

CHAPTER 2

Futures Markets and Central Counterparties

Practice Questions

2.1

There will be a margin call when \$1,000 has been lost from the margin account. This will occur when the price of silver increases by $1,000/5,000 = \$0.20$. The price of silver must therefore rise to \$17.40 per ounce for there to be a margin call. If the margin call is not met, your broker closes out your position.

2.2

The total profit is $(\$50.50 - \$48.30) \times 1,000 = \$2,200$. Of this $(\$49.10 - \$48.30) \times 1,000$ or \$800 is realized on a day-by-day basis between September 2021 and December 31, 2021. A further $(\$50.50 - \$49.10) \times 1,000$ or \$1,400 is realized on a day-by-day basis between January 1, 2022, and March 2022. A hedger would be taxed on the whole profit of \$2,200 in 2022. A speculator would be taxed on \$800 in 2021 and \$1,400 in 2022.

2.3.

A stop order to sell at \$2 is an order to sell at the best available price once a price of \$2 or less is reached. It could be used to limit the losses from an existing long position. A *limit order* to sell at \$2 is an order to sell at a price of \$2 or more. It could be used to instruct a broker that a short position should be taken, providing it can be done at a price at least as favorable as \$2.

2.4

In futures markets, prices are quoted as the number of U.S. dollars per unit of foreign currency. Spot and forward rates are quoted in this way for the British pound, euro, Australian dollar, and New Zealand dollar. For other major currencies, spot and forward rates are quoted as the number of units of foreign currency per U.S. dollar.

2.5

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.

2.6

Margin is money deposited by a trader with his or her broker. It acts as a guarantee that the trader 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 lead to the balance in the margin account falling below a certain level, the trader is required to deposit a further margin. This system makes it unlikely that the trader will default. A similar system of margin accounts makes it unlikely that the trader's broker will default on the contract it has with the clearing house member and unlikely that the clearing house member will default with the clearing house.

2.7

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 pound. \$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 pound.

2.8

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 may find it attractive to enter into a long futures contract and wait for delivery to be made.

2.9

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 favorable 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 favorable than the specified price.

2.10

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.

2.11

The clearing house 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.

2.12

Regulations require most standard OTC transactions entered into between financial institutions to be cleared by CCPs. These have initial and variation margin requirements similar to exchanges. There is also a requirement that initial and variation margin be provided for most bilaterally cleared OTC transactions between financial institutions.

As more transactions go through CCPs there will be more netting. (Transactions with counterparty A can be netted against transactions with counterparty B provided both are cleared through the same CCP.) This will tend to offset the increase in collateral somewhat. However, it is expected that on balance there will be collateral increases.

2.13

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 a trader wanting to sell Swiss francs.

2.14

Live hog futures are traded by the CME Group. 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 then 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.

2.15

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

2.16

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.

2.17

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.

2.18

The total profit is

$$40,000 \times (1.2120 - 1.1830) = \$1,160$$

If the company is a hedger, this is all taxed in 2023. If it is a speculator

$$40,000 \times (1.2120 - 1.1880) = \$960$$

is taxed in 2022 and

$$40,000 \times (1.1880 - 1.1830) = \$200$$

is taxed in 2023.

2.19

The farmer can short 3 contracts that have 3 months to maturity. If the price of cattle falls, the gain on the futures contract will offset the loss on the sale of the cattle. If the price of cattle rises, the gain on the sale of the cattle will be offset by the loss on the futures contract. Using futures contracts to hedge has the advantage that the farmer can greatly reduce the uncertainty about the price that will be received. Its disadvantage is that the farmer no longer gains from favorable movements in cattle prices.

2.20

The mining company can estimate its production on a month by month basis. It can then short futures contracts to lock in the price received for the gold. For example, if a total of 3,000 ounces are expected to be produced in September 2022 and October 2022, the price received for this production can be hedged by shorting 30 October 2022 contracts.

2.21

A CCP stands between the two parties in an OTC derivative transaction in much the same way that a clearing house does for exchange-traded contracts. It absorbs the credit risk but requires initial and variation margin from each side. In addition, CCP members are required to contribute to a default fund. The advantage to the financial system is that there is a lot more collateral (i.e., margin) available and it is therefore much less likely that a default by one major participant in the derivatives market will lead to losses by other market participants. The disadvantage is that CCPs are replacing banks as the too-big-to-fail entities in the financial system.

2.22

The total profit of each trader in dollars is $0.03 \times 1,000,000 = 30,000$. Trader B's profit is realized at the end of the three months. Trader A's profit is realized 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.

2.23

Open interest is the number of contract outstanding. Many traders close out their positions just before the delivery month is reached. This is why the open interest declines during the month preceding the delivery month. The open interest 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.

2.24

There is a margin call if \$1,000 is lost on the contract. This will happen if the price of wheat futures rises by 20 cents from 750 cents to 770 cents per bushel. \$1,500 can be withdrawn if the futures price falls by 30 cents to 720 cents per bushel.

2.25

You could go long one June oil contract and short one December contract. In June, you take delivery of the oil borrowing \$50 per barrel at 4% to meet cash outflows. The interest accumulated in six months is about $50 \times 0.04 \times 1/2$ or \$1 per barrel. In December, the oil is sold for \$56 per barrel which is more than the \$51 that has to be repaid on the loan. The strategy therefore leads to a profit. Note that this profit is independent of the actual price of oil in June and December. It will be slightly affected by the daily settlement procedures.

2.26

The long forward contract provides a payoff of $S_T - K$ where S_T is the asset price on the date and K is the delivery price. The put option provides a payoff of $\max(K - S_T, 0)$. If $S_T > K$ the sum of the two payoffs is $S_T - K$. If $S_T < K$ the sum of the two payoffs is 0. The combined payoff is therefore $\max(S_T - K, 0)$. This is the payoff from a call option. The equivalent position is therefore a call option.

2.27

The counterparty may stop posting collateral and some time will then elapse before the bank is able to close out the transactions. During that time, the transactions may move in the bank's favor, increasing its exposure. Note that the bank is likely to have hedged the transactions and will incur a loss on the hedge if the transactions move in the bank's favor. For example, if the transactions change in value from \$10 to \$13 million after the counterparty stops posting

collateral, the bank loses \$3 million on the hedge and will not necessarily realize an offsetting gain on the transactions.