Fahim Hoq

MAT 6908 -Weekly Report

<u>Technical Analysis on Ethereum</u>

<u>What is Ethereum?</u>

Ethereum is a cryptocurrency. It is a decentralized blockchain platform that uses smart contracts. Smart Contacts a self-executing contract between peers (a buyer and a seller) these are written in verifiable application codes. These codes and the terms of agreements exist across a distributed, decentralized blockchain network. Therefore, Smart contracts allows its users to make transaction without a trusted central authority. Transaction records are immutable, meaning it cannot be changed. These are securely distributed across the network, giving its users complete ownership and transparency in the transaction data. Transactions are sent from and received by user created Ethereum accounts. A sender must sign transactions and spend Ethereum's native cryptocurrency known as Ether, as a fee of doing transactions on their network.

<u>Data Set:</u>

It was collected from Yahoo Finance website. The variables contain Date of transactions, highest & lowest price for the day, opening and closing/adjusted closing price and volume of transactions etc.

Date	High	Low	Open	Close	Volume	Adj_Close
1/1/2022	3769.92	3682.29	3683.05	3769.697	9776191466	3769.697
1/2/2022	3836.16	3727.36	3769.298	3829.56	9881471548	3829.56
1/3/2022	3836.19	3698.05	3829.54	3761.38	12080777893	3761.38
⋮	⋮	⋮	⋮	⋮	⋮	⋮
10/6/2022	1380.41	1349.45	1352.81	1351.71	12033514861	1351.71

| 10/7/2022 | 1359.33 | 1321.75 | 1351.84 | 1332.52 | 10061619355 | 1332.52 |
| 10/8/2022 | 1335.35 | 1327.15 | 1331.86 | 1329.98 | 9077997568 | 1329.98 |

Adjusted Closing Price:

The adjusted closing price corrects a stock's closing price to reflect that stock's value after accounting for any corporate actions such as all applicable splits and dividend distributions. Adjusted close price for our data is plotted below:

The price of Ethereum has fallen US$3770 to US$1335 as of today.

Simple Moving Average:

Moving averages are popular & versatile for identifying price trends. They smooth out fluctuations in market prices, thus making it simpler to find out the underlying trends. Moving averages can also suggest substantial changes in direction as soon as possible. To calculate let say a five-day moving average: we simply add the closing prices of the last 5 closings and then divide it by five. We add each new closing & skip the oldest one. As a result, the sum of closings

always stays constant at five days. This calculation is the same for ten days, twenty-one day or any other moving average day calculations.

The 5-day moving average of Ethereum is plotted with in the same chart as the closing price below. so, a change in direction of trend can be indicated by the penetration or crossover of the Simple Moving Average. Generally, a buy signal is generated if the price breaks above the moving average and similarly a sell signal is generated by a price break below the moving average. It is an extra confirmation when the moving average line turns in the direction of the price trend.

5-day Simple Moving Average

The moving average naturally lags price movement, and the extent by which it lags, or its sensitivity, is a function of the time span. Normally, the shorter the moving average, the more sensitive it is. For instance, a twenty-one-day moving average will react more slowly to a change in price than the five-day moving average. However, the twenty-one-day moving average is less

likely to give false signals than the five-day moving average; so, there is a tradeoff. The 21-day moving average of Ethereum is plotted below:

21-day Simple Moving Average

We can clearly see from the 2 plots that the 21-day is lot less sensitive than the 5-day moving average.

## **Exponential Moving Average:**

Exponential Moving Average or EMA is like SMA, measuring trend direction over a period. But EMA applies more weight to data that is more recent whereas Simple moving average just calculates an average of price data,

Calculation: EMA = (K(C - P)) + P

Where: C = Current Price, P = Previous periods EMA, &, K = Exponential smoothing constant

The smoothing constant K applies appropriate weight to the most current price. It uses the number of periods specified in the moving average. The 5-day and 21-day EMA for Ethereum is shown below:

