Points and Line Chart

By Mohamed Ashraf Mahfouz

1. Introduction

Price charting is a key and vital concept in Technical Analysis. It is the origin of the Technical Analysis idea that everything around us will be discounted by just looking at charts.[1]

It is commonly known that price charting may be done using detail-oriented charts (or regular time-series charts) and demand and supply charts (or irregular time-series charts). Each type of charting technique has its advantages and drawbacks. Thus, while the Point and Figure chart (P&F thereafter) has the advantage of focusing on the demand and supply equation by filtering the price action by excluding noise, it always lacks the smoothed display of the detail-oriented charts, such as the Line chart. Furthermore, volume and time can not be displayed on a P&F chart.[2] In addition, it is often hard to benefit efficiently from applying indicators and oscillators on the P&F chart, specifically with regard to the 3 box reversal P&F charts (or greater) due to the condensation of the chart where the Technical Analysis indicator calculations are based on the center price of every column and not on the last price.

Thus, the purpose of this paper is to attempt to create what will be referred to henceforth as "*Points and Line chart*." The chart's purpose is to maximize P&F and line charting benefits by merging them while eliminating their drawbacks. From its name, Points and Line chart uses only points on the chart and a line that connects those points. It uses the same P&F chart principles including price filtration, scaling, box size, box reversal, the buy/sell triggers, and target projections. At the same time, it benefits from the Line chart advantages, including the use of closing price, volume, smoothed trend display, price patterns, target projections, and trend lines. Points and Line chart also adds to both charts two new concepts: the total volume and time (or number of days). And last but not least, it allows for much more efficient Technical Analysis indicator application compared with the P&F and the Line charts.

The paper will be divided into six sections. The following section of the paper will review the Line and the P&F charting methods, pointing out their benefits and drawbacks in comparative points in order to highlight the importance of the new charting method: the Points and Line chart. Section 3 will be devoted to illustrating the Points and Line charting's main idea and its calculation methodology with clear examples. For more understanding of the chart filtering purpose, the concept of filtering prices from noise versus price smoothing will be clarified. Two types of volume display (total and average volume) will be added to the Points and Line chart, allowing it to be more informative. In order to add time, a new concept will be introduced: the number of days. The advantages and similarities of the Points and Line chart versus the Line chart and the P&F chart will be discussed in terms of price chart analysis, trend lines, price patterns, and target projections. The possibility of converting the Points and Line chart into a weekly chart will also be discussed under what can be referred to as a 5 Points chart. The difference between the Points and Line chart and the monthly Line chart will be clarified. Finally, this part will end with the recommended box size and box reversal that should be used with the Points and Line chart and the possibility of adjusting those parameters. Section 4 will explain the advantages of this charting technique over the Line and the P&F charts in terms of applying the Technical Analysis indicators and oscillators. Section 5 will demonstrate the advantage of the Points and Line chart over the P&F chart with the aid of a practical example. Section 6 concludes the paper. At the end of this paper, two appendixes are available; the first one illustrates extra examples for the Points and Line chart and the second makes a quick review of other filtering ideas that could be applied on the Line chart.

Keywords: Line Chart, Point and Figure Chart, Closing Price, Trend, Volume, Time, Price Patterns, Trend Lines, Total Volume, Average Volume, Number of Days, Noise Filtration, Vertical Count, Horizontal Count, Box Size, Box Reversal, Peak/Bottom, Support/Resistance, Breakouts, Simple Buy/Sell Signal.

2. Price Charting Techniques: A Background

2.1 Detail-oriented charts (regular time-series charts): Line charts

The Line chart is one of the oldest and most important charting methods in Technical Analysis. It is a simple charting method that plots only successive closing prices. Yet, its importance and validity in measuring price activity is highlighted by Charles Dow, who relied exclusively on closing prices, as he did not consider intraday penetrations valid.[3] Also, as Murphy argues, "Many chartists believe that because the closing price is the most critical price of the trading day, a line (or close only) chart is more valid measure of price activity."[4]

2.2 Demand and supply oriented charts (irregular time-series charts): Point and Figure charts

P&F chart is also one of the oldest charts. It focuses on the significant moves rather than plotting all the data. "On the Point and Figure chart, only the price changes are recorded. If no price change occurs, the chart is left untouched. During active market periods, a considerable amount of plotting may be required. During quiet market conditions, little or no plotting will be needed."[5] P&F chart excludes prices that are not significant by focusing on the trend demand and supply by plotting simple

consecutive Xs that represent the demand and consecutive Os that represent the supply. This plotting is based on specific criteria: the "Box Size" and the "Box Reversal."

