

# Supply and demand vs. price driven graphs financial data visualization

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**Abstract—** In the financial world, people almost every day, argue whether the price of a financial instrument will go up or down. While long term investors use fundamental data to create their view, mid & short term investors and traders use charts to detect patterns and forecast the future price movement. In this paper, I look at the benefits of using supply and demand driven chart - the ManoStick to visualize financial data.

**Keywords-component;** data visualization, chart, graph, candlestick, manostick, share price, S&P500

## I. INTRODUCTION

For many decades, we use graphs to visualize financial data such as share prices, commodity prices and foreign exchange rates, in the hope to manually detect patterns and apply those patterns to make advantage on real trading, which is an ongoing process.

Although, there are few trading algorithms, professionals like sessional investors, still heavily rely on graphs to synchronize themselves with the share prices. Trading algorithms don't always succeed as the financial instrument prices are driven by multi conscious human activity, in such environment; some open long positions while the other open short positions - the seller.

There are two types of chart to draw graphs available, which are price driven and, supply and demand driven. Price driven chart types are Line, Bar and CandleStick while supply and demand driven chart is the ManoStick.

First, I discuss the strength and weakness of those above mentioned chart types, which are common on today's charting software, with some statistics. Although, it's difficult to prove whether price moves by supply and demand or supply and demand moves by prices, we will look, which charting solution is informative and beneficial to those extremely stressed financial analysts.

## II. BACKGROUND

Line chart shows closing price of the financial instrument for that session on the time series chart. Line charts as being basic, which is referred as first generation charts.

Bar chart as shown on figure 1, shows open, high, low and close prices, which is OHLC, for the given session according to the time series such as minute, hour, daily or weekly.

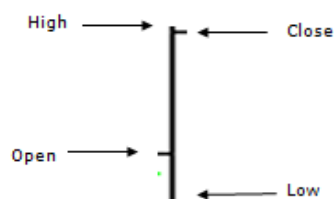


Figure 1

CandleStick [1] as shown on figure 2, shows OHLC in a better way, as it has the tube shape body to indicate exclusively the price change action, omitting the high and low, as a noise occurred during that session. CandleStick had been invented in Japan in late 18<sup>th</sup> century to visualize their rice trading. The philosophy behind CandleStick are, when the demand is high, the closing price should be higher than opening price and lower closing price than the opening price indicates more supply.

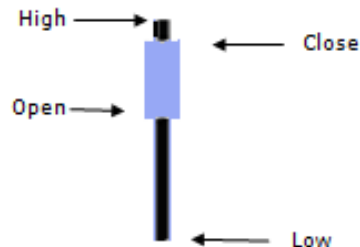


Figure 2

As both Bar chart and CandleStick uses OHLC, these are referred as second generation chart.

ManoStick is mainly relay on volume although it shows high, low and closing price, referred as third generation chart. ManoStick [2] has five microstructures as shown on figure 3 & 4, which are

1. Upper tail
2. Upper body
3. Middle body
4. Lower body
5. Lower tail

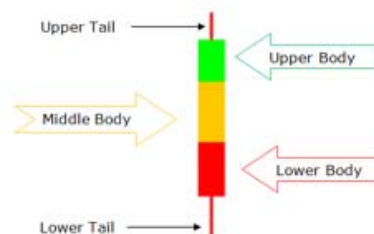


Figure 3

Each microstructure represents 20% of volume. To create a chart, we need to sort the price data, find the total volume and divide the total volume with five as there are five microstructures in Mano Stick. Now, first data set represents upper tail, the second data set represents the upper body and so on.

To differentiate microstructures, we can use different colours or patterns. Number five is convenient here as everyone used to it, ever since the invention of analogue clock. When the whole divided by five, we get 20%, which is each macrostructures weight.

Having four microstructures against one is, again rule of 80/20. Italian economist Vilfredo Pareto created a mathematical formula to describe the unequal distribution of wealth in his country, observing that 20% of the people owned 80% of the wealth. This opens up possibilities to analyse data even with single ManoStick.

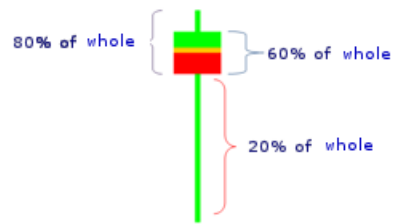


Figure 4

### III. DATA SET

These statics are to show that how little impact the opening price and the closing price of shares have on overall trading. I have taken data from S&P 500 daily trading log for randomly selected dates.

