Futures Markets by Siegel and Siegel

Chapter 1: The Basics of Futures Contracting

Problem 1

Explain the circumstances in which

(a) a futures trade will increase open interest

A futures trade will increase open interest if neither party in the trade is offsetting an existing position. In this situation, open interest goes up with the volume of trading.

(b) a futures trade will decrease open interest

If both parties in a trade are offsetting existing positions, then open interest falls as the contract is unwinding.

(c) a futures trade will leave open interest unchanged

If only one party in a trade is offsetting an existing position, open interest will remain the same.

Note: Open Interest = the number of total positions that remain open at the end of the day and are carried over into the next. Because each long position must have a corresponding short position, open interest represents the number of long [or short] positions remaining open. This double counting is not unlike double counting majors in say a Finance Department that offers both Finance and Real Estate degrees.

2. Commodity Arbitrage

Suppose you enter into a long position in a Gold Futures Contract for 100 oz. (1 contract) of gold, expiring in 120 days at a price of $400 per oz. In addition you borrow and lend at 9% per annum. Finally, you plan to borrow to pay any mark-to-market losses, and lend any mark-to-market gains at that 9% rate. Assume a 360 day year when calculating interest.

(a) If the Gold Futures price stays at $400/oz for 119 days and then jumps to $421/oz just as the contract expires, what will be your futures profits at expiration? (European contract situation)

In this situation there is an immediate mark-to-market profit of $421 - $400 = $21/oz.
Given that there is no interest, the total profit turns out to be:
$21/oz x 100 oz of Gold = $2,100

(b) If the gold futures price immediately jumps to $421/oz and then stays there until contract expiration, what will be your futures profits after 120 days?

This trade generates an immediate mark-to-market profit of $421/oz - $400/oz = $21/oz
So, your position would be debited in the amount of:
$21/oz x 100 oz of Gold in the Contract = $2,100 and this amount can be invested to earn 9% for 120 days until contract expiration.

Futures Profit =	Gain on the Contract debited to Your Account ==➔	$2,100
	Interest on the Debited Amount [$2,100 x .09(120/360)]=➔	63
	Futures Profit from the Trade ======➔	$2,163

(c) If the Gold Futures immediately drops to $370 and stays there, and then jumps to $421 on the last day at expiration, what will be your futures gain at expiration if any?

In this case there is an immediate mark-to-market loss in your position of:
$370/oz - $400/oz = ($30/0z) so your position will be credited in the amount of:
($30/oz) x 100 oz of Gold = $3,000 consequently you incur borrowing costs to finance this credit amount to your position of: $3,000 x .09(120/360) = ($90)

Futures Profit =	Immediate Mark-to Market Loss ==========➔	($3,000)
	Borrowing Costs to Maintain the Position ======➔	(90)
	At expiration Mark-to-Market Gain	
	$421/oz - $370/oz = $51/oz	
	$51/oz x 100 oz. of Gold ==========➔	$5,100
	Futures Profit from the Tade ==========➔	$2,010

(d) Why do you get a different answer in each case even though the initial futures price is $400/oz and the futures price of the contract settles at $421/oz at expiration?

We get differing answers because the cash flows come at different times. In case (a), no interest is received because the gain occurs on the last day. In (b) the gain is recorded immediately, so the cash flows can be invested over the entire 120 days to earn interest. With (c) the loss comes early resulting in the need to finance the contract through borrowing thereby reducing the ultimate gain from the position. The profit comes late so there is no opportunity to earn interest on the cash flow in this instance when the contract is marked-to-market.

3. Arbitrage using Futures

In financial markets we define the bid price as the price where one can SELL an asset, or the price at which one can go SHORT a futures contract. We define the ask price as the price at which one can BUY an asset or the price where one can go LONG a futures contract.

(a) Suppose that on March 15th, we observe the following futures prices per oz.

MARCH 15th Futures Listing

	Bid	Ask
August Gold Futures [100 oz]	$425.10	$425.20
December Gold Futures [100 oz]	$453.50	$453.65

Why would we expect the bid price to always be below the ask price?

The price whereby one can sell to a market maker must be below the price at which one can buy, otherwise there would be an easy arbitrage opportunity. If the August Bid price were say $430 per oz. versus an ask price of $424.20, then a trader would buy at the ask price of $424.20 and simultaneously sell at the bid of $430 thereby making $5.80 in arbitrage profits. This arbitrage process would push the bid price down and the ask price up to market equilibrium.

(b) Now suppose we decide to enter into a LONG August, SHORT December spread for 5 Gold Contracts on June 13th. On June 13th the futures prices are as follows:

JUNE 13th Futures Listing

	Bid	Ask
August Gold Futures [100 oz]	$413.40	$413.45
December Gold Futures [100 oz]	$445.60	$445.70

There are two legs to this spread ---- the LONG and the SHORT

LONG

On March 15th – You go long August GOLD Futures at $425.20 per oz.

90 days later . . . . .

On June 13th you close this position out so you will sell or go short Aug Gold Futures at $413.40/oz

On this leg of the spread you lost money ====➔ Aug Futures Loss = $413.40 - $425.20 = ($11.80)

SHORT

On March 15th you short the December Gold Futures Contract at: $453.50

On June 13th you close this position out by going Long December Gold Futures at $ 445.70

On this leg of the spread you have a gain ======Dec Futures Gain = $453.50 - $445.70 = $7.80/oz

Net Profit/loss from this Spread = -$11.80 + $7.80 = -$4.00/oz

Which translates to 5 contracts or 500 oz gold x -$4.00 = -$2,000

(c) Now suppose that on June 13th, the futures prices per oz are as follows:

JUNE 13th Futures Listing

	Bid	Ask
August Gold Futures [100 oz]	$433.40	$433.45
December Gold Futures [100 oz]	$465.60	$465.70

And we decide to close the spread by offsetting positions at these prices. What will be the net profits from each leg of the spread, as well as, the net profit or loss in this trade?

LONG

On March 15th you go long the Aug Gold Futures Contract at: $425.20

On June 13th you unwind by selling the Aug Gold Futures Contract at: $433.40

You have a net profit per oz in this leg of the spread of: $433.40 - $425.20 = $8.20/oz

SHORT

On March 15th you short the Dec Gold Futures Contract at: $453.50

You then cover the short by buying the Dec. Futures Contract on June 13th at: $465.70

Consequently there is a net loss to this leg of: $453.50 - $465.70 = ($12.20)/oz

The Net Loss on the Spread: ($12.20) + $8.20 = ($4.00)/oz

500 oz x ($4.00)/oz = ($2,000) loss on the 5 contracts

(d) what is the relationship between net profits in parts (b) and (c)

The net profits in parts (b) and (c) are the same, because the:

Short Aug – Long Dec Spread is:

Long		Short	
Dec Ask	-	Aug Bid	
$445.70	-	$413.40	Part (b)

$32.30

Long		Short	
Dec Ask	-	Aug Bid	
$465.70	-	$433.40	Part (c)

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$32.30

In either case, the closing spread is the same, so the profit (loss) on the spreads must be identical. Only relative price movements matter.