2.3 Line charts versus Point and Figure charts: Advantages and limitations

This section will offer a detailed overview of the advantages and the limitations of the Line chart versus the P&F chart by comparing them from eight different perspectives. This comparison will facilitate highlighting the importance of the new chart concept that will be introduced later in the paper.

2.3.1 The smooth ascending and descending display versus the vertical display

The Line chart has a smoothed ascending and descending display that shows the price movements in a more informative way than the P&F chart, especially if it is viewed at the price action from the momentum point of view. The vertical display of the P&F chart will not differentiate between a rise (or a decline) on a higher or a lower momentum, as in both cases it will be displayed as a column of Xs (or a column of Os). On the contrary, the Line chart will show the change in momentum clearly as the line slope will differ if the price momentum changed. For example, by using the P&F chart, if the closing prices of a stock moved directly from 25 to 27 it will be displayed exactly the same as if the prices moved from 25 to 26 then from 26 to 27; in both cases it will be displayed by drawing three consecutive Xs (Box size 1). However, the Line chart will show a steeper slope in case of the direct rise from 25 to 27 than the rise from 25 to 26 then from 26 to 27.

2.3.2 The filtration characteristic versus the normal chart display

The P&F chart focuses on the demand and supply of the trend by filtering the price chart from insignificant price movements or noise, while the Line chart records every single day even if the price remained the same. This advantage is highlighted in buy/sell signals that are triggered from the violation of resistance and support levels. Using those signals in the Line chart could cause a lot of whipsaws and false breaks, as there will always be a lot of insignificant support and resistance levels that are created from the short-term fluctuations. On the other hand, using those signals in the P&F chart is much more significant, as the short-term fluctuations are already filtered, and only significant support and resistance levels are shown.

2.3.3 Data plotting

The Line chart plots the actual price data; on the other hand, due to its filtration concept, the P&F chart does not plot the actual data, but it plots the box size where prices are trading within.

2.3.4 Volume display

The Line chart has the advantage of displaying volume as a separate entity. The P&F chart does not display volume as a separate entity with a claim that volume is reflected in the amount of price changes recorded in the chart. The volume display is very important for the following reasons:

1. It increases the significance of support and resistance levels.
2. It is a leading indicator for the price action, "Volume should increase or expand in the direction of the existing trend."[6] This information is always important in confirming the price movement or in warning of a trend reversal or at least in indicating that the current movement can or can not be trusted.
3. It confirms the price patterns.
4. It can identify important reversal peaks and bottoms, what is known as blow off and selling climax situations.[7]
5. There are various indicators that were created to analyze the volume structure to trigger buy/sell signals (e.g., On Balance Volume, Weighted-On Balance Volume, Volume Zone Oscillator).

2.3.5 Price patterns and their projected targets

The P&F chart can provide the same information that is displayed by the Line chart, as it shows price patterns that can be seen by the Line chart (e.g., Triangles, Head and Shoulders). The P&F chart also has its own set of chart-patterns that have important indications (e.g., Catapult, Fulcrum, Compound Fulcrum, saucer). However, the construction and psychology behind the significance of these patterns is nearly the same compared to the Line chart patterns, but with minor variations. What is unique in the P&F chart is that it not only allows the normal target measuring and projections of the Line chart patterns (vertical measurement), but it also allows horizontal measurement of the price target, which "is based on the premise that there is a direct relationship between the width of a congestion area and the subsequent move once a breakout occurs."[8]

2.3.6 Trend lines

Trend lines can be drawn on both Line charts and P&F charts. In P&F charts there are two types of trend lines; the subjective trend line (which is similar to the Line chart trend lines) and the objective trend line (what is known as the 45 degree trend line). Murphy advised to apply the 45 degree trend lines when using the P&F chart because of the severe condensation on these charts.[9] Thus, when using the 3 box reversal P&F chart, due to the chart condensation, it is not desirable to draw subjective trend lines that connect rally tops or reaction lows like the Line chart. The trend lines of both the Line chart and the P&F charts will trigger buy/sell signals, but the trend line on the Line chart has the advantage of adjusting to monitor the trend slope or the change in the rate of speed over time. It has also the advantage of anticipating potential support/resistance levels in the future.