5-day Exponential Moving Average
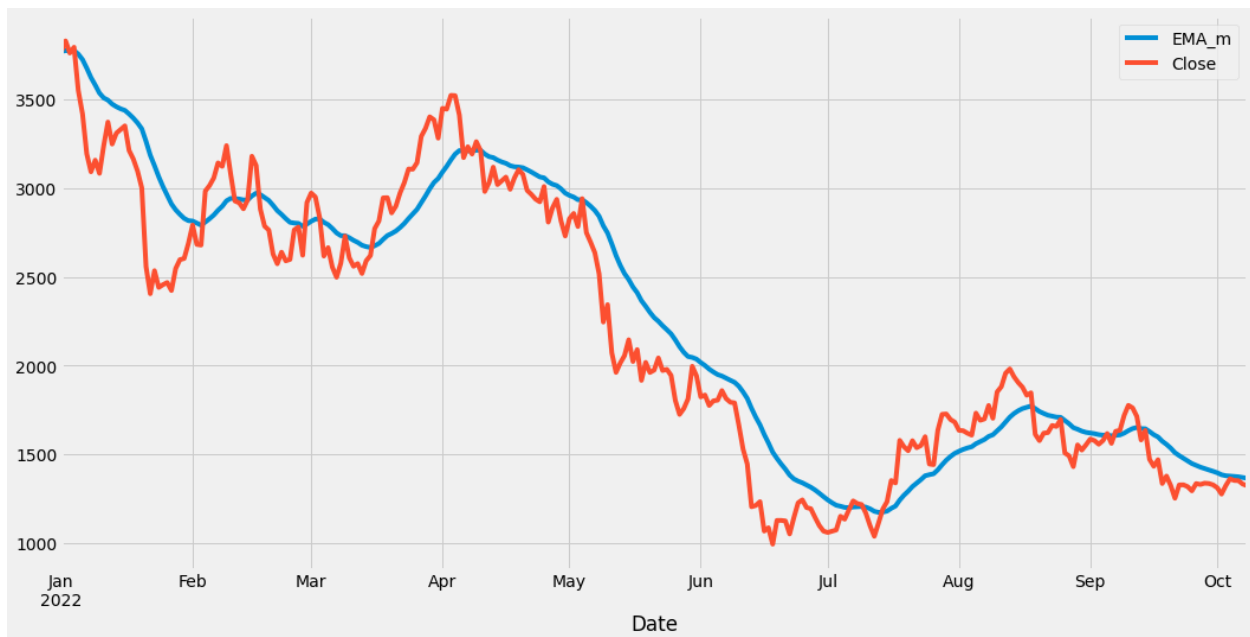
21-day Simple Moving Average

There does not seem to be a noticeable difference between EMA and SMA for our example.

They are similar measuring trends after all, so it is not completely unexpected.

Relative Strength Index:

J. Welles Wilder developed the Relative Strength Index (RSI). It is a momentum oscillator that measures the speed & change of price movements. The RSI oscillates between zero & one hundred. Traditionally the RSI is considered oversold when it is below thirty and it is considered overbought when it is above seventy.

Calculation: Ration, $R = \dfrac{Average\ of\ Upward\ Price\ Change}{Average\ of\ Downward\ Price\ Change}$

$RSI = 100 - \left(\dfrac{100}{1+R}\right)$

The figure below shows the RSI for our data of Ethereum:

RSI for Ethereum

The red dotted line indicates when it is overbought and oversold.

Python Codes:

```
pip install mplfinance
pip install yfinance
pip install --upgrade pandas
pip install --upgrade pandas-datareader

import pandas_datareader as web
import pandas as pd
import datetime as dt
import matplotlib.pyplot as plt
import mplfinance as mpf
import numpy as np
import yfinance as yf
yf.pdr_override()
plt.style.use('fivethirtyeight')

#Data
start = dt.datetime(2022,1,1)
end = dt.datetime.now()
Ethereum = web.get_data_yahoo('ETH-USD',start,end)
print(Ethereum)

#Variables
SMA_sh= SMA_short(Ethereum, period = 5, column = 'Close')
SMA_med = SMA_medium(Ethereum, period = 21, column = 'Close')
EMA_sh= EMA_short(Ethereum, period = 5, column = 'Close')
EMA_med = EMA_medium(Ethereum, period = 21, column = 'Close')

#RSI
delta = Ethereum['Close'].diff(1)
delta = delta.dropna()
up = delta.copy()
down = delta.copy()
up[up>0] = 0
down[down<0] = 0
period =14
Avg_gain = abs(up.rolling(window=period).mean())
Avg_loss = abs(down.rolling(window=period).mean())
RS2 = Avg_gain/Avg_loss
RSI_new = 100.0 - (100.0/(1.0+RS2))

#Adding Data Set
Ethereum['SMA_medium'] = SMA_medium(Ethereum)
Ethereum['EMA_medium'] = EMA_medium(Ethereum)
new_df = pd.DataFrame()
```

```python
new_df['Close'] = Ethereum['Close']
new_df['RSI'] = RSI_new
new_df['EMA_s'] = EMA_sh
new_df['EMA_m'] = EMA_med
new_df['SMA_s'] = SMA_sh
new_df['SMA_m'] = SMA_med

plt.style.use('fivethirtyeight')
#Plots for Adjusted Close Price
plt.figure(figsize=(16,8))
Ethereum['Adj Close'].plot()
plt.ylabel('Adj Close')
plt.show()

#Plots for SMA short
column_list = ['SMA_s','Close']
new_df[column_list].plot(figsize=(16,8))
plt.show()
#Plots for SMA medium
column_list = ['SMA_m','Close']
new_df[column_list].plot(figsize=(16,8))
plt.show()
#Plots for EMA short
column_list = ['EMA_s','Close']
new_df[column_list].plot(figsize=(16,8))
plt.show()
#Plots for EMA medium
column_list = ['EMA_m','Close']
new_df[column_list].plot(figsize=(16,8))
plt.show()

#Plot for RSI
plt.figure(figsize=(16,8))
RSI_new.plot()
plt.axhline(30, linestyle = '--', alpha = 0.5, color = 'red')
plt.axhline(70, linestyle = '--', alpha = 0.5, color = 'red')
plt.show()
```