

Midterm Exam II

Please answer all questions. Each question's weight in the total grade is given next to the question number.

1. (40%) Explain the reasons why you **agree** or **disagree** with the following statements. Circle the correct answer and complete the sentence.

- (i) A speculator who expects that interest rates will go up in the near future should invest in a bond portfolio with a long duration.

Disagree, because

If interest rates are expected to rise, this will result in a loss on long term bonds(at least in the short term).

- (ii) An investor has paid \$3 for a call option with a strike price, X, of \$60. At expiration the underlying stock price is \$61. Then the investor should not exercise the call option at expiration because he will lose \$2 on his investment.

Disagree, because

He will make \$1 exercising the option, as the strike is \$60 and he can instantly sell at \$61. The \$3 is sunk cost.

- (iii) European call options are worth more, the longer their time to expiration.

Disagree because

If the underlying stock pays dividends, it may be the case that an option with a dividend immediately after the expiration may be worth less one immediately after the ex-dividend date.

- (iv) It is riskier to have (i.e. you can lose more money on) a short position in a call option than a short position in a put option.

Agree, because

Losses on a short call option are unbounded while the loss on a short put is $-S_t$.

- (v) If company A and B face the borrowing terms shown below and A wants a fixed rate loan while B wants a floating rate loan, they can benefit from a swap.

	Fixed %	Floating %
Company A	7.20	Libor + 0.50
Company B	8.00	Libor + 1.00

Disagree, because

B has a comparative advantage in floating while A has a comparative advantage in fixed(thus they have the CA in the type they want, so no swap possible).

Company A could borrow at Libor +.5, B borrows at 8, they swap, and A ends

up at 7.2 fixed, which would give B Libor + 1.3. Thus neither firm is better (and one is worse).

2. (40%) On October 25, 2000, Compaq's stock price closed at \$28. The following option prices were quoted in WSJ:

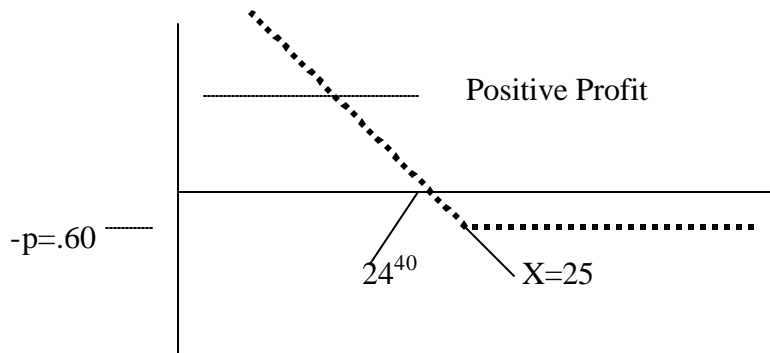
Strike (\$)	Expiration	Call Price (\$)	Put Price (\$)
25	Nov	3.90	0.60
30	January	2.55	4.10
35	Nov	0.25	7.50

(i) Compute the intrinsic value and the time value of these options.

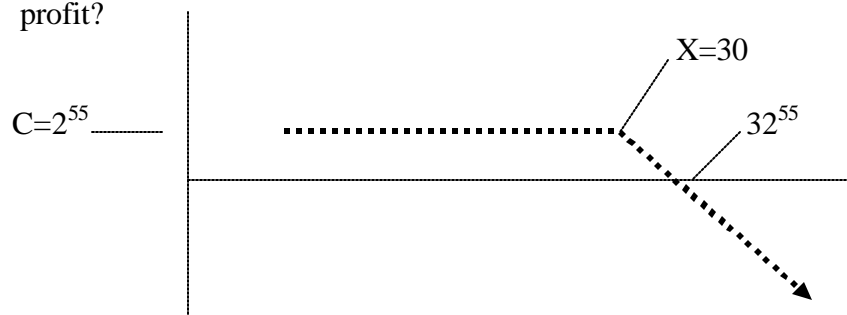
	Strike	Expiration	Intrinsic value	Time value
Call	25	Nov	3	.90
Call	30	January	0	2.55
Call	35	Nov	0	.25
Put	25	Nov	0	.60
Put	30	January	2	2.10
Put	35	Nov	7	.50

How does the strike price and the time to expiration affect the call and put option prices? **Call options are decreasing in price as the strike price increases. Put options are increasing in price as the strike price increases. Both are increasing in price as the time to maturity increases.**

(ii) Plot the *profit* diagram for a *long* position in the November, 25 *put* option as a function of the stock price at expiration. When does this position make a profit?



(iii) Plot the *profit* diagram for a *short* position in the January, 30 *call* option as a function of the stock price at expiration. When does this position make a profit?



- (iv) On November 7, 2000, the Compaq stock price had risen to \$31.30. The January call and put options with strikes of \$30 were now quoted at \$3.60 and \$2.10. Compute the percentage rate of return on the Compaq stock and on the call and put options between October 25 and November 7.

Percentage rate of return:

$$\text{Stock} = \frac{31.30}{28} - 1 = 11.7\%b$$

$$\text{Call} = \frac{3.60}{2.55} - 1 = 41.1\%$$

$$\text{Put} = \frac{2.10}{4.10} - 1 = -48.7\%$$

Which asset appears to be most risky?

Both the call and the put seem much more risky than the stock.

3. (20%) An investor owns a bond portfolio worth \$2m with a duration of 14 years. The investor fears that long interest rates, currently at 6.2 percent, may go up in the near future. The investor decides to set up a hedge by investing in T-bond futures contracts. Currently the January 2001 T-bond futures contract is trading at par and its duration is estimated at 16.5 years. Each bond futures contract is for \$100,000.

(i) Explain which position (short/long and number of contracts) the investor should take in the T-bond futures contract.

The investor should take a short position in the future.

$P=2,000,000$

$D_p=14$

$F_c=100,000$

$D_f=16.5$

$P D_p / F_c D_f = 16.9 \sim 17$. The investor should be short 17 contracts.

In January, 2001 in fact the interest rate has *decreased* to 5.8 percent and the value of the investor's bond portfolio has increase to \$2.112 million. The bond futures price has increased from 100 to 107 out of par.

(ii) Compute the change in the value of the investor's hedged portfolio. In this case was it a good idea to hedge?

Change in bond portfolio = 112,000.

Change in hedge = $(100,000 - 107,000) * 17 = -119,000$.

So a net loss of \$7000, vs. a gain of \$112,000 had he not hedged. But the hedge was successful in the sense it dramatically reduced the risk(in exchange for the chance to make profit).