

4 Using Futures Markets

Answers to Questions and Problems

1. Explain **how** futures markets can benefit individuals in society who never trade futures.

One of the main benefits that the futures market provides is price discovery; futures markets provide information about the likely future price of commodities. This information is available to anyone in the economy, because the prices are publicly available. It is not necessary to trade futures to reap this benefit.

2. A *futures price* is a market quoted price today of the best estimate of the value of a commodity at the expiration of the futures contract. What do you think of this definition?

This claim is intriguing but controversial. If there is no risk premium embedded in the futures price, the statement is likely to be true. The definition implies that random holding of futures positions should earn a zero profit. This seems to be approximately true, but studies such as that by Bodie and Rosansky find positive returns to long futures positions. While the claim may not hold literally, it does seem to be close to correct. Further, those who reject the claim may have a difficult time in identifying futures prices that are above or below the future spot price.

3. Explain the concept of an unbiased predictor.

A predictor is unbiased if the average prediction error equals zero. This implies that errors in the prediction are distributed around zero, and that the prediction is equally likely to be high as well as low.

4. How are errors possible if a predictor is unbiased?

Saying that a predictor is unbiased merely claims that the predictions do not tend to be too high or too low. They can still be in error. For example, the futures price may provide an unbiased prediction of the future spot price of a commodity. Nonetheless, the errors in such a prediction are often large, because the futures price today can diverge radically from the spot price at the expiration of the futures.

5. Scalpers trade to capture profits from minute fluctuations in futures prices. Explain how this avaricious behavior benefits others.

Scalpers trade frequently, attempting to profit by a tick here or there. In pursuing their profit, the scalpers provide the market with liquidity. Thus, a trader who wishes to take or offset a position benefits from the presence of scalpers ready to take the opposite side of the transaction. With many scalpers competing for business, position traders will be able to trade at prices that closely approximate the true value of the commodity. Expressed another way, as scalpers compete for profits, they force the bid-asked spread to narrow, therefore contributing to the liquidity of the market.

6. Assume that scalping is made illegal. What would the consequences of such an action be for hedging activity in futures markets?

Without scalpers, the liquidity of the futures market would be greatly impaired. This would imply a widening of bid-asked spreads. The potential hedger would face having to accept a price that was distant from the true price. Faced with the higher transaction costs represented by wider bid-asked spreads, some hedgers might find that hedging is too expensive and they might not hedge. Thus, without scalpers, hedging would be more expensive, and we would observe a lower volume of hedging activity.

7. A trader anticipates rising corn prices and wants to take advantage of this insight by trading an intracommodity spread. Would you advise that she trade long nearby/short distant or the other way around? Explain.

The answer depends on the relative responsiveness to nearby and distant futures prices to a generally rising price level for corn. If the nearby contract price rises more than the price of the distant contract, the trader should go long nearby/short distant, for example. For most agricultural commodities, there is no general rule to follow.

8. Assume that daily settlement prices in the futures market exhibit very strong first-order serial correlation. How would you trade to exploit this strategy? Explain how your answer would differ if the correlation is statistically significant but, nonetheless, small in magnitude.

With strong serial correlation, a price rise is likely to be followed by another price rise, and a price drop is likely to be followed by another price drop. Therefore, the trader should buy after a price rise and sell after a price fall. If the correlation is strong, the strategy should generate profits. However, the correlation must be very strong to generate profits sufficient to cover transaction costs. The correlation can be statistically significant, but still too small to be economically significant. To be economically significant, the correlation must be strong enough to generate trading profits that will cover the transaction costs. Studies typically find statistically significant first-order serial correlation in futures price changes, but they also find that these correlations are not economically significant.

9. Assume that you are a rabid efficient markets believer. A commodity fund uses 20 percent of its funds as margin payments. The remaining 80 percent are invested in risk-free securities. What investment performance would you expect from the fund?

For any efficient markets believer, rabid or calm, the expected return on the 80 percent of the funds is the risk-free rate. If there is no risk premium, the expected profit on the futures position is zero. Thus, we define a rabid efficient markets believer as one who denies the existence of a risk premium. Therefore, the rabid theorist expects returns from the funds that would be 80 percent of the risk-free rate.

10. Consider two traders. The first trader is an individual with his own seat who trades strictly for his own account. The other trader works for a brokerage firm actively engaged in retail futures brokerage. Which trader has a lower effective marginal trading cost? Relate this comparison in marginal trading costs to quasi-arbitrage.

This is a difficult question. The trader who owns a seat incurs the following costs to trade: the capital commitment to the seat, the opportunity cost of foregone alternative employment, and the exchange member's out-of-pocket transaction costs. These out-of-pocket costs are quite low. For the broker, the scale is much greater. Behind the broker in the pit stands the entire brokerage firm organization with the overhead it represents. Offsetting this overhead to some extent is the much greater scale associated with the brokerage firm. Also, for the trader associated with the brokerage firm, much of the overhead is associated with retail operations, and the marginal cost of trading an additional contract can be quite low. Thus, we judge that the brokerage firm has the lower marginal cost of trading. This difference in trading costs (whichever is really lower) can be important for quasi-arbitrage. Essentially, the fruits of quasi-arbitrage can be harvested by the trader with the lowest marginal transaction costs. If our assessment of these costs is correct, the brokerage firm should be able to squeeze out the market maker and capture these quasi-arbitrage profits.