2.3.7 Time display

Unlike the Line chart, the P&F chart does not plot time as Murphy pointed out, "it is the study of pure price movement. That is, it does not take time into consideration while plotting the price action."[10] The P&F chart substitutes volume and time by recording the number of price reversals; thus, time is substituted by the number of changes in direction or the number of columns.[11] Time is an important indicator in identifying support and resistance levels. Using the P&F chart, during major market bottoms (or tops) it is often difficult to identify the time duration before the reversal takes place, even if we identify a catapult or fulcrum pattern, the increase in the number of

columns in this area could be on account of the high volatility fluctuations (number of price reversals), not because prices have been traded for a long time during this period. Thus, we could identify two similar catapult formations: one that took months to construct and the other took weeks. Also, in the case of the support and resistance levels that are constructed within the trend, it will always be seen that those that have not been tested have the same importance regardless of time differentials.

2.3.8 Technical Analysis indicators

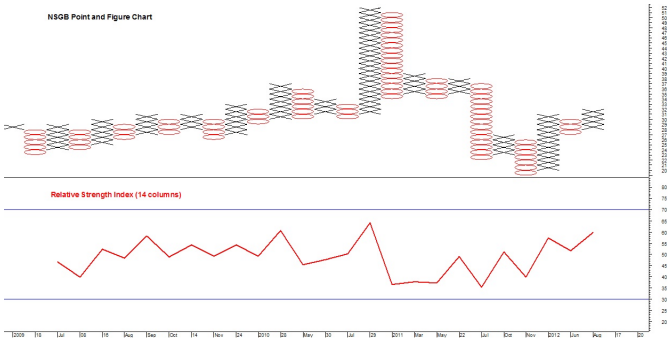
Unlike the Line chart, Technical Analysis indictors cannot be applied on the P&F chart unless they are based on the number of columns instead of time. As David Keller pointed out, "One of the traditional disadvantages of point and figure charts is that they can't be used with indicators such as MACD, stochastic, or OBV, and the like, because they don't have a time scale and consequently won't match up with the indicator. If, however, the indicator is calculated based on columns rather than time, any indicator can be used with a Point and Figure chart. The difference is that the indicator "period" (length) is measured in columns rather than days or weeks."[12]

Although the change in indicator calculation has solved the problem of drawing, this calculation method still means that every column in the P&F chart will be represented as one point in the calculated indicator (usually the midpoint of each column). For example, if we have a column of 10 Xs, it will be represented by only one point in the calculation of any indicator. This calculation will decrease the indicator's efficiency relative to the Line chart, especially for the oscillators, in showing divergences, leading moves, failure swings, and trend identification. That is why a lot of Technical Analysis indicators will not be that informative when applied on the P&F chart compared to the Line chart, because there is a small number of columns in the P&F chart relative to the large number of prices shown by the Line chart from where the Technical Analysis indicators are calculated. Furthermore, David Keller states that "indicators do not work well on arithmetic Point and Figure charts because of the sensitivity and hence the number of columns is not consistent throughout the chart."[13]

Charts 1 and 2 show the Relative Strength Index (RSI) application for the same stock and in the same period on the Line chart and the P&F chart.

Chart 1: National Societe Generale Bank (NSGB.CA) Line chart with the Relative Strength Index (14 days)

Chart 2: National Societe Generale Bank (NSGB.CA) Point and Figure chart (1 box size X 3 Box reversal) with the Relative Strength Index (14 columns)



As observed from the charts, the P&F chart has plotted the Relative Strength Index (14 columns) successfully and, of course, filtered relative to the Line chart, but the indicator is of little value when it is applied here, as it is calculated from the number of columns. On the other hand, the RSI is much more informative when applied on the Line chart. The only way to solve this problem is to use the P&F chart with 1 box reversal, but this will eliminate the filtration advantage of the P&F chart.

To the P&F practitioners, this is not considered a problem, as it is believed that indicators are not made to give buy/sell signals when they are used on the P&F chart but are only made to confirm the unambiguous signals generated from the P&F chart. "Adding moving averages to the chart helps to confirm or reject a Point and Figure signal that is already there."[14] That is why Jeremy Du Plessis has only applied in his book three indicators that will work efficiently when they are drawn on the P&F chart (i.e., the moving averages, the Bollinger bands, and the parabolic stop and reverse [SAR]).[15] Yet their default parameters must be decreased to work with the small number of columns in the P&F chart.

