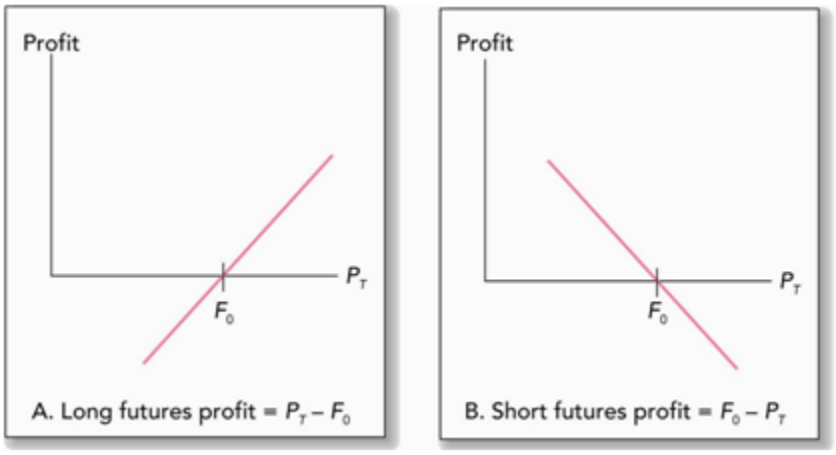
Futures Contracts

Forward Contracts

Futures Contracts

Forwards	*Futures*
Private contract between 2 parties	Traded on an exchange
Not standardized	Standardized contract
Usually one specified contract date	Range of delivery dates
Settled at end of contract	Settled daily
Delivery or final cash settlement usually takes place	Contract is usually closed out prior to maturity
Some credit risk	Virtually no credit risk


Profit
P_T
F_0
A. Long futures profit = $P_T - F_0$
Profit
P_T
F_0
B. Short futures profit = $F_0 - P_T$

Wheat futures

Each futures contract shall be for 5,000 bushels of No. 2 Soft Red Winter, No. 2 Hard Red Winter, No. 2 Dark Northern Spring, and No. 2 Northern Spring at par; and No. 1 Soft Red Winter, No. 1 Hard Red Winter, No. 1 Dark Northern Spring and No. 1 Northern Spring at 3 cents per bushel over contract price. Every delivery of wheat may be made up of the authorized grades for shipment from eligible regular facilities provided that no lot delivered shall contain less than 5,000 bushels of any one grade in any one facility.

14105. LOCATION DIFFERENITALS

In accordance with the provisions of Rule 14106., wheat for shipment from regular facilities located within the Chicago Switching District, the Burns Harbor, Indiana Switching District or the Toledo, Ohio Switching District may be delivered in satisfaction of Wheat futures contracts at contract price, subject to the differentials for class and grade outlined above. Only No. 1 Soft Red Winter and No. 2 Soft Red Winter Wheat for shipment from regular facilities located within the St. Louis-East St. Louis and Alton Switching districts may be delivered in satisfaction of Wheat futures contracts at a premium of 10 cents per bushel over contract price, subject to the differentials for class and grade.

14106. DELIVERY POINTS

Wheat certificates shall specify shipment from one of the currently regular for delivery facilities located in one of the following territories:
Wheat for shipment from regular facilities located within the Chicago Switching District, the Burns Harbor, Indiana Switching District or the Toledo, Ohio Switching District may be delivered in satisfaction of wheat futures contracts. Only No. 1 Soft Red Winter and No. 2 Soft Red Winter Wheat for shipment from regular facilities located within the St. Louis-East St. Louis and Alton Switching Districts may be delivered in satisfaction of Wheat futures. When used in these Rules, Burns Harbor, Indiana Switching District will be that area geographically defined by the boundaries of Burns Waterway Harbor at Burns Harbor, Indiana which is owned and operated by the Indiana Port Commission.

