

EXAMPLE 11.1: FRM EXAM 2000—QUESTION 12

Suppose the price for a six-month S&P index futures contract is 552.3. If the risk-free interest rate is 7.5% per year and the dividend yield on the stock index is 4.2% per year, and the market is complete and there is no arbitrage, what is the price of the index today?

- a. 543.26
- b. 552.11
- c. 555.78
- d. 560.02

EXAMPLE 11.2: FRM EXAM 2009—QUESTION 3-1

A stock index is valued at USD 750 and pays a continuous dividend at the rate of 2% per annum. The six-month futures contract on that index is trading at USD 757. The risk-free rate is 3.50% continuously compounded. There are no transaction costs or taxes. Is the futures contract priced so that there is an arbitrage opportunity? If yes, which of the following numbers comes closest to the arbitrage profit you could realize by taking a position in one futures contract?

- a. \$4.18
- b. \$1.35
- c. \$12.60
- d. There is no arbitrage opportunity.

EXAMPLE 11.3: FRM EXAM 2003—QUESTION 2

The current spot CHF/USD rate is 1.3680 CHF. The three-month USD interest rate is 1.05%, and the three-month Swiss interest rate is 0.35%, both continuously compounded and per annum. A currency trader notices that the three-month forward price is USD 0.7350. In order to arbitrage, the trader should

- a. Borrow CHF, buy USD spot, go long Swiss franc forward
- b. Borrow CHF, sell Swiss franc spot, go short Swiss franc forward
- c. Borrow USD, buy Swiss franc spot, go short Swiss franc forward
- d. Borrow USD, sell USD spot, go long Swiss franc forward

EXAMPLE 11.4: FRM EXAM 2009—QUESTION 3-19

Bonumeur SA is a French company that produces strollers for children and is specialized in strollers for twins and triplets for the EU market. The company buys the wheels of the strollers on the U.S. market. Invoices are paid in USD. What is Bonumeur's currency risk and how can the company hedge its exposure?

- a. EUR depreciating against USD; selling EUR against buying USD forward
- b. EUR depreciating against USD; selling USD against buying EUR forward
- c. EUR appreciating against USD; selling EUR against buying USD forward
- d. EUR appreciating against USD; selling USD against buying EUR forward

EXAMPLE 11.5: FRM EXAM 2008—QUESTION 2-27

Which of the following statements is correct when comparing the differences between an interest rate swap and a currency swap?

- a. At maturity, the counterparties to interest rate swaps and the counterparties to currency swaps both exchange the principal of the swap.
- b. At maturity, the counterparties to interest rate swaps do not exchange the principal, but the counterparties to currency swaps exchange the value difference in principal determined by prevailing exchange rates.
- c. At maturity, the counterparties to interest rate swaps do not exchange the principal, and counterparties to currency swaps do exchange the principal.
- d. Counterparties to interest rate swaps are exposed to more counterparty credit risk due to the magnifying effect of currency, interest rate, and settlement risk embedded within the transaction.

EXAMPLE 11.6: FRM EXAM 2006—QUESTION 88

You have entered into a currency swap in which you receive 4%pa in yen and pay 6%pa in dollars once a year. The principals are 1,000 million yen and 10 million dollars. The swap will last for another two years, and the current exchange rate is 115 yen/\$. The annualized spot rates (with continuous compounding) are 2.00% and 2.50% in yen for one- and two-year maturities, and 4.50% and 4.75% in dollars. What is the value of the swap to you in million dollars?

- a. -1.270
- b. -0.447
- c. 0.447
- d. 1.270

EXAMPLE 11.7: FRM EXAM 2007—QUESTION 87

Your company is expecting a major export order from a London-based client. The receivables under the contract are to be billed in GBP, while your reporting currency is USD. Since the order is a large sum, your company does not want to bear the exchange risk and wishes to hedge it using derivatives. To minimize the cost of hedging, which of the following is the most suitable contract?

- a. A chooser option for GBP/USD pair
- b. A currency swap where you pay fixed in USD and receive floating in GBP
- c. A barrier put option to sell GBP against USD
- d. An Asian call option on GBP against USD

EXAMPLE 11.8: FRM EXAM 2008—QUESTION 2-30

If the lease rate of commodity A is less than the risk-free rate, what is the market structure of commodity A?

- a. Backwardation
- b. Contango
- c. Flat
- d. Inversion

EXAMPLE 11.9: FRM EXAM 2007—QUESTION 29

On January 1, a risk manager observes that the one-year continuously compounded interest rate is 5% and the storage cost of a commodity product A is USD 0.05 per quarter (payable at each quarter end). The manager further observes the following forward prices for product A: March, 5.35; June, 5.90; September, 5.30; December, 5.22. Given the following explanation of supply and demand for this product, how would you best describe its forward price curve from June to December?

- a. Backwardation as the supply of product A is expected to decline after summer
- b. Contango as the supply of product A is expected to decline after summer
- c. Contango as there is excess demand for product A in early summer
- d. Backwardation as there is excess demand for product A in early summer

EXAMPLE 11.10: FRM EXAM 2007—QUESTION 30

Continuing with the previous question, what is the annualized rate of return earned on a cash-and-carry trade entered into in March and closed out in June?

