

Derivative Securities, Fall 2011
Review questionnaire
Due December 15, 2011

(You can work on this in groups if you prefer. Most questions are "interview-type" items that you should be able to answer without doing major calculations.)

1. What is the largest futures contract in the world by daily traded volume?
2. Describe the difference between a futures contract and a forward contract.
3. You want to determine the fair value of a 2-year forward on a 6-month loan in the interbank market. The futures price for 3-month LIBOR (3M Eurodollar futures) settling in 2 years is 99.00. What information do you get from this?
4. What is contango? Give an example.
5. What is backwardation? Give an example.
6. Describe put-call parity for options. Does it hold for American-style options?
7. What is implied dividend? Give some examples of calculations of implied dividends for stocks and ETFs.
8. What is a hard-to-borrow stock? Explain put-call parity for hard-to-borrow stocks.
9. You hold a call option with expiration date T on stock XYZ. The company announces a dividend distribution with ex-date *before* T . What happens to the value of the option? What if the ex-dividend date is *after* T ?
10. What is implied volatility? Describe the general shape of the implied volatility curve for options with same settlement date and different strikes, (a) in the case of equity indices, (b) in the case of an index of mining companies (e.g. XAU).
11. What is the Delta of an option and what is it used for? Give a simple example.
12. What is the difference between the Black-Scholes formula and the Black 76 formula? Give an example.
13. Estimate the fair value of an ATM 1-year European-style call with volatility 30% as a percentage of the forward price to *without* using the Black-Scholes formula.
14. What is a call spread? Why would an investor buy/sell a call-spread?

15. What is a put spread? Why would an investor buy/sell a put spread?
16. What is a risk-reversal? Why would an investor buy/sell a risk-reversal?
17. What is a butterfly spread? Can a butterfly spread trade at a negative asking price?
18. Selling (naked) 10-year S&P 500 index puts is a strategy that supports what view of the market?
19. Describe the relation between a trinomial tree scheme and the Black-Scholes equation.
20. Derive formulas for the Up/down/middle probabilities for a trinomial tree for an index with given volatility, dividend yield and financing rate.
21. Write a formula for currency forward rates and give an example.
22. Describe the profit/loss of a trading strategy in which a Brazilian trader sells BRL against USD (for 1MM dollars) and simultaneously enters into a 1-year forward contract to sell 1MM dollars and buy BRL at the forward rate.
23. A down-and out call is a call that "knocks out" if the underlying asset crosses a lower barrier. Suppose that the investor gets a rebate of \$1 if the option knocks out. Describe the relation between the fair-values of this option and a plain-vanilla option with the same strike and expiration date.
24. An up -and -in call is a derivative security that gives the holder a call (with pre-assigned strike and expiration) if the stock crosses a level above the current strike price. Describe the risk profile of this option.
25. True or false: an up-and-out call should be more expensive if implied volatility suddenly rises.
26. Consider an *up-and-in* 1.30 EUR call/USD put maturing in 1 year with knock-in barrier at 1.50. Rates are $r_{US}=0.4\%$, $r_{EUR}=1.5\%$ and spot is 1.350. Consider 3-scenarios: (1) the 1-year variance is constant, equal to $(20\%)^2$, (2) the 1-year variance is upward-sloping with average $(20\%)^2$, (3) the 1-year variance is downward-sloping with average $(20\%)^2$. Can you say/guess under which of the three scenarios the option will be more expensive?

27. An equity-linked note based on the S&P500 index has the following structure: expiration date: December 31, 2022. On December 31 of each calendar year, investor receives 50% of the return of the index from January 1 to December 31st of the calendar year and a 3% coupon payment. Price this ELN, assuming the following tables for interest rates and volatility

Maturity (years)	Rate	Dividend	Volatility
1	0.75	2	30
2	0.9	2	27
3	0.95	2	26
4	1	2	25
5	1	2.5	25
6	1.5	2.5	25
7	1.6	2.5	25
8	2	2.5	26
9	2.5	2.5	27
10	2.6	2.5	28