Thursday, March 30, 2006

Agriculture Futures

	OPEN	HIGH	LOW	SETTLE	CHG	LIFETIME HIGH	LIFETIME LOW	OPEN INT
Corn (CBT)-5,000 bu; cents per bu.								
May	224.00	228.00	223.75	227.75	3.50	276.50	208.75	421,628
July	235.00	239.00	234.75	238.75	3.25	279.00	217.25	270,275
Soybean (CBT)-5,000 bu; cents per bu.								
May	581.50	589.00	581.00	587.75	5.25	742.00	530.25	179,961
July	595.00	601.25	593.00	601.00	5.75	736.00	535.00	92,435
Soybean Meal (CBT)-100 tons; $ per ton.								
May	178.70	181.00	178.00	179.40	.70	230.50	164.80	60,344
July	180.80	182.80	180.10	181.60	.70	227.00	166.00	42,054
Soybean Oil (CBT)-60,000 lbs; cents per lb.								
May	22.97	23.25	22.83	23.17	.20	26.35	20.00	100,486
July	23.40	23.64	23.25	23.57	.17	25.55	20.25	52,456
Rough Rice (CBT)-2,000 cwt; cents per cwt.								
May	830.00	837.00	830.00	836.00	4.50	901.00	719.00	5,196
July	860.00	865.00	858.00	864.00	6.00	921.00	738.00	2,642
Wheat (CBT)-5,000 bu; cents per bu.								
May	341.25	345.75	340.25	344.50	2.75	390.50	316.50	187,238
July	354.25	358.00	352.50	357.25	2.75	400.00	325.50	94,151
Cattle-Live (CME)-40,000 lbs; cents per lb.								
Apr	80.750	81.175	80.525	81.000	.375	95.550	80.350	32,105
June	74.800	76.025	74.700	75.900	1.150	88.000	74.550	114,889
Hogs-Lean (CME)-40,000 lbs; cents per lb.								
Apr	57.400	58.300	57.250	58.125	.625	71.325	55.000	12,599
June	66.250	66.900	65.800	66.750	.600	73.450	59.500	82,554
Pork Bellies (CME)-40,000 lbs; cents per lb.								
May	83.300	83.650	81.250	81.775	–1.925	99.900	73.850	1,093
July	84.250	84.500	82.400	83.500	–1.700	99.900	75.300	450
Coffee (NYBOT)-37,500 lbs; cents per lb.								
May	104.65	109.60	104.50	108.60	4.25	148.50	92.10	57,460
July	107.80	112.00	107.40	111.40	4.25	147.30	89.00	25,714
Sugar-World (NYBOT)-112,000 lbs; cents per lb.								
May	18.08	18.48	18.08	18.27	.07	19.65	7.65	208,762
July	18.09	18.40	18.09	18.21	.09	18.71	7.70	112,000
Orange Juice (NYBOT)-15,000 lbs; cents per lb.								
May	147.00	150.25	146.55	148.75	1.30	151.50	95.30	22,737
July	144.00	146.70	144.00	146.05	1.35	147.80	98.00	7,860

