markets is pure gambling. It is not in the public interest to allow speculators to trade on a futures exchange.' Discuss this viewpoint.

Speculators are important market participants because they add liquidity to the market. However, contracts must be useful for hedging as well as speculation. This is because regulators generally only approve contracts when they are likely to be of interest to hedgers as well as speculators.

Problem 2.22
'When a futures contract is traded on the floor of the exchange, it may be the case that the open interest increases by one, stays the same, or decreases by one.'
Explain this statement.

If both sides of the transaction are entering into a new contract, the open interest increases by one. If both sides of the transaction are closing out existing positions, the open interest decreases by one. If one party is entering into a new contract while the other party is closing out an existing position, the open interest stays the same.

Problem 2.23
Suppose that on 24 October 2011, a company sells three September 2012 wheat futures contract. It closes out its position on 21 July 2012. The futures price (per tonne) is AUD 305.00 when it enters into the contract, AUD 302.40 when it closes out the position and AUD 303.00 at the end of June 2012. One contract is for the delivery of 200 metric tonnes of wheat. What is the profit? How is it taxed if the company is: (a) a hedger, and (b) a speculator? Assume that the company has a 30 June accounting year end.

The total profit is
$$600 \times (305.00 - 302.40) = A\$1,560$$
If you are a hedger this is all taxed in 2012. If you are a speculator
$$600 \times (305.00 - 303.00) = A\$1,200$$
is taxed in 2011 and
$$600 \times (303.00 - 302.40) = A\$360$$
is taxed in 2012.

Extension

Problem 2.24
What do you think would happen if an exchange started trading a contract in which the quality of the underlying asset was incompletely specified?

The contract would not be a success. Parties with short positions would hold their contracts until delivery and then deliver the cheapest form of the asset. This might well be viewed by the party with the long position as garbage! Once news of the quality problem became widely known no one would be prepared to buy the contract. This shows that futures contracts are feasible only when there are rigorous standards within an industry for defining the quality of the asset. Many futures contracts have in practice failed because of the problem of defining quality.

Assignment Questions

Problem 2.25
Trader A enters into futures contracts to buy 1 million euros for 1.3 million Australian dollars in three months. Trader B enters in a forward contract to do the same thing. The exchange rate (Australian dollars per euro) declines sharply during the first two months and then increases for the third month to close at AUD 1.3300. Ignoring daily settlement, what is the total profit of each trader? When the impact of daily settlement is taken into account, which trader has done better?

The total profit of each trader in Australian dollars is 0.03×1,000,000 = 30,000. Trader B's profit is realised at the end of the three months. Trader A's profit is realised day-by-day during the three months. Substantial losses are made during the first two months and profits are made during the final month. It is likely that Trader B has done better because Trader A had to finance its losses during the first two months.

Problem 2.26
Explain what is meant by open position/open interest. Why does the open position/open interest usually decline during the month preceding the delivery month? On a particular day there are 2,000 trades in a particular futures contract. Of the 2,000 traders on the long side of the market, 1,400 were closing out position and 600 were entering into new positions. Of the 2,000 traders on the short side of the market, 1,200 were closing out position and 800 were entering into new positions. What is the impact of the day's trading on open position?

Open position/open interest is the number of contracts outstanding. Many traders close out their positions just before the delivery month is reached. This is why the open position/open interest declines during the month preceding the delivery month. The open position went down by 600. We can see this in two ways. First, 1,400 shorts closed out and there were 800 new shorts. Second, 1,200 longs closed out and there were 600 new longs.

Problem 2.27
One orange juice futures contract is on 15 000 pounds of frozen concentrate. Suppose that in September 2011 a company sells a March 2013 orange juice futures contract for 120 cents per pound. In December 2011, the futures price is 140 cents; in December 2012, it is 110 cents; and in February 2013, it is closed out at 125 cents. The company has a December year end. What is the company's profit or loss on the contract? How is it realised? What is the accounting and tax treatment of the transaction if the company is classified as: (a) a hedger, and (b) a speculator?

The price goes up during the time the company holds the contract from 120 to 125 cents per pound. Overall the company therefore takes a loss of 15,000×0.05 = $750. If the company is classified as a hedger this loss is realised in 2013. If it is classified as a speculator it realises a loss of 15,000×0.20 = $3000 in 2011, a gain of 15,000×0.30 = $4,500 in 2012 and a loss of 15,000×0.15 = $2,250 in 2013.

Problem 2.28
A company enters into a short futures contract to sell 5,000 bushels of wheat for 450 cents per bushel. The initial margin is $3,000 and the maintenance margin is $2,000. What price change would lead to a margin call? Under what circumstances could $1,500 be withdrawn from the margin account?

Gain(Loss) per contract = Contract Size * the change in the futures price

There is a margin call if $1,000 is lost on the contract. There is a margin call if the price of wheat futures rises by 20 cents from 450 cents to 470 cents per bushel.

Gain(Loss) per contract = Contract Size * (F1-F2)
2,000-3,000=5,000* (4.50-F2)
The change in the futures price=-1,000/5,000 = -0.2 or -20 cents. F2 = 4.5+0.2=$4.7 or 470 cents per bushel.

$1,500 can be withdrawn if the futures price falls by 30 cents to 420 cents per bushel.
1,500=5,000* (4.50-F2)
The change in the futures price=1,500/5,000 = 0.3 or 30 cents. F2 = 4.5-0.3=$4.2 or 420 cents per bushel.

Problem 2.29
Suppose that there are no storage costs for greasy wool and the interest rate for borrowing or lending is 3% per annum. The greasy wool futures contract for December 2012 is quoted at AUD 9.55 per kilogram, while the June 2013 contract is quoted at AUD 9.89 per kilogram. One contract is for delivery of 2,500 kilograms. How could you make money by trading the December 2012 and June 2013 greasy wool futures contracts today?

The December 2012 settlement price for greasy wool is $9.55 per kilogram. The June 2013 settlement price for greasy wool is $9.89 per kilogram. You could go long one December 2012 greasy wool contract and short one June 2013 contract. In December 2012 you take delivery of the greasy wool borrowing $9.55 per kilogram at 3% to meet cash outflows. The interest accumulated in six months is about 9.55×2,500×0.03×0.5 or $385.13 per contract. In June 2013 the greasy wool is sold for $9.89 per kilogram which is more than the amount that has to be repaid on the loan. The gain from the buy/sell transaction is ($9.89 - $9.55)×2,500 = $850 per contract. Hence, the strategy leads to a profit of $850-$385.13=$491.87 per contract. Note that this profit is independent of the actual price of greasy wool in June 2013 or December 2012. It will be slightly affected by the daily settlement procedures.

Problem 2.30
What position is equivalent to a long forward contract to buy an asset at K on a certain date and a put option to sell it for K on that date?

The equivalent position is a long position in a call with strike price K.