

UNIVERSITY OF TEXAS AT AUSTIN

Problem Set # 13

Mean and median of the log-normal stock prices.

Problem 13.1. The current price of a non-dividend-paying stock is \$80 per share. Under the risk-neutral probability measure, its mean rate of return 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 13.2. A stock is valued at \$75.00. The continuously compounded, risk-free interest rate 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 under the risk-neutral probability measure?

Problem 13.3. A non-dividend-paying stock is valued at \$55.00 per share. Its standard deviation of annualized returns is given to be 22.0%. The continuously compounded risk-free interest rate is 12%. 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 under the risk-neutral probability measure?

Problem 13.4. Assume that the stock price is modeled using the lognormal distribution. The stock pays no dividends. Under \mathbb{P}^* , the annual mean rate of return on the stock is given to be 12%. Also under \mathbb{P}^* , 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 13.5. 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 risk-free interest rate equals 8%. Let its volatility equal 20%.

Find the value t^* at which the median stock price equals \$120, under the risk-neutral probability measure.

Problem 13.6. The volatility of the price of a non-dividend-paying stock is 0.2. The stock price is modeled using a log-normal distribution. Under \mathbb{P}^* , the expected time-2 stock price is \$120. What is the median of the time-2 stock price under \mathbb{P}^* ?