Metal & Petroleum Futures

	OPEN	HIGH	LOW	SETTLE	CHG	LIFETIME HIGH	LIFETIME LOW	OPEN INT
Copper-High (CMX)-25,000 lbs; cents per lb.								
Apr	246.90	250.60	246.50	250.35	4.70	250.60	113.00	4,589
May	243.50	249.40	243.58	248.45	4.60	249.40	100.00	60,765
Gold (CMX)-100 troy oz; $ per troy oz.								
Apr	572.60	587.40	571.30	586.70	13.40	587.40	418.00	33,999
June	578.00	592.00	576.50	591.80	13.20	592.00	312.00	233,541
Aug	583.90	598.00	581.90	597.10	13.30	598.00	435.50	9,542
Oct	588.40	603.00	587.10	602.50	13.40	603.00	436.50	10,459
Dec	593.80	608.50	592.60	607.80	13.50	608.50	338.00	17,758
Dc07	631.00	638.50	631.00	640.20	14.70	638.50	368.00	10,273
Platinum (NYM)-50 troy oz; $ per troy oz.								
Apr	1076.90	1095.00	1076.00	1090.70	13.80	1095.00	815.00	889
July	1088.00	1104.80	1084.00	1102.70	14.80	1104.80	985.00	8,243
Silver (CMX)-5,000 troy oz; cnts per troy oz.								
Apr	1114.0	1142.0	1114.0	1161.8	54.5	1142.0	920.0	150
May	1110.0	1171.5	1110.0	1166.0	54.5	1171.5	685.5	83,288
Crude Oil, Light Sweet (NYM)-1,000 bbls; $ per bbl.								
May	66.51	67.30	66.05	67.15	0.70	70.33	36.86	250,120
June	67.50	68.50	67.11	68.33	0.86	70.80	23.75	132,805
July	68.10	69.10	67.78	69.02	0.95	71.10	30.05	52,456
Dec	68.95	70.00	68.75	69.89	0.87	71.70	19.10	90,677
Dc07	68.55	69.35	68.55	69.49	0.77	70.80	19.50	65,963
Dc08	67.81	67.81	67.65	68.20	0.68	68.60	19.75	38,881
Heating Oil No. 2 (NYM)-42,000 gal; $ per gal.								
Apr	1.8542	1.8890	1.8425	1.8843	.0323	2.1160	1.0954	11,012
May	1.8510	1.8850	1.8396	1.8793	.0299	2.0300	1.0600	66,907
Gasonline-NY Unleaded (NYM)-42,000 gal; $ per gal.								
Apr	1.9525	2.0025	1.9465	1.9957	.0415	2.0760	1.4475	10,559
May	1.9050	1.9250	1.8935	1.9101	.0027	2.0700	1.4710	69,209
Natural Gas (NYM)-10,000 MMBtu; $ per MMBtu.								
May	7.480	7.562	7.370	7.487	.031	11.266	3.571	108,520
June	7.680	7.748	7.580	7.674	.033	11.285	3.601	30,745
July	7.839	7.925	7.760	7.859	.043	11.300	3.580	27,545
Oct	8.244	8.290	8.150	8.252	.051	11.390	3.732	38,076
Nov	9.409	9.440	9.300	9.330	–.051	11.765	3.950	28,423
Ja07	11.034	11.060	10.850	10.890	–.141	12.600	4.823	46,332

Interest Rate Futures

	OPEN	HIGH	LOW	SETTLE	CHG	LIFETIME HIGH	LIFETIME LOW	OPEN INT
Treasury Bonds (CBT)-$100,000; pts 32nds of 100%								
June	109-22	109-28	108-26	109-06	–16	117-24	108-26	624,046
Sept	109-20	109-20	108-26	109-07	–16	115-16	108-26	2,978
Treasury Notes (CBT)-$100,000; pts 32nds of 100%								
June	106-210	106-240	106-040	106-100	–9.5	110-130	106-040	1,960,846
Sept	106-160	106-210	106-065	106-110	–10.5	109-280	106-065	65,241
5 Yr. Treasury Notes (CBT)-$100,000; pts 32nds of 100%								
June	104-180	104-215	104-095	104-125	–5.5	106-250	104-095	1,160,470
Sept	104-195	104-195	104-120	104-120	–6.0	106-220	104-120	9,448
2 Yr. Treasury Notes (CBT)-$200,000; pts 32nds of 100%								
Mar	—	—	—	101-290	–1.5	102-272	101-295	1,028
June	101-305	101-315	101-282	101-287	–1.5	102-265	101-280	454,522
30 Day Federal Funds (CBT)-$5,000,000; 100 - daily avg.								
Mar	95.415	95.415	95.410	95.415	—	96.285	95.400	93,351
Apr	95.230	95.235	95.230	95.235	—	95.985	95.230	174,852