Fifty high turnaround S&P 500 shares as of 23<sup>rd</sup> August 2010. The reason of choosing high turnaround shares is to make the test tough, some low turnaround shares won't even start trading in the first hour.

Ticker	Company Name
AAPL	Apple Inc
BAC	Bank of America Corp
HPO	Hewlett-Packard Co
GOOG	Google Inc
INTC	Intel Corp
XOM	Exxon Mobil Corp
MSFT	Microsoft Corp
C	Citigroup Inc
JPM	JP Morgan Chase & Co
CSCO	Cisco Systems Inc
IFE	Pfizer Inc
T	AT&T Inc
GE	General Electric Co
WFC	Wells Fargo & Co
CRM	Salesforce.com
CVX	Chevron Corp
WMT	Wal-Mart Stores
COP	ConocoPhillips
CAT	Caterpillar Inc
VZ	Verizon Communications Inc
SLB	Schlumberger Ltd
GS	Goldman Sachs Group Inc
JNJ	Johnson & Johnson
IBM	Intl Business Machines Corp
PG	Procter & Gamble
OCOM	QUALCOMM Inc
X	United States Steel Corp
F	Ford Motor Co
AMZN	Amazon.com Inc
LLY	Lilly Eli & Co
INTU	Intuit Inc
DD	DuPont E.I. de Nemours
FCX	Freeport McMoRan Copper & Gold
SNDK	SanDisk Corp
MET	Metlife Inc
MFE	McAfee Inc
KO	Coca-Cola Co
LOW	Lowe's Cos Inc
ORCL	Oracle Corp
MCD	McDonalds Corp
OXY	Occidental Petroleum
DE	Deere & Co
EMC	EMC Corp
ABT	Abbott Laboratories
CMCSA	Comcast Corp A
MRK	Merck & Co Inc
TYC	Tyco Intl
EBAY	eBay Inc
APA	Apache Corp
V	Visa Inc

**OPENING PRICE EVALUATION:**

First five minutes volume against whole session for randomly selected dates, results are given as %. Although, we are interested only opening price associated volume, however, the choice of using five minutes of the data, is to make a though test.

Ticker	1 <sup>st</sup> test	2 <sup>nd</sup> test	3 <sup>rd</sup> test	4 <sup>th</sup> test
	23/08-	04/10-10	15/12-	25/01-
AAPL	0.49751	0.05874	0.37035	0.72634
BAC	0.28084	0.12042	0.07569	1.08203
HPO	0.10654	0.11028	0	0.02249
GOOG	0.07379	0	0	0.02927
INTC	0.13235	0.00152	0.10802	0.05317
XOM	0.12598	0.01321	0.00528	0.04014
MSFT	0.02281	0.03760	0.00145	0.09255
C	0.18180	9.33566	4.33217	1.27164
JPM	0.07897	0.07258	0.02783	0.15359
CSCO	0.00825	0.00323	0.07906	0.19305
IFE	0	0	0.08148	0.00646
T	0	0	0.03024	0.35305
GE	0.17663	0	0.11764	0.06487
WFC	0.03342	0.00418	0.15995	0.00497
CRM	1.15932	0	0.29391	0
CVX	0.05109	0.02748	0	0.47592
WMT	0	0.02991	0	0.02404
COP	0.02756	0	0	0
CAT	0.11754	0	0.59757	0.26019
VZ	0	0.01227	0	1.34320
SLB	0.09922	0	0.12927	0.01510
GS	0	0.06929	0.19033	0.8631
JNJ	0.28793	0.04784	0	4.99948
IBM	0	0.023735	0.04575	1.18028
PG	0	0	0	0.07765
OCOM	0	0	0	0.25388
X	0.01901	0.10476	0	0.29585
F	0.06151	1.70038	0.58678	0.34357
AMZN	0	0.49194	0.10407	0
LLY	0.00731	0	0	0
INTU	0	0	0	0
DD	0.07055	0	0	0.18116
FCX	0.72730	0.09545	0.14159	0.02951
SNDK	0	0.01429	0.03621	0
MET	0	0	0	0
MFE	0.12260	0	0	1.26618
KO	0.06112	0.01782	0.01591	0.14587
LOW	0.02200	0	0	0
ORCL	0	0.00568	0.08077	0
MCD	0	0	0	1.43312
OXY	0	0	0	0
DE	0	0	0.07717	0
EMC	0	0	0	2.91645
ABT	0	0	0	0.01546
CMCSA	0	0	0	0
MRK	0	0	0	0.02326
TYC	0	0	0	0
EBAY	0	0	0	0
APA	0.02795	0	0.22812	0
V	0.08913	0	0	0.24838

**LOSING PRICE EVALUATION:**

Last five minutes volume against full session for randomly selected dates, results are given as %. Although, we are interested only closing price associated volume, the choice of using five minutes of the data is to make a though test.

