# Ease Of Movement

September 29, 2021

## 1 Ease of Movement (EVM)

```
The Ease of Movement indicator involves several different calculations:
```

```
Distance Moved = ((High + Low) / 2 - (Prior High + Prior Low) / 2)
```

Box Ratio = (Volume / 100,000,000) / (High - Low)

1-Period EMV = ((High + Low) / 2 - (Prior High + Prior Low) / 2) / ((Volume / 100,000,000 / (High - Low))

14-Period Ease of Movement = 14-period simple moving average of 1-period EMV

https://www.investopedia.com/terms/e/easeofmovement.asp

```
[1]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

import warnings
warnings.filterwarnings("ignore")

# fix_yahoo_finance is used to fetch data
import fix_yahoo_finance as yf
yf.pdr_override()
```

```
[2]: # input
symbol = 'AAPL'
start = '2018-01-01'
end = '2019-01-01'

# Read data
df = yf.download(symbol,start,end)

# View Columns
df.head()
```

[\*\*\*\*\*\*\*\*\* 100%\*\*\*\*\*\*\*\*\* 1 of 1 downloaded

```
[2]:
                      Open
                                  High Low
                                                         Close
                                                                 Adj Close \
    Date
    2018-01-02 170.160004 172.300003 169.259995 172.259995 168.987320
    2018-01-03 172.529999 174.550003 171.960007 172.229996 168.957886
    2018-01-04 172.539993 173.470001 172.080002 173.029999 169.742706
    2018-01-05 173.440002 175.369995 173.050003 175.000000 171.675278
    2018-01-08 174.350006 175.610001 173.929993 174.350006 171.037628
                  Volume
    Date
    2018-01-02 25555900
    2018-01-03 29517900
    2018-01-04 22434600
    2018-01-05 23660000
    2018-01-08 20567800
[3]: # Create a function for Ease of Movement
    def EVM(data, ndays):
        dm = ((data['High'] + data['Low'])/2) - ((data['High'].shift(1) +_U

→data['Low'].shift(1))/2)
        br = (data['Volume'] / 100000000) / ((data['High'] - data['Low']))
        EVM = dm / br
        EVM_MA = pd.Series(EVM.rolling(ndays).mean(), name='EVM')
        data = data.join(EVM_MA)
        return data
[4]: # Compute the 14-day Ease of Movement for stock
    n = 14
    Stock EVM = EVM(df, n)
    EVM = Stock_EVM['EVM']
[5]: # Plotting the Price Series chart and the Ease Of Movement below
    fig = plt.figure(figsize=(16,12))
    ax = fig.add_subplot(2, 1, 1)
    ax.set xticklabels([])
    ax.plot(df['Adj Close'],lw=1)
    ax.axhline(y=df['Adj Close'].mean(),color='r')
    ax.set_title(symbol + ' Price Chart')
    ax.set ylabel('Close Price')
    ax.grid(True)
    ax1 = fig.add_subplot(2, 1, 2)
    ax1.plot(EVM,'k',lw=0.75,linestyle='-',label='EVM(14)')
    ax1.axhline(y=0,color='r')
    ax1.legend(loc=2,prop={'size':9})
    ax1.set_ylabel('EVM values')
    ax1.grid(True)
```

```
ax1 = plt.gca()
ax1.get_xticklabels()
```

### [5]: <a list of 6 Text xticklabel objects>



#### 1.1 Candlestick with EVM

```
[6]: from matplotlib import dates as mdates
  import datetime as dt

dfc = df.copy()
  dfc = dfc.dropna()
  dfc['VolumePositive'] = dfc['Open'] < dfc['Adj Close']
  dfc = dfc.reset_index()
  dfc['Date'] = mdates.date2num(dfc['Date'].astype(dt.date))
  dfc.head()</pre>
```

```
[6]:
           Date
                       Open
                                                          Close
                                                                  Adj Close \
                                   High
                                                Low
    0 736696.0
                 170.160004
                             172.300003
                                        169.259995
                                                     172.259995
                                                                 168.987320
      736697.0
                 172.529999
                             174.550003
                                         171.960007
                                                     172.229996
                                                                 168.957886
    1
    2 736698.0 172.539993
                            173.470001 172.080002 173.029999
                                                                 169.742706
```

```
3 736699.0 173.440002 175.369995 173.050003 175.000000 171.675278
    4 736702.0 174.350006 175.610001 173.929993 174.350006 171.037628
         Volume VolumePositive
    0 25555900
                          False
    1 29517900
                          False
    2 22434600
                          False
    3 23660000
                          False
    4 20567800
                          False
[7]: from mpl finance import candlestick ohlc
    fig = plt.figure(figsize=(14,10))
    ax1 = plt.subplot(2, 1, 1)
    candlestick ohlc(ax1,dfc.values, width=0.5, colorup='g', colordown='r', alpha=1.
     →0)
    ax1.xaxis_date()
    ax1.xaxis.set_major_formatter(mdates.DateFormatter('%d-%m-%Y'))
    ax1.grid(True, which='both')
    ax1.minorticks_on()
    ax1v = ax1.twinx()
    ax1v.fill_between(dfc.Date, 0, dfc.Volume[0:], facecolor='#0079a3', alpha=0.4)
    ax1v.axes.yaxis.set_ticklabels([])
    ax1v.set_ylim(0, 3*df.Volume.max())
    ax1.set_title('Stock '+ symbol +' Closing Price')
    ax1.set_ylabel('Price')
    ax2 = plt.subplot(2, 1, 2)
    ax2.plot(EVM, label='EVM')
    ax2.axhline(y=0,color='r')
    ax2.grid()
    ax2.set_ylabel('Ease of Movement')
    ax2.set_xlabel('Date')
    ax2.legend(loc='best')
```

[7]: <matplotlib.legend.Legend at 0x2da6141cfd0>



```
[8]: fig = plt.figure(figsize=(14,10))
     ax1 = plt.subplot(2, 1, 1)
     candlestick ohlc(ax1,dfc.values, width=0.5, colorup='g', colordown='r', alpha=1.
     →0)
     ax1.xaxis date()
     ax1.xaxis.set_major_formatter(mdates.DateFormatter('%d-\%m-\%Y'))
     ax1.grid(True, which='both')
     ax1.minorticks on()
     ax1v = ax1.twinx()
     colors = dfc.VolumePositive.map({True: 'g', False: 'r'})
     ax1v.bar(dfc.Date, dfc['Volume'], color=colors, alpha=0.4)
     ax1v.axes.yaxis.set_ticklabels([])
     ax1v.set_ylim(0, 3*df.Volume.max())
     ax1.set_title('Stock '+ symbol +' Closing Price')
     ax1.set_ylabel('Price')
     ax2 = plt.subplot(2, 1, 2)
     ax2.plot(EVM, label='EVM')
     ax2.axhline(y=0,color='r')
     ax2.grid()
     ax2.set_ylabel('Ease of Movement')
```

```
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

### [8]: <matplotlib.legend.Legend at 0x2da62fad978>

