Final Report

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Nowadays, the technology in the modern life is getting better hence by exploiting arbitrage opportunities to earn profit in the stock market it's getting tougher. We decided to investigate how can you earn the profit by exploiting arbitrage opportunities. We had come up an idea of using the Lagrange interpolation to assess the call and put price and by compare to the market value to see if there is any profit that we can possibly earn.

We will approach by analyze the latest call prices of the selected stocks to predict the prices of call and put at a different strike price that is not yet available in the market. We will use the 500 S&P index as our direction to find the company that we are interesting to investigate on. We decided to find out the answer by using the newton's divided difference method. We will derive the solution by setting the strike price as the x value and the y value as the last sold price. By using the method we can obtain the predicted strike's last sold price and by can compare to the actual strike's last sold price. The answer we obtained will be the approximate predicted last sold price value, we will use the value to compare with the actual last sold price to get the absolute error and relative error to see if there is any arbitrage opportunities in between.

The data we had decided to use here are **Tesla**, **Chevron**, **Amazon**, **Berkshire Hathaway** and **Facebook'**s stock market value. In the experiment we will choose the strike price that's is near the current price.

We had choose four strikes prices from **Tesla** that is near the current price (336.2) which are 332.5,335,340 and 342.5 the corresponding las sold price are 6.2, 4.75, 2.54 and 1.86. According to the code when we predict the price of 337.5 we obtain 3.51667 as last sold price, by compare to the actual last sold price(3.45) we obtain the relative error as 0.01932 and absolute error as 0.06667.

We had choose four strike price from **Amazon** that is close to the current price (1,769.96) which are 1765,1767.5,1772.5 and 1775; and their corresponding last sold price are 16.65, 17, 13.3 and 12.1. By the code to predict the strike price at 1770, I had obtained the result of 15.40764 as last sold price. By compare to the actual last sold price which is 14.6. I had the absolute error as 0.80764 and the relative error as 0.05531781. For **Chevron** we had choose 114,115,117,118 as our four strike price and the corresponding last sold price are 4.05,1.94,0.46,0.26. By the code when predict strike price at 116, we obtain 0.88167 as last sold price compare to the actual last sold price (0.87) the relative error is 0.01167 and absolute error is 0.0134137931. For **Berkshire Hathaway** we had choose 217.5, 220, 225, 227.5 as our four strike price the corresponding last sold value are 5.8, 6.35, 0.52 and 0.07. According to the code when predict strike price 222.5 we obtain 0.065 as the last sold price. Compare to the actual last sold price(0.07) we obtain the relative error as 0.0714286 and

absolute error as 0.005. Lastly, four strike price for **Facebook** are 180,182.5,187.5,190 and their corresponding last sold price are 16.5 , 14.55 , 11.4, 8.6. According to the code when predict strike price at 185 we obtain 13.11667 as predict last sold price. Compare to the actual last sold price(12.25) we obtain the relative error as 0.0707485 and absolute error as 0.86666.

All in all, by our result we actually have a very small relative error such as Chevron's relative error is 0.01167. However, we are not able to conduct a way to exploiting arbitrage opportunity, but by learning the process of analyze the model that we have choice can still give use the knowledge on how to predicted the future price. additionally, It can also help us to find the better potential investment opportunity in the future market.