Although his recommendation is to apply the moving average indicator, he advised that it is better to use two moving averages instead of one; one is short term and the other is longer term, as he pointed out that "you cannot use the same length (measure in columns) moving average across different box sizes, different reversals and different construction methods. So, the choice of moving average length is much more complex for Point and Figure then it is when using line charts."[16]

3. The Points and Line Chart

After this brief background comparing the Line and P&F charts, the following sections will be dedicated to explaining in detail how the Points and Line chart is drawn and the advantage of the Points and Line chart over the P&F and the Line charts.

3.1 Main idea

The Points and Line chart has the same display as the normal Line chart, but it filters the trend from noise by using the same filtering criteria as the P&F

chart, where it uses the standard box size[17] and 3 box reversals.[18] It differs, however, in the following six important aspects:

1. It plots prices in points connected with a line, not Xs or Os.
2. It does not move in columns, but in an ascending and descending manner.
3. If prices move directly from 20 to 24, it will not plot 21, 22, and 23; a point will be plotted at 20 and the next point will be at 24.
4. It plots the actual prices, not the box size. If the prices reach 20.25, the point will be plotted at 20.25, not at 20 (box size scale), unlike P&F.
5. Volume is included: total volume or average volume.
6. A new concept is included: the number of days, which represents the time that prices stay in a support or resistance.

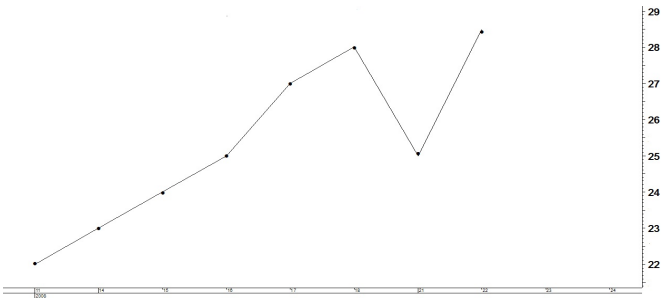
3.1.1 Numerical example

The example below shows how the Points and Line chart is drawn. As can be seen in Chart 3, the Points and Line chart is plotted as the usual Line chart; however, it does not plot insignificant price actions.

Table 1: Daily closing prices for a hypothetical stock for 10 consecutive day

Day	Closing Price
1	22
2	23
3	24
4	25
5	27
6	27.5
7	28.01
8	25
9	24.8
10	28.50

Chart 3: Points and Line chart of the hypothetical stock



The following charts will illustrate step by step how Chart 3 is drawn, pointing out the differences between the Points and Line chart and the Line and the P&F charts. The default box size according to this data is 1 and box reversal used is 3.

As can be seen in Chart 4, Day 1 was plotted as a point at price 22, and then when prices rose to 23 in Day 2, instead of plotting an X above 22 (like the P&F chart), another point was plotted above and to the right of 22 at 23. Then, the two points were connected with a line.

Chart 4: Points and Line chart for Day 1 and Day 2

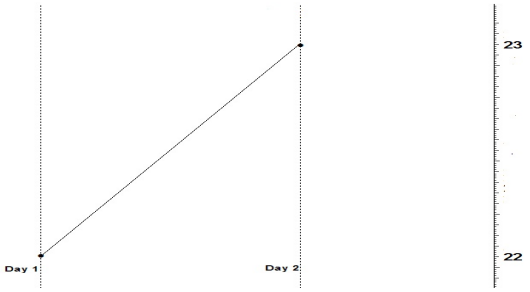
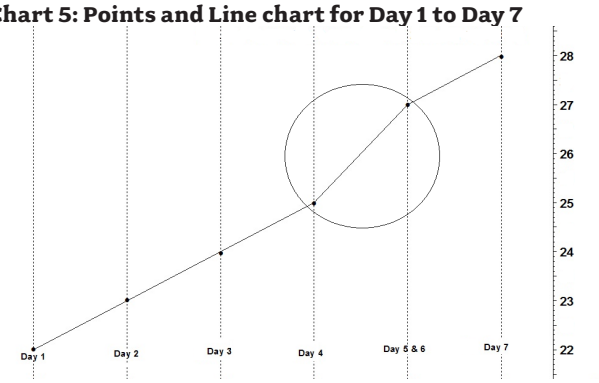