Ticker	1 <sup>st</sup> test	2 <sup>nd</sup> test	3 <sup>rd</sup> test	4 <sup>th</sup> test
	23/08-	04/10-	15/12-	25/01-
AAPL	0.01381	0.04993	0.42208	0.0527
BAC	0.06587	0.18669	1.28050	0
HPO	0.05011	0.00891	0	0
GOOG	0	0	0	0.02927
INTC	0.00304	0.00303	0	0.02820
XOM	0.02522	0	0	0
MSFT	0.00396	0.01047	0.00145	0
C	0.05994	0.00086	0.04771	0
JPM	0	0.01973	0.0087	0
CSCO	0	0.02484	0.04196	0.0091
PFE	0	0	0	0
T	0	0.00397	0	0
GE	0	0	0	0
WFC	0	0	0	0
CRM	0	0.04523	0	0
CVX	0	0.09812	0	0
WMT	0	0	0	0
COP	0	0	0	0
CAT	0	0	0	0
VZ	0	0	0	0
SLB	0	0	0	0
GS	0.03423	0.03465	0	0
JNJ	0	0	0	0
IBM	0	0	0	0
PG	0	0	0	0
OCOM	0	0	0.02935	0.01763
X	0.00590	0.02619	0	0
F	0.00949	0.07744	0.01779	0
AMZN	0	0	0	0
LLY	0	0	0	0
INTU	0	0	0	0
DD	0	0	0	0
FCX	0.28721	0	0.01022	0
SNDK	0	0.02673	0	0.05107
MET	0	0	0	0
MFE	0	0	0	0
KO	0	0	0	0
LOW	0	0	0	0
ORCL	0	0	0	0
MCD	0	0	0.05074	0
OXY	0	0	0	0
DE	0	0	0.02572	0
EMC	0.02063	0.00793	0	0
ABT	0	0	0	0
CMCSA	0	0	0	0
MRK	0	0	0	0
TYC	0	0	0	0
EBAY	0	0	0	0
APA	0	0	0	0
V	0	0	0.00915	0

#### IV. ANALYSIS

The highest representation of the opening price is 9.34% on the 4<sup>th</sup> of October 2010 for Citigroup Inc. and the highest represented closing price for the share Bank of America Corp occurred on 15th of December 2010 with the value of 1.28%.

This indicates that using opening and closing price to visualize data is not working anymore. The low volume associated with the opening and closing price, further indicates, how vulnerable are these prices and how easy to manipulate it with high tech trading platform.

During the real rice trading, as stated previously, people would have sold more if it was predicted rain in the night, however, with all the internet trading systems, it seems that traders and investors don't wait until the end of day to place their trades nowadays. This dataset clearly shows that any reliable attempt of data visualization should use opening and closing price as main data.

For intraday charts such as minute, hourly, there is no need for opening and closing price as the previous closing price will be the next opening price for high turnaround shares and other financial instrument.

That is another reason that we need to look at what price traders and investors are confident enough to exchange, rather than opening and closing price with little representation.

ManoStick, in other hand, is able to show the trading. Even with single ManoStick, one can easily find out what price range most trades had taken place.

When 'upper body', 'middle body' and 'lower body' are in the top range, there is a pressure of buying and when the 'upper body', 'middle body' and 'lower body' are in the lower range, there is a pressure of selling. That's how ManoStick technicians are able to analyze the market easily and profoundly.

#### V. CONCLUSION

According to the data we analyzed, one can conclude that visualizing financial data with price-driven charts, such as bar and CandleStick, doesn't bring any meaningful information.

Although, we need to do more researches with data from different stock exchanges and different period, in order to make an international theory, ManoStick's ability to show additional dimension, as the way of equally dividing and visualizing the volume, give much more benefit to the user and make it a reliable source of financial data visualization.

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