University of Texas at Austin

Problem Set # 5

Mean and median of the log-normal stock prices.

Problem 5.1. The current price of a continuous-dividend-paying stock is \$80 per share. Its rate of appreciation is 12% and its volatility is 30%.

Let $R(0,t)$ denote the realized return of this stock over the time period $[0,t]$ for any $t > 0$. Calculate $\mathbb{E}[R(0,2)]$.

Problem 5.2. (5 points)

A stock is valued at \$75.00. The annual expected rate of appreciation is 10.0% and the standard deviation of annualized returns is 25.0%. If the stock is lognormally distributed, what is the expected stock price after 2 years?

(a) About \$71.61
(b) About \$81.63
(c) About \$91.61
(d) About \$108.83
(e) None of the above.

Problem 5.3. (5 pts) A non-dividend-paying stock is valued at \$55.00 per share. The annual expected (rate of) return is 12.0% and the standard deviation of annualized returns is given to be 22.0%. If the stock price is modeled using the lognormal distribution (as discussed in class), what is the median of the stock price in 3 years?

(a) \$57.67
(b) \$67.67
(c) \$73.31
(d) \$87.31
(e) None of the above.

Problem 5.4. Assume that the stock price is modeled using the lognormal distribution. The annual mean rate of appreciation on the stock is given to be 12%. The median time$-t$ stock price is evaluated to be $S(0)e^{0.1t}$. What is the volatility parameter of this stock price?

Problem 5.5. The current stock price is \$100 per share. The stock price at any time $t > 0$ is modeled using the lognormal distribution. Assume that the continuously compounded mean rate of return for the stock equals 12%. Let the stock's dividend yield be 4% and let its volatility equal 20%.

Find the value t^* at which the median stock price equals \$120.

Problem 5.6. The volatility of the price of a continuous-dividend-paying stock is 0.2. The stock price is modeled using a log-normal distribution. The expected time-2 stock price is \$120.

Then, the median of the time-2 stock price falls within this interval:

(a) $[0, 86)$
(b) $[86, 106)$
(c) $[106, 112)$
(d) $[112, 124)$
(e) None of the above.