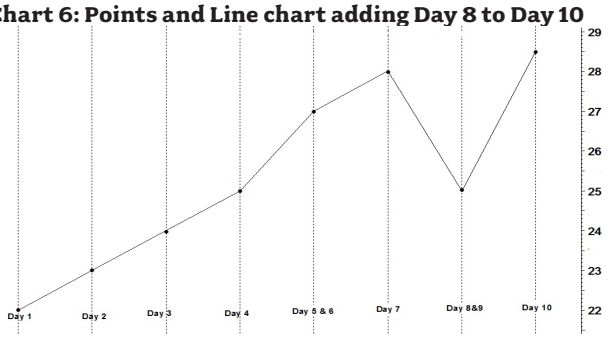
Chart 5: Points and Line chart for Day 1 to Day 7



As can be seen in Chart 5, Day 3 and Day 4 were plotted normally, similar to Day 1 and Day 2. At Day 5, prices jumped directly from 25 to 27; unlike the P&F, the Points and Line chart did not plot a point at 26 and showed a steeper slope from 25 to 27, indicating the increase in the rate of change of prices, as shown in the circle.

Also, it can be noticed that Day 6 was not plotted on the chart since 27.50 was included in the box size of Day 5 at 27; thus, it was not plotted because it was not a significant move.

Chart 6: Points and Line chart adding Day 8 to Day 10



As can be seen in Chart 6, at Day 8 when prices declined to 25, a point was drawn at 25; unlike the P&F chart, Day 7 and Day 8 were connected directly from 28 to 25. Day 9 was included in Day 8, as 24.50 was still in the box size of 25.

At Day 10, prices rose to 28.50, making another 3 box reversal, and a point is plotted at 28.50. Unlike the P&F chart, the Points and Line chart has plotted a point exactly at 28.50, not at box 28, making a new high relative to the previous peak at Day 7.

Before moving on to the Volume and Time plotting of the Points and Line chart, it is very important to clarify the noise filtration concept that is applied by the Points and Line chart and the difference between the noise filtration and the price smoothing that the moving average indicator applies.

3.1.2 Noise filtration

The Points and Line chart has the advantage of filtering trend from noise; thus, an important question is in place: what price movement is considered noise?

One of the important Technical Analysis premises is that prices move in trends that represent the market direction; all Technical Analysis charts and tools are used for the purpose of participating in those trends. But as Murphy states, "Market moves are characterized by a series of zigzags. These zigzags resemble a series of successive waves with fairly obvious peaks and troughs. It is the direction of those peaks and troughs that constitutes market trend." [19] Looking closely at the trend and its zigzag structure, there are an almost infinite number of trends interacting with one another to construct it from the very short-term trends to the very long-term trends. Very short-term trends that constitute the larger term movements are considered noise relative to the overall trend, whether these movements are counter-trend movements (corrections) or along with trend direction. Thus, the less amplitude a wave or a movement has, the noisier it becomes relative to the overall trend.

In the following example, Chart 7 displays a normal Line chart of a hypothetical stock that is in an uptrend without making any noise filtration.

Chart 7: Line chart of a hypothetical stock in an uptrend

As observed in Chart 7, the very short-term trend zigzags and the longer term trends zigzags are interacting together to construct this uptrend. Thus, the more the waves of small amplitudes are excluded, the clearer this uptrend will be. (See Charts 8 and 9)

Chart 8: Same Line chart of Chart 7 after excluding small waves or noise

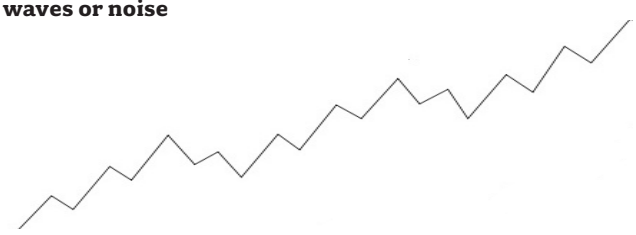
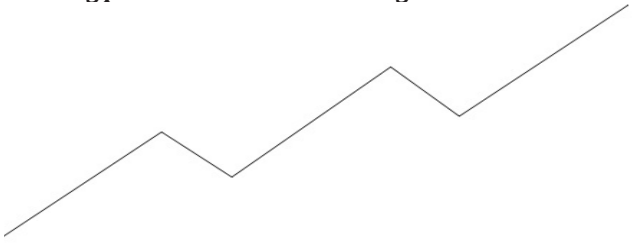


