

Homework Assignment 7 solution.

1. (1 point) Describe the procedure that clearing corporations use to eliminate the risk of default on any of futures contracts.

Clearing corporations *mark to market* using margin accounts of all participants. The essence of this procedure is that gains/losses, which occur because of the fluctuations in the price of the underlying assets, are posted to the margin accounts daily. As a result, no money has to change hands on the delivery date and the default risk is virtually eliminated.

2. (1 point) What is the price of the futures contract on its expiration date? What process guarantees that the price will be as you described it?

The price of the futures contract is equal to the price of underlying asset on the expiration date. Arbitrage guarantees that this is always the case. Arbitragers would exploit any price difference between the underlying asset and futures contract and drive the two prices together immediately.

3. (1 point) Is an investor who took a short position in Treasury Bonds Futures market hoping for higher or lower interest rates in the future? Explain.

Short position means obligation to deliver some amount of T-Bonds at some point in the future at a fixed price. This investor would, therefore, hope for lower price of these bonds on the delivery date (the investor can buy them cheap and sell them at the fixed higher price). The bonds are cheap when interest rates are high.

4. (1 points) Suppose an owner of a manufacturing firm in US expects to get paid in Euros in five months by a customer in Germany. What are the risks associated with this transaction? Name at least one way to hedge against the exchange rate risk?

There are a couple of risks associated with this transaction. First of all, there is the risk of default – the risk that the customer in Germany won't pay at all. There is also exchange rate risk – the risk that the exchange rate between the US dollar and Euro will significantly change in five months. The exchange rate risk can be insured via (1) foreign currency futures, (2) foreign currency options, (3) foreign currency swaps. There are other derivatives that allow hedging against exchange rate risk.

5. (1 point) Describe the difference between American and European options?

American options can exercised on any date before expiration date. European options can exercised on the expiration date only.

6. (1 point) Compute the profits of an investor who bought for a \$1000 premium a *call* option on 1000 stocks with a strike price of \$110, if at the expiration date the price is \$114.

This option will be exercised because market price is above option strike price (option gives you the right to buy 1000 shares at a price below market price).

Profit = -\$1000 (premium) + \$114,000 (sell stocks at the current market price) - \$110,000 (buys stocks at the strike price from the option writer) = \$3,000.

7. (1 point) Compute the profits of an investor who bought for a \$1000 premium a *put* option on 1000 stocks with a strike price of \$113, if at the expiration date the price is \$114.

This option will not be exercised because the market price is above the option strike price (put option gives you the right to sell 1000 shares at a price below current market price).

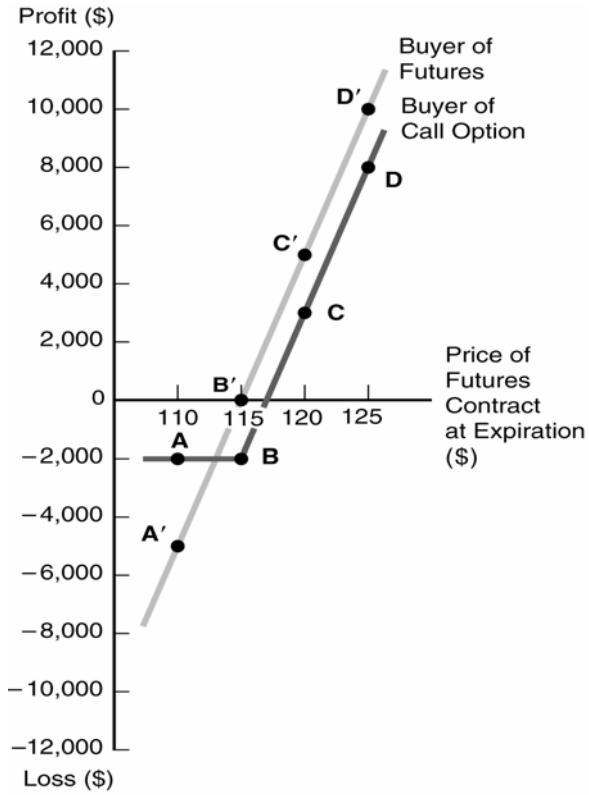
Profit = -\$1000 (premium).

8. (1 points) Name at least two factors affecting option premiums?
- a) **Strike price;**
 - b) **Term to expiration;**
 - c) **Volatility of prices of the underlying asset.**
9. (2 points) Show graphically and explain the profits and losses of buying futures relative to buying call options.

As the graph from the textbook shown below demonstrates (you didn't have to put numbers on the axes – I'm interested in the overall shapes of these two curves), the profit-loss function for futures is linear. Both gains and losses grow linearly for each \$1 change in the underlying security price at expiration (equal to the price of futures contract at the expiration). The profit curve for options is nonlinear. The loss is limited to the amount of the premium. Profits are a linear function of the asset price at expiration, but profits from options are always less than for futures by the amount of the premium. The key differences are that options losses are limited, while futures losses are not. Gains for futures and options are linear functions of the expiration price, but option profits are always less than futures profits by the amount of the premium.

The key to understanding this graph is to realize that a futures gives you *the obligation* to buy some asset, while an option gives you *the right* to buy it. If the market conditions are not favorable (the market price of the asset at the expiration date is low), you do not exercise the contract (you can buy the asset cheaper on the

market instead of exercising the option by buying it from option writer at a higher price).



(a) Profit or loss for buyer of call option and buyer of futures