11. Consider the classic hedging problems of the farmer who sells wheat in the futures market in anticipation of a harvest. Would the farmer be likely to deliver his harvested wheat against the futures? Explain. If he is unlikely to deliver, explain how he manages his futures position instead.

Most farmers who hedge would not deliver against the futures. Often the wheat would not be deliverable, due to differences in grade or type of wheat. Also, the wheat is probably distant from an approved delivery point, and trying to deliver the wheat would involve prohibitively high transportation costs. Instead of actually delivering, the farmer would be much more likely to sell the harvested wheat to the local grain elevator and offset the futures position.

12. A cocoa merchant holds a current inventory of cocoa worth \$10 million at present prices of \$1,250 per metric ton. The standard deviation of returns for the inventory is .27. She is considering a risk-minimization hedge of her inventory using the cocoa contract of the Coffee, Cocoa and Sugar Exchange. The contract size is 10 metric tons. The volatility of the futures is .33. For the particular grade of cocoa in her inventory, the correlation between the futures and spot cocoa is .85. Compute the risk-minimization hedge ratio and determine how many contracts she should trade.

We know that the hedge ratio is:

$$\text{HR} = -\frac{\rho_{SF}\sigma_S\sigma_F}{\sigma_F^2}$$

where S and F indicate the spot and futures, respectively. Therefore, with our data, the hedge ratio is:

$$\text{HR} = -\frac{\rho_{SF}\sigma_S\sigma_F}{\sigma_F^2} = -\frac{.85(.27)(.33)}{(.33)(.33)} = -.6955$$

Currently, the merchant holds $\$10,000,000/\$1,250 = 8,000$ metric tons. The hedge ratio indicates trading .6955 of the futures for each unit of the spot. This implies a futures position of $8,000(.6955) = 5,563.64$ metric tons. With the futures consisting of 10 tons per contract, the correct futures quantity is $5,564/10 \approx 556$ contracts. Because she is long the physical cocoa, she should sell 556 futures contracts.

13. A service station operator read this book. He wants to hedge his risk exposure for gasoline. Every week, he pumps 50,000 gallons of gasoline, and he is confident that this pattern will hold through thick and Hussein. What advice would you offer?

The operator should probably not hedge. By construction, the operator faces a fairly small and recurring risk. If the futures price equals the expected future spot price, the expected gains from hedging are zero, ignoring transaction costs. If we consider transaction costs, the hedging program is almost certain to cost money over the long run. Futures hedging is better designed for large risks or special applications. Persistent hedging of repeated small and independent risks will lead to losses equal to the transaction costs the more often the hedge is attempted (assuming the futures price equals the expected future spot price).

Questions and Problems

14. Describe the difference between a stack hedge and a strip hedge. What are the advantages and disadvantages of each?

A hedge implemented by establishing futures positions in a series of futures contracts of successively longer expirations is called a strip hedge. A hedge implemented by stacking the entire futures position in the front month and then rolling the position forward (less the portion of the hedge that is no longer needed) into the next front month contract is called a stack hedge.

Each strategy involves tradeoffs. The strip hedge has a higher correlation with the underlying risks than the stack hedge, (i.e., has lower tracking error), but may have higher liquidity costs because the more distant contracts may be very thinly traded and may have high bid/ask spreads accompanied by high trade-execution risk. The stack hedge has lower liquidity costs but has higher tracking error.

15. Why might it be inappropriate for a corporation to hedge?

First, reducing risk also means reducing expected return. Whether hedging improves the tradeoff between risk and expected return depends on the risk preferences of individual traders. Second, when applied to publicly held corporations, we find that hedging may not add to shareholder value. These companies are organized using the corporate form specifically for the purpose of spreading the risk of corporate investments across many shareholders who further spread the risk through their individual ownership of diversified portfolios of stocks from many corporations. In a sense, a publicly held corporation is hedged naturally through its ownership structure. Shareholders are therefore likely to be at best indifferent to hedges constructed at the corporate level since such hedges can be replicated or undone by the portfolio composition of individual shareholders. The shareholder's indifference means that they are unwilling to pay a premium for shares of stock where earnings are hedged at the corporate level. Yet in spite of this indifference, many publicly held corporations are observed to hedge. We must assume that since capital market discipline creates powerful incentives for corporations to make value-maximizing decisions, that not all observed hedging is being done over the objections of shareholders.

16. What is a hedge fund? Do hedge funds actually hedge?

A hedge fund is a term used to describe a wide range of pooled investment vehicles that are privately organized and not widely available to the public. Hedge funds are accessible only to wealthy individuals and institutional investors. Hedge funds can employ any trading strategy they choose, including highly risky strategies, hence the term “hedge” is misleading in describing the risk appetite of the fund’s investors. Many investors are attracted to certain hedge funds because they represent a separate asset class that fits well into an overall portfolio diversification strategy.