Chart 9: Same Line chart of Chart 7 by increasing the filtering parameters to exclude larger waves

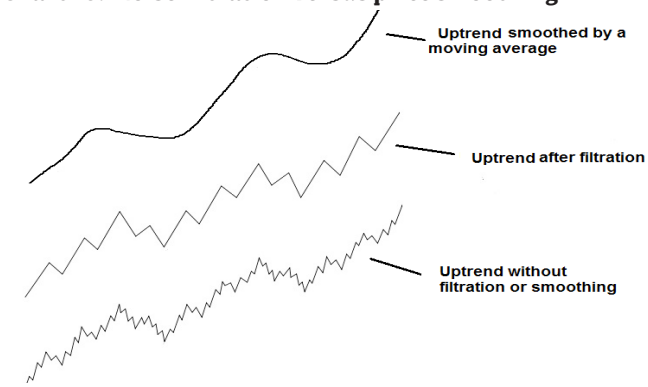


That is what the Points and Line chart does; it filters the price trend from noise to focus on the main market direction. (See also Charts 11 and 12 to compare the Points and Line chart with the Line chart from the filtration perspective). Of course, the larger the box size and box reversal used, the more filtration that will be applied on prices.

3.1.3 Noise filtration versus price smoothing

The noise filtration excludes the price waves of small amplitude to focus on price waves of larger amplitude. On the other hand, the price smoothing converts the trend zigzag display in a smoothed line that does not include any zigzags to focus only on the market direction, whether it is going up or down. (See Chart 10)

Chart 10: Noise filtration versus price smoothing



3.2 Plotting volume to the "Points and Line chart"

There are two types of volume plotting in the Points and Line chart; the first type is the total volume and the second type is the average volume.

3.2.1 Total volume

The normal definition of volume applies to total volume—it "represents the total amount of trading activity in that market for that day."[20] The total volume is calculated by adding the volume of all sessions tvvhat are included in the same point.

3.2.1.1 Numerical example

Table 2 shows how the Points and Line volume can be calculated. The first column shows the number of sessions, the second one shows the daily closing prices, the third one shows the daily normal volume, and the fourth one shows the Points and Line total volume.

Table 2: Daily closing prices and volume for a hypothetical stock for 10 consecutive days and the Points and Line volume

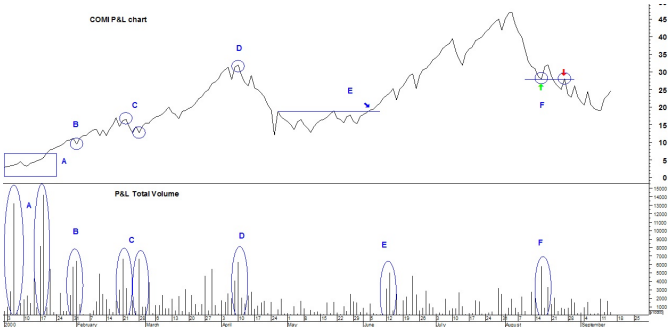
Day	Closing Price	Volume	Points and Line Volume
1	22	100,000	100,000
2	23	120,000	120,000
3	24	130,000	130,000
4	25	150,000	150,000
5	27	125,000	255,000
6	27.5	130,000	
7	28.01	145,000	145,000
8	25	90,000	240,000
9	24.8	150,000	
10	28.50	180,000	180,000

As can be seen in Table 2, the Points and Line total volume adds the volume of the days that are included in the same box size. In Day 5, the price has reached 27 (a new upside point) and its volume is plotted normally 125,000; in Day 6, the price rose to 27.50, which is an insignificant move that is not plotted, but its volume is added to the previous day. Thus, the volume of Day 5 is then equal to Day 5 volume + Day 6 volume (125,000+130,000) = 255,000. The same goes for Days 8 and 9, where the volume of Day 9 is added to the volume of Day 8 (90,000+150,000 = 240,000)

Thus, the Points and Line total volume rule is to add the volume of the ignored insignificant days to the previous plotted day.

