Derivative Securities FALL 2019: Assignment 1

Problem 1.

Estimate the forward price of Intel Stock (INTC) one year from now, assuming

1. Trade Date: September 18 2019, end-of-day
2. Settlement Date: September 18, 2020 end-of-day
3. Dividend stream over the last 11 distribution dates:

Date	Dividend ($
6-Aug-19	0.315
6-May-19	0.315
6-Feb-19	0.315
6-Nov-18	0.3
6-Aug-18	0.3
4-May-18	0.3
6-Feb-18	0.3
6-Nov-17	0.273
3-Aug-17	0.273
3-May-17	0.273
3-Feb-17	0.26
3-Nov-16	0.26

Assume a flat discount rate of 2.25%. State your assumptions on future dividend rates clearly. Also, calculate the equivalent continuously compounded implied dividend yield.

Problem 2.

The S&P 500 index level was SPX= 2995.69 on September 17, 2019 at 12:38 EST. At the same time the term structure of ES futures was

Futures	Price
Sep-19	2997.25
Dec-19	2999.75
Mar-19	3002

1. Assuming an interest rate of 2.25%, compute the implied dividend yield for the period until the March 2020 settlement date.
2. The SPY price quoted at that time was $300.00. Compare with the SPY dividend yield from Yahoo!Finance. Is there an arbitrage by carrying SPY vs a mirror futures position? Explain.

Problem 3.

According to the CME specifications for the WTI futures contract

``Trading terminates 3 business day prior to the 25th calendar day of the month prior to the contract month. If the 25th calendar day is not a business day, trading terminates 4 business day prior 25th calendar day.''

1. Make a table in which you calculate the termination dates for the front-month WTI contract since Jan1 2017. The first column should contain the actual date (from Jan 1 2017 to Sep 10 2019, the second column should contain the corresponding termination date for the first live contract (OCT 2019 for dates in the beginning of Sep 2019).

2. Based on the data provided (myWTI.xlsx), add two more columns. The first column is the front month contract price. The second column is the second month contract price.

3. Add an additional column to the table, which consists of daily returns from a strategy which invests in the front month contact if the date is less than the 15^{th} of the delivery month and invests in the next-month contract if the date is greater than the 15^{th} of the current calendar month. We call this a ``rolling futures'' strategy. [Hint: use the termination date to determine when the $2^{nd}$ month ``becomes'' the front contract. This allows the accurate computation of the return around this date.]

4. Compare the P/L of investing in this strategy to the chart of WTI for the same period. What do you find? Compare this strategy with an investment in USO for the same period. Analyze.