	OPEN	HIGH	LOW	SETTLE	CHG	YIELD	CHG	OPEN INT
1 Month Libor (CME)-$3,000,000; pts of 100%								
Apr	95.1050	95.1050	95.0950	95.0975	–.0025	4.9025	.0025	22,165
May	94.9750	94.9750	94.9575	94.9650	–.0050	5.0350	.0050	41,500
Eurodollar (CME)-$1,000,000; pts of 100%								
Apr	94.9600	94.9600	94.9450	94.9500	–.0125	5.0500	.0125	44,588
June	94.8250	94.8400	94.7900	94.7950	–.0300	5.2050	.0300	1,365,087
Sept	94.7700	94.7900	94.7150	94.7250	–.0400	5.2750	.0400	1,340,598
Dec	94.7850	94.8100	94.7250	94.7400	–.0400	5.2600	.0400	1,388,203

Currency Futures

	OPEN	HIGH	LOW	SETTLE	CHG	LIFETIME HIGH	LIFETIME LOW	OPEN INT
Japanese Yen (CME)-¥12,500,000; $ per 100¥								
June	.8578	.8630	.8568	.8614	.0034	.9949	.8455	161,932
Sept	.8706	.8736	.8678	.8721	.0035	.9435	.8572	18,741
Canadian Dollar (CME)-CAD 100,000; $ per CAD								
June	.8545	.8647	.8544	.8634	.0090	.8879	.7950	82,915
Sept	.8574	.8666	.8574	.8657	.0090	.8912	.7970	2,320
British Pound (CME)-£62,500; $ per £								
June	1.7364	1.7502	1.7361	1.7485	.0126	1.8120	1.7076	75,545
Sept	1.7438	1.7530	1.7410	1.7511	.0127	1.7941	1.7282	252
Swiss Franc (CME)-CHF 125,000; $ per CHF								
June	.7697	.7781	.7695	.7771	.0075	.8635	.7633	88,067
Sept	.7835	.7852	.7822	.7842	.0076	.8134	.7712	252
Australian Dollar (CME)-AUD 100,000; $ per AUD								
June	.7055	.7150	.7055	.7140	.0079	.7760	.7006	66,866
Sept	.7090	.7140	.7069	.7132	.0079	.7700	.7001	143
Mexican Peso (CME)-MXN 500,000; $ per 10MXN								
Apr	—	—	—	.91375	.00275	.94950	.90700	20
June	.90750	.91250	.90550	.90975	.00275	.95000	.84500	43,780
Euro (CME)-€125,000; $ per €								
June	1.2087	1.2230	1.2081	1.2213	.0131	1.3795	1.1798	136,658
Sept	1.2157	1.2292	1.2157	1.2277	.0132	1.2770	1.1864	2,080

Index Futures

	OPEN	HIGH	LOW	SETTLE	CHG	LIFETIME HIGH	LIFETIME LOW	OPEN INT
DJ Industrial Average (CBT)-$10 × Index								
June	11266	11320	11172	11204	–63	11410	10363	37,753
Sept	11310	11310	11281	11281	–63	11445	10891	58
Mini DJ Industrial Average (CBT)-$5 × Index								
June	11265	11320	11172	11204	–63	11413	10600	66,550
Sept	11300	11305	11300	11281	–63	11470	11300	10
S&P 500 Index (CME)-$250 × Index								
June	1310.30	1319.00	1305.00	1307.50	–2.60	1321.30	1080.00	645,025
Sept	1320.00	1329.30	1316.00	1318.30	–2.50	1331.40	1112.60	6,275
Mini S&P 500 (CME)-$50 × Index								
June	1310.50	1319.25	1304.75	1307.50	–2.50	1321.50	1261.25	1,159,253
Sept	1330.00	1330.00	1316.00	1318.25	–2.50	1331.75	1311.25	777
Nasdaq 100 (CME)-$100 × Index								
June	1720.50	1737.50	1715.50	1725.00	4.50	1791.50	1576.50	57,932
Mini Nasdaq 100 (CME)-$20 × Index								
June	1720.5	1737.5	1715.5	1725.0	4.5	1793.0	1652.5	275,210
Sept	1757.0	1757.0	1736.5	1744.5	4.5	1757.0	1693.5	74
Russell 1000 (NYBOT)-$500 × Index								
June	714.50	715.50	712.60	713.00	–1.50	719.00	695.75	87,433