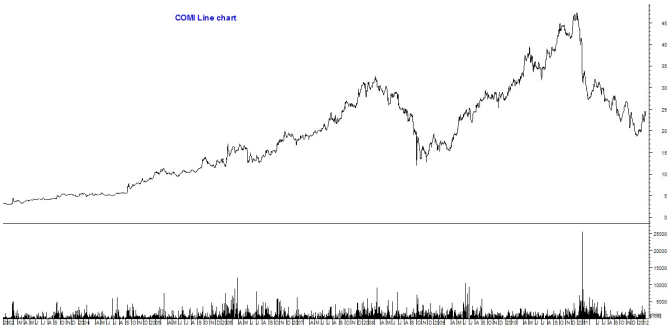
The Points and Line total volume is important in determining critical support and resistance levels since "The more trading that takes place in support area, the more significant it becomes because more participants have a vested interest in that area."[21] Thus, it shows the extreme volume that appears in peaks and bottoms. (See Chart 11)

Chart 11: Commercial International Bank (COMI.CA) Points and Line chart with total volume from February 2002 to February 2012.



As observed in Chart 11, there are six extreme volume cases that show significant important support and resistance levels. Unlike the simple Line chart (Chart 12 below), these extreme cases appear very clear using a Points and Line presentation because the stock has witnessed a lot of insignificant price fluctuations.

Chart 12: Commercial International Bank (COMI.CA) Line chart with normal volume from year 2002 to February 2012



At point A: This was the beginning of the strong uptrend of COMI, and the stock witnessed extremely high total volume.

At point B: The stock bottom at point B was so significant that the market did not reach it again.

At point C: The stock has witnessed a resistance area that was accompanied by extreme volume, and was violated again by another significant volume.

At point D: The stock witnessed extreme volume at an important market peak at that time and changed its trend to the downside.

At point E: After changing its trend to the downside, the Points and Line volume was normal until the stock violated an important resistance that shifted the trend to the upside with extreme high volume.

At point F: The stock was in a downtrend, and that was the first support that halted the stock decline, which is why it was accompanied by an extremely high volume. According to the support-resistance reversing rule,[22] when the stock violated the support level at point F to the downside it turned to become a strong resistance level, and its significance comes from its extremely high volume.

Unlike the Points and Line chart, the Line chart showed a lot of noise in the price action, as it does not ignore the insignificant moves. Also, the volume of the Line chart did not show the extreme cases that were shown clearly in the Points and Line chart. At the same time, the P&F charts do not display volume at all; thus, all price levels will have the same importance despite the volume structure.

3.2.2 Average volume

Though plotting total volume in the manner explained earlier has the advantage of highlighting extreme support and resistance levels, it tends to show relatively small total volumes for points corresponding to single days. This could be misleading in some cases because single days with large trading volumes could be hard to trace in a large-scale chart. One method to account for this problem is to plot average trading volume for each point rather than total volume.

For example if the closing price stays at 27 for 10 successive sessions with total volume 1,000,000 shares, this means that each session has an average of 100,000 shares. If the closing price reaches 28 the next day and the volume of this session is 200,000 shares, and the stock stays at 28 for only one session and rises to 29 the next day, the total volume of the Points and Line chart will show that at price 28 there is low volume. This low volume is shown in the total volume, although day 28 witnessed high volume (200,000) relative to the previous 10 sessions (100,000).

3.2.2.1 Numerical example

Table 3 shows how the Points and Line average volume is calculated. The first column shows the number of sessions, the second one shows the daily closing prices, the third one shows the per-point total volume, the fourth one shows the number of days per point and the fifth column shows the Points and Line average volume, which is the total volume divided by the number of days in each point.

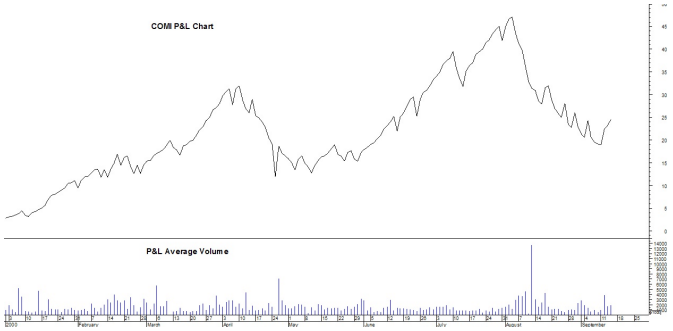
Table 3: Average volume calculation for a hypothetical stock for 10 consecutive days

Day	Closing Price	Points and Line Total Volume	Number of Days at Each Point	Points and Line Average Volume Total V/No. of Days
1	22	100,000	1	100,000
2	23	120,000	1	120,000
3	24	130,000	1	130,000
4	25	150,000	1	150,000
5	27	255,000	2	127,500
6	27.5			
7	28.01	145,000	1	145,000
8	25	240,000	2	120,000
9	24.8			
10	28.50	180,000	1	180,000

As observed in Table 3, after calculating the average volume there will not be any extreme volume that is affected by the number of days. (See Chart 13).