- a. 9.8%
- b. 8.9%
- c. 39.1%
- d. 35.7%

EXAMPLE 11.11: FRM EXAM 2008—QUESTION 4-16

In late 1993, MGRM reported losses of about \$1.3 billion in connection with the implementation of a hedging strategy in the oil futures market. In 1992, the company had begun a new strategy to sell petroleum to independent retailers at fixed prices above the prevailing market price for periods of up to 10 years. At the same time, MGRM implemented a hedging strategy using a large number of short-term derivative contracts such as swaps and futures on crude oil. This led to a timing (maturity) mismatch between the short-term hedges and the long-term liability. Unfortunately, the company suffered significant losses with its hedging strategy when oil market conditions abruptly changed to:

- a. Contango, which occurs when the futures price is above the spot price
- b. Contango, which occurs when the futures price is below the spot price
- c. Normal backwardation, which occurs when the futures price is above the spot price
- d. Normal backwardation, which occurs when the futures price is below the spot price

EXAMPLE 11.12: FRM EXAM 2006—QUESTION 115

Assume the risk-free rate is 5% per annum, the cost of storing oil for a year is 1% per annum, the convenience yield for owning oil for a year is 2% per annum, and the current price of oil is USD 50 per barrel. All rates are continuously compounded. What is the forward price of oil in a year?

- a. USD 49.01
- b. USD 52.04
- c. USD 47.56
- d. USD 49.50

EXAMPLE 11.13: FRM EXAM 2006—QUESTION 138

Imagine a stack-and-roll hedge of monthly commodity deliveries that you continue for the next five years. Assume the hedge ratio is adjusted to take into account the mistiming of cash flows but is not adjusted for the basis risk of the hedge. In which of the following situations is your calendar basis risk likely to be greatest?

- a. Stack-and-roll in the front month in oil futures
- b. Stack-and-roll in the 12-month contract in natural gas futures
- c. Stack-and-roll in the three-year contract in gold futures
- d. All three situations will have the same basis risk.

11.8 ANSWERS TO CHAPTER EXAMPLES

Example 11.1: FRM Exam 2000—Question 12

a. This is the cash-and-carry relationship, solved for S . We have $Se^{-y\tau} = Fe^{-r\tau}$, or $S = 552.3 \times \exp(-7.5/200)/\exp(-4.2/200) = 543.26$. We verify that the forward price is greater than the spot price since the dividend yield is less than the risk-free rate.

Example 11.2: FRM Exam 2009—Question 3-1

b. The fair forward price is $F = Se^{-y\tau}/e^{-r\tau} = 750\exp(-0.02 \times 6/12)/\exp(-0.035 \times 6/12) = 750 \times 0.9905/0.9827 = 755.65$. The actual price is 757.00. Hence buying at the cheap price and selling at the forward price gives a profit of \$1.35.

Example 11.3: FRM Exam 2003—Question 2

c. For consistency, translate the spot rate into dollars, $S = 0.7310$. The CHF interest rate is lower than the USD rate, so the CHF must be selling at a forward premium. The fair forward price is $F = S \exp((r - r^*)\tau) = 0.7310 \exp((0.0105 - 0.0035) 0.25) = 0.7323$. Because this is less than the observed price of 0.7350, we sell at the expensive forward price and borrow USD, buy CHF spot, and invest in CHF. At maturity, we liquidate the CHF investment to satisfy the forward sale into dollars, repay the loan, and make a tidy profit.

Example 11.4: FRM Exam 2009—Question 3-19

a. Because the company has revenues fixed in EUR and some costs in USD, it would be hurt if the USD appreciated. So, the risk is that of a depreciation of the EUR against the USD. This can be hedged by buying the USD forward, which will lock in the EUR payment even if the USD appreciates.

Example 11.5: FRM Exam 2008—Question 2-27

c. Because principals on currency swaps are in different currencies, they need to be exchanged. In contrast, the principal amounts for interest rate swaps are in the same currency and are not exchanged.

Example 11.8: FRM Exam 2006—Question 88

a. The net present values of the payoffs in two currencies are described in the following table. As a result, the value of the currency swap is given by the dollar value of a long position in the yen bond minus a position in the dollar bond, or $(1/115)1,000(102.85/100) - 10(102.13/100) = \$8.943 - \$10.213 = -\1.270 .

T	Yen			USD		
	Rate	CF	NPV	Rate	CF	NPV
1	2.00%	4	3.92	4.50%	6	5.74
2	2.50%	104	98.93	4.75%	106	96.39
Sum			102.85			102.13

Example 11.7: FRM Exam 2007—Question 87

c. A cross-currency swap is inappropriate because there is no stream of payment but just one. Also, one would want to pay GBP, not receive it. An Asian option is generally cheap, but this should be a put option, not a call. Among the two remaining choices, the chooser option is more expensive because it involves a call and a put.

Example 11.8: FRM Exam 2008—Question 2-30

b. If the lease rate is, for example, zero, the futures price must be greater than the spot price, which describes a contango.

Example 11.9: FRM Exam 2007—Question 29

d. From June to December, prices go down, which is backwardation. June prices are abnormally high because of excess demand, which pushes prices up.

Example 11.10: FRM Exam 2007—Question 30

d. The trade involves now going long a March contract and short a June contract. In practice, this means taking delivery of the commodity and holding it for three

months until resale in June. The final payout is $5.90 - 0.05$ on a base of 5.35 . This gives an annualized rate of return of $r = 4\ln(5.85/5.35) = 35.7\%$.

Example 11.11: FRM Exam 2008—Question 4-16

a. MGRM had purchased oil in short-term futures market as a hedge against the long-term sales. The long futures positions lost money due to the move into contango, which involves the spot price falling below longer-term prices.

Example 11.12: FRM Exam 2006—Question 115

b. Using $F_t e^{-r\tau} = S_t e^{-y\tau}$, we have $F = S \exp(-(y - c)\tau + r\tau) = 50 \exp(-(0.02 - 0.01) + 0.05) = 52.04$.

Example 11.13: FRM Exam 2006—Question 138

a. For gold, forward rates closely follow spot rates, so there is little basis risk. For oil and natural gas, there is most movement at the short end of the term structure of futures prices. So using short maturities, or the front month, has the greatest basis risk.