Self Test
Energy Futures Markets for Managing Risk

Click on True or False to test your knowledge of the chapter.

1. **True** **False** Riskiness of the energy industry is perceived as a "chance of loss" in the popular sense.

2. **True** **False** Financial risk includes the possibility of accidents that have health and safety implications, examples such as power plant melt down, oil spill, an LNG explosion, smog etc.

3. **True** **False** There are six types of financial risk including market, credit, premium, liquidity, operational, and legal.

4. **True** **False** A risk neutral individual would be indifferent between $200 and an asset that has 20% chance of paying $1000 and 80% chance of paying nothing.

5. **True** **False** To find the optimal hedge ratio (the ratio which minimizes risk or variance), we use the following formula: $\delta = \rho + \mu + (\ln S_t - \ln F_t^T)/T$.

6. **True** **False** The efficient market hypothesis suggests that the spot price plus any necessary risk premium (RP) is a good predictor of future energy prices.

7. **True** **False** A derivative is a financial instrument whose value depends on the value of an underlying asset.

8. **True** **False** Suppose you have purchased a futures contract of 1,000 barrels for $35/bbl for June delivery and you have posted a margin of $3400, and the price of crude for June delivery increases to $35.50 tomorrow, and you decide to cash out tomorrow. Your margin will increase to $3900, and if you decide to cash out, you will have $500 less a transaction fee.

9. **True** **False** High volatility of energy prices since 1973 is one of the reasons that drove the development of financial derivative markets.

10. **True** **False** Derivatives are financial instruments that were developed as a result of the Internet boom of the 1990"s.

11. **True** **False** A refiner who is buying crude oil and selling products makes money on price differentials and is more interested in the difference between the crude and product prices than in the absolute price level of each. This difference between the crude and product prices is called a refinery margin, and by selling a crack spread, which is buying crude futures and selling products futures, a refinery can hedge its refinery margin.

12. **True** **False** Crude sells for $22 per barrel, gasoline sells for $27 per barrel and distillate sells for $28 per barrel. If you produce 75% of gasoline and 25% of distillate, your crack spread is $27 +$28 - $22 = $27 per barrel.

13. **True** **False** If you were a power plant owner and you wanted to hedge using a spark spread, your strategy would be to short electricity and go long in the fuel you use for electricity generation.

14. **True** **False** The "Open Interest" column in a Wall Street Journal (WSJ) futures quote indicates the number of contracts outstanding and/or that remained open at the close of the day.

15. **True** **False** Metallgesellschaft A. G. encountered cash flow problems when they tried to hedge forward a huge volume of heating oil and gasoline in the early 1990s.

16. **True** **False** Assume today is August 28th and you are willing to buy a forward contract for Brent crude for September 15th delivery. You give your 15 days notice for the delivery of Brent crude. However, because of a technical problem with your tanker, you receive the crude oil on the September 19th at Sullom Voe, Scotland. Now the oil you received is trading"dated Brent."

17. **True** **False** Futures are sold on exchanges while swaps are traded outside exchanges.

18. **True** **False** A long position, in terms of financial derivatives, is when a party agrees to buy a commodity, and a short position is when a party agrees to sell the commodity.

19. **True** **False** Hedging using energy derivative contracts to reduce the effective price volatility to a buyer or seller does not involve any potential loss.

20. **True** **False** Arbitrage is the simultaneous buying and selling of the same product to make a risk free profit.

21. **True** **False** You have a government bond that is sold at discount with no income and comes due in one year. The risk free discount rate is 5% per year. The current bond price is $1000. If the 9-month forward price is $1030, you would hold the bond and sell a 9 month forward contract on the bond.

22. **True** **False** Consider a 12-month forward contract on a 10-year bond currently selling for $1000. The bond pays a $40 coupon payment at 3, 6, 9 and 12 months. The continuous compounding 3 month annual interest rate is 7% and the continuous compounding annual rate for a year or more is 12% per annum. The equivalent forward price F_t^T is $974.42.

23. **True** **False** Modeling prices for energy commodities is different than for energy stocks and bonds. The futures price can be modeled as $F_t^T = (S_t + U_t)*e^{(r - \delta)*(T - t)}$.

24. **True** **False** You have a 6-month forward contract on a 1-year discount bond that has just been issued. The risk free rate is 10% per annum. The current bond price is $950. The futures price negotiated today should be $998.70.

25. **True** **False** If the six month futures price for natural gas is $3.50, spot price is $3.40, annual interest rate is 0.1, and annual storage cost as a percent of price is 0.2, then for a 6-month period, the convenience yield is 0.295.

26. **True** **False** In case of a demand shock for crude oil, if the world crude oil market is caught with low inventories, we expect the convenience yield to be low and the market more likely to be in contango.

27. **True** **False** Hedgers seldom take delivery on futures contracts.

28. **True** **False** There are 42 gallons in 1 barrel of crude oil.

29. **True** **False** A distributor has some jet fuel cargo available in transit. The distributor paid the current spot price of S_t = $1.05 per gallon for the fuel. She can lose or gain money depending on S_T. She negotiates with an airline a forward contract at t for delivery at T at price F^T_t = $1.05 per gallon in order to hedge her position. At T the contract is worth $S_T - F_t^T = S_T - 1.05$

30. **True** **False** You have 1000 mcf of natural gas which cost you $3 per Mcf. The current spot price is $3.30 per barrel and the six month futures price is $3.20. The cost of carry per month is $0.03 per Mcf. The basis is $0.30.

31. **True** **False** As above, you have 1000 Mcf of natural gas which cost you $3 per Mcf. The current spot price is $3.30 per Mcf and the six month futures price is $3.20. The cost of carry per month is $0.03 per Mcf. You have contracted to sell your gas in one month. If you could sell your product at the current spot price in two months, your total profits would be $240.

32. **True** **False** Suppose that on November 15, 2002, gas was trading at the Houston Ship Channel at an average cost of $5.83/mmbtu, and peak power was selling at an average price of $54.58/MWh. You are an analyst for a power company that owns 2 power plants with heat rates of 7000 and 8000 btu/kwh. It is cheaper for you to self-generate and sell your power, rather than buy the power off the grid, to meet your contractual commitments.

33. **True** **False** Billy Bob Thornton owns a small production well that produces 500 bbl per month. He expects prices to fall at the end of the month. He should buy 500 bbl worth of futures contract to protect himself from the price fall. (Contributed by Nahl Zahran)

34. **True** **False** Marketers/distributers or bankers are always long in the futures market. (Contributed by Nahl Zahran)

35. **True** **False** An oil producer on planet Petro wants to hedge her crude oil but there is no future market for crude oil. However, oil is widely used to generate electricity so oil and electricity prices are strongly related. The hedger is long on one barrel of crude and short on 2 electricity contracts. Crude spot price (S_t) is correlated to electricity spot price (E_t) such that $S_t^T = 2 \times E_t^T$. Currently crude spot price $S_t = 110$ $/bbl and electricity spot price $E_t = 55$ $/MWh. There is a possibility for electricity future price (E_t^T) to increase or decrease by 5%. The hedger will profit when electricity price decrease, yet will incur an equivalent loss at the crude market. (Ali Albinali)

36. **True** **False** In case of a demand shock for crude oil, if the world crude oil market is caught with low inventories, we expect the convenience yield to be low and the market more likely to be in contango.