4 Futures Essentials

1) Margin

2) Marking-to-market

You are long 10 gold futures contracts, established at an initial settle price of $785 per ounce, where each contract represents 100 ounces. Your initial margin to establish the position is $2,025 per contract, and the maintenance margin is $1,700 per contract. Over the subsequent four trading days, gold settles at $779, $776, $781, and $787, respectively. Compute the balance in your margin account at the end of each of the four trading days, and compute your total profit or loss at the end of the trading period. Assume that a margin call requires you to fund your account back to the initial margin requirement.

You are short 25 gasoline futures contracts, established at an initial settle price of $2.085 per gallon, where each contract represents 42,000 gallons. Your initial margin to establish the position is $7,425 per contract, and the maintenance margin is $6,500 per contract. Over the subsequent four trading days, gas settles at $2.071, $2.099, $2.118, and $2.146, respectively. Compute the balance in your margin account at the end of each of the four trading days, and compute your total profit or loss at the end of the trading period. Assume that a margin call requires you to fund your account back to the initial margin requirement.

3) Cash futures arbitrage

4) Futures positions can be reversed at any time.

Taxes

Position limits – Wheat below

In accordance with Rule 559., Position Limits and Exemptions, no person shall own or control positions in excess of:

1. 600 contracts net long or net short in the spot month. In the last five trading days of the expiring futures month in May, the speculative position limit will be 600 contracts if deliverable supplies are at or above 2,400 contracts, 500 contracts if deliverable supplies are between 2,000 and 2,399 contracts, 400 contracts if deliverable supplies are between 1,600 and 1,999 contracts, 300 contracts if deliverable supplies are between 1,200 and 1,599 contracts, and 220 contracts if deliverable supplies are below 1,200 contracts. Deliverable supplies will be determined from the CBOT's Stocks of Grain report on the Friday preceding the first notice day for the May contract month.
2. 5,000 futures-equivalent contracts net long or net short in any single contract month excluding the spot month. Additional futures contracts may be held outside of the spot month as part of futures/futures spreads within a crop year provided that the total of such positions, when combined with outright positions, does not exceed the all months combined limit.
3. 6,500 futures-equivalent contracts net long or net short in all months combined.

Futures pricing

$F_T = S(1+ R)^T$

Stock price = \$12, R_F = 4%, expiration = 3 months

With dividends

$F_T = S(1+ R – d)^T$

Stock price = \$80, R_F = 7%, expiration = 6 months, d = 3%

CFA Question

Joan Tam, CFA, believes she has identified an arbitrage opportunity as indicated by the information given below:

Spot price for commodity: $120

Futures price for commodity expiring in one year: $125

Interest rate for one year: 8%

a. Describe the transactions necessary to take advantage of this specific arbitrage opportunity.

b. Calculate the arbitrage profit.

c. Describe two market imperfections that could limit Tam's ability to implement this arbitrage strategy.

c. Direct Transaction Costs: First, the trader must pay a fee to have an order executed. This fee includes commissions and various exchange fees. Second, in every market, there is a bid-ask spread. Market makers on the floor of the exchange must try to sell at a higher price (ask price) than the price at which they are willing to buy (bid price). Without the inclusion of transactions costs, the same arbitrage opportunity that is profitable without transaction costs may not be profitable after transaction costs. Rather than having a specific no-arbitrage price in which traders can profit, there is now a bound of no-arbitrage futures prices, bounded by the applicable transaction costs.

