CHAPTER 34

VALUING FUTURES AND FORWARD CONTRACTS

Problem 1

The implied interest rate can be calculated by dividing the futures price by the spot price.

\[
\text{Implied interest rate} = \frac{\text{Futures price}}{\text{Spot price}} - 1
\]

<table>
<thead>
<tr>
<th>Months to expiration</th>
<th>Trading at</th>
<th>Futures/Spot</th>
<th>Annualized</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$404.62</td>
<td>0.3397%</td>
<td>4.1539%</td>
</tr>
<tr>
<td>2</td>
<td>$406.11</td>
<td>0.7092%</td>
<td>4.3316%</td>
</tr>
<tr>
<td>3</td>
<td>$407.70</td>
<td>1.1035%</td>
<td>4.4877%</td>
</tr>
<tr>
<td>6</td>
<td>$412.51</td>
<td>2.2963%</td>
<td>4.6454%</td>
</tr>
<tr>
<td>12</td>
<td>$422.62</td>
<td>4.8035%</td>
<td>4.8035%</td>
</tr>
</tbody>
</table>

Problem 2

a. Theory Price = Spot price + Spot price \times (\text{Int rate - Div. Yield})

\[
= 258.90 + 258.90 \times (1.06^{(164/365)} - 1.03^{(164/365)}) = 262.306356
\]

The actual price is lower than the theory price. The contract is underpriced.

To set up the arbitrage: (1) Buy futures contract (2) Sell short stocks in index (3) Invest in T.Bills

b. Sell futures contracts on the index. # of contracts =

\[
(380000/258.90) \times 0.8/500 = 2.34839706
\]

Problem 3

# of contracts that have to be sold = (100 mil/258.9) \times 1.25/500 = 965.623793

3b. Expected Return on the mutual fund = 6 + 1.25(8) = 16%

3c. Expected return if you hedge away all market risk = 6% (Riskfree rate)

Problem 4

Theory price = Spot price \times (1+r) + kt = 481.40(1.06) + 481.40(0.02) = 519.912

Actual price = 515.60. The contract is underpriced.

To set up arbitrage: (1) Buy futures contract (2) Sell short on gold (3) Invest in T.Bills

To unwind: (1) Collect on T.Bills (2) Pay 515.60. Receive gold (3) Return gold; Collect storage cost;

Net profit = 519.91 - 515.60 = 4.31
Problem 5
a. Month Theory Basis Actual Basis
   March 1.26668689 0.43 Underpriced
   June  3.03339624 1.93 Underpriced

b. To set up arbitrage: (1) Buy futures contract (2) Sell short on stocks (3) Invest in T.Bills
   At expiration: (1) Collect on T.Bills (2) Pay $247.75; Receive stocks. (3) Deliver stocks;
   Pay dividends;

Problem 6
a. F* = Spot \((1+r)^t + kt = 19000 (1.10) + 200 = 21,100\)
b. Since the actual futures contract price is $20,400, I would
   1. Buy the futures contract for $20,400
   2. Sell short wheat at $19,000
   3. Invest the cash at 10%
   At expiration:
   1. Collect on my cash investment = $20,900
   2. Take delivery on the futures contract paying $20,400
   3. Return the wheat to the owner; collect saved storage costs of $200
   Arbitrage Profit = (20,900+200) - 20,400 = $700
   c. 19,000 \((1+r) = 20,400\)
   Solve for r,
   \(r = \frac{20,400}{19000} = 7.37\%\)