As can be seen in Chart 13, the volume picture is similar to the normal Line chart in Chart 12.

Chart 13: Commercial International Bank (COMI.CA) Points and Line chart with Average volume from year 2002 to February 2012



3.3 Plotting time or the number of days to the "Points and Line chart"

Murphy argued that "The longer the period of time that prices trade in a support or resistance area, the more significant that area becomes. For example, if prices trade sideways for three weeks in a congestion area before moving higher, that support area would be more important than if only three days of trading had occurred."[23]

According to his argument, as previously stated, the Points and Line chart can add more information to the chart by showing the number of days, which is the time that prices stay at every point in the chart; it will thus show the total number of days that prices congest in specific areas.

3.3.1 Numerical example

Table 4 shows how the Points and Line number of days is calculated. The first column shows the days, the second one shows the daily closing prices and the third one shows the number of days at each point.

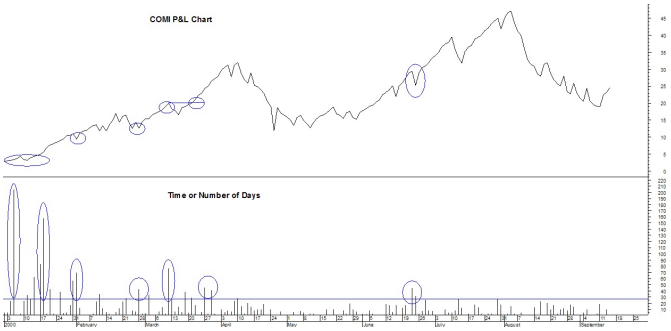
Table 4: Daily closing prices and the number of days for a hypothetical stock for 10 consecutive days

Day	Closing Price	Number of Days at Each Point
1	22	1
2	23	1
3	24	1
4	25	1
5	27	2
6	27.5	
7	28.01	1
8	25	2
9	24.8	
10	28.50	1

Thus, by looking at Table 4 we will find that prices have stayed at levels 27 and 25 more than the other level.

As can be seen in Chart 14, the number of days is plotted below the price chart like volume plotting. The number of days can be used to highlight support and resistance levels in a similar manner to the total volume, as can be seen in the chart above.

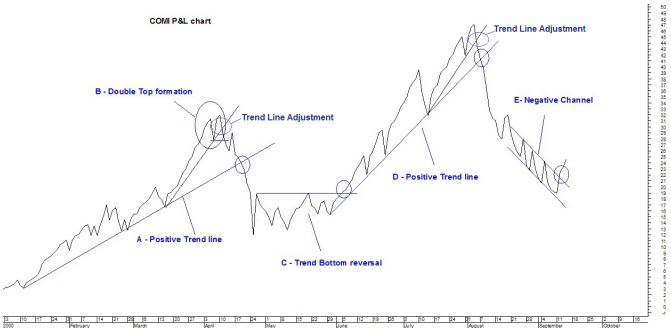
Chart 14: Commercial International Bank (COMI.CA) Points and Line chart with number of days from year 2002 to February 2012



3.4 Points and Line chart analysis versus Line chart and P&F chart

Since the Points and Line chart display is similar to the Line chart display, except that it filters significant price movements from insignificant ones, the Points and Line chart is analyzed exactly like the Line chart. Meanwhile, at the same time, it will trigger the same buy/sell signals that are found in the P&F chart in addition to the advantage stated in the previous sections of adding the total volume and the number of days. (See Chart 15)

Chart 15: Commercial International Bank (COMI.CA) Points and Line chart with classic price analysis



As can be seen in Chart 15, the Points and Line chart can be analyzed similar to the Line chart. The following can be observed:

At Point A: There was a confirmed positive trend line that can be drawn, and its violation has signaled the stock decline and a target can be measured to the downside. Also, the adjustment of the same trend line has given an earlier sell signal.

At point B: A double top formation can be seen, which reversed the stock trend at that time.