Unequal Borrowing and Lending Rates: In perfect markets, all traders can borrow and lend at the risk-free rate. This is not true in real markets. Generally, traders face a borrowing rate that exceeds the lending rate. As in the case of transaction costs, there is no longer a single no-arbitrage price but rather a transaction that has boundaries established by the differential between the borrowing and lending rates.

Restrictions on Short Selling: In perfect markets traders can sell assets short and use the proceeds from the short sale. In actual markets, however, there are serious impediments to short selling. First, for some goods, there is virtually no opportunity for short selling. This is particularly true for many physical goods. Second, even when short selling is permitted, restrictions limit the use of funds from the short sale. Often these restrictions mean that the short seller does not have the use of all of the proceeds from the short sale. This particularly is important in the reverse cash and carry, where the short sale is employed in the transaction. Short selling restrictions lower the boundary of the reverse cash and carry. If an investor can only use a portion of the short sale proceeds, that condition will depress the lower boundary, having little effect on the futures price.

Limitations on Storage: The storability of a commodity is important in the futures pricing of some commodities. While some goods store well, others do not. Perishable commodities are said to have infinite storage costs. This limitation to storage means that a cash and carry strategy cannot link futures and cash prices. Therefore, when the cash and carry or reverse cash and carry strategy are executed, the inability to store a commodity indefinitely can cause the no arbitrage bounds to be altered to reflect the actual limitations to storage.

Supply Shortage: The supply of commodities such as gold is large relative to its consumption, hence the market for gold will closely approximate its full carry market. The supply of some industrial metals is small relative to consumption and those markets are not full carry markets.

Seasonal Factors: Highly seasonal production or consumption factors can cause distortions in normal price relationships.

Tam must also realize that these imperfections differ widely across markets and have different effects on different traders, and that their potential effect on her ability to implement a given arbitrage strategy depends on her unique circumstances.

CFA Problem

Donna Doni, CFA, wants to explore inefficiencies in the futures market. The TOBEC stock index has a spot value of 185 now. TOBEC futures are settled in cash and underlying contract values are determined by multiplying $100 times the index value. The current annual risk-free interest rate is 6 percent.

a. Calculate the theoretical price of the futures contract expiring six months from now, using the cost-of-carry model.

b. The total (round-trip) transaction cost for trading a futures contract is $15. Calculate the lower bound for the price of the futures contract expiring six months from now.

Hedging with Futures

Stock hedging with futures

# of contracts = $\frac{\beta_P \times V_P}{V_F}$

S&P500 = 1300, V_P = $100,000,000, S&P futures are $250 times the index, portfolio β = 1.25

Bond hedging with futures

# of contracts = $\frac{D_P \times V_P}{D_F \times V_F}$

$D_F = D_U + M_F$

D_P = 8 years, V_P = $100,000,000, D_U = 6.5 years, maturity = 6 months, Futures price = 98, bond futures = $100,000

Cross Hedging

$$h = \rho_{S,F}\left(\frac{\sigma_S}{\sigma_F}\right)$$

Company needs 1 million gallons of jet fuel in 3 months. Hedge with heating oil (42,000 gallon contracts).

$\sigma_{JF} = .032$, $\sigma_{HO} = .040$, $\rho_{JF,HO} = .8$

Treasury Bonds and Cheapest to Deliver

Conversion factor

Value of the bond on the first day of the delivery month assuming the interest rate for all maturities is 6% (changeable). Bond maturity and coupon payment are rounded to the nearest 3 months.

If the bond payment is in exactly 6 months, the first payment is assumed to be after 3 months and the interest is subtracted.

Example 1

14% semiannual coupon, 20 years and 2 months to maturity

Example 2

14% semiannual coupon, 18 years and 4 months to maturity

Finding the CTD bond

Theories of Futures Prices

1) Expectations

2) Normal backwardation

3) Contango

Futures Price over Time, in the Special Case that the Expected Spot Price Remains Unchanged