QF602 - Homework 1

Question 1

- The forward price $F_0(T)$ is 105, $T = 1.5$. The spot price S_0 is trading at 100. Assume the dividend yield is 0, what is the implied risk free rate?

- Now let's say the dividend yield is 2%, what is the implied risk free in this case?

Question 2

- We have two forward prices with different maturities, 1 year and 2 years: $F_0(1) = 105, F_0(2) = 109$. Spot price S_0 is trading at 100. Assume the risk free rate is piece-wise constant, dividend yield is 0, what is the implied risk free rate between $T = 1$ and $T = 2$?

Question 3

- Spot S_0 is trading at 100. One year forward price $F_0(1)$ is 105. Risk free rate is 2%. Dividend yield is 1%. Is there an arbitrage opportunity? If yes, describe how would you monetize such opportunity and how much you would earn?

- What is the no-arbitrage forward price?

Question 4

- You enter a long position of a forward contract with 1 year maturity on 100 shares of a stock. The spot S_0 is trading at 100. The risk free rate is 2% and dividend yield is 0%.

- One month later, the company releases an annual report and the spot is now trading at 120, i.e. $S_{1/12} = 120$. Assume the risk free rate and dividend yield don't change, what is the PnL of your forward position at $t = 1/12$?

- What if the company decides to increase the dividend yield from 0% to 5% in one month time, i.e. $t = 1/12$, what would be the PnL of your forward position at $t = 1/12$?

Question 5

- Explain why American call option on the underlying which pays dividend may be optimal to exercise early? Please give an example to illustrate that.

- How about the underlying that pays no dividend?

- How about American put option?

Question 6

- Explain why forward price and futures price might be different for the same underlying asset.

- Describe a situation that a futures price could be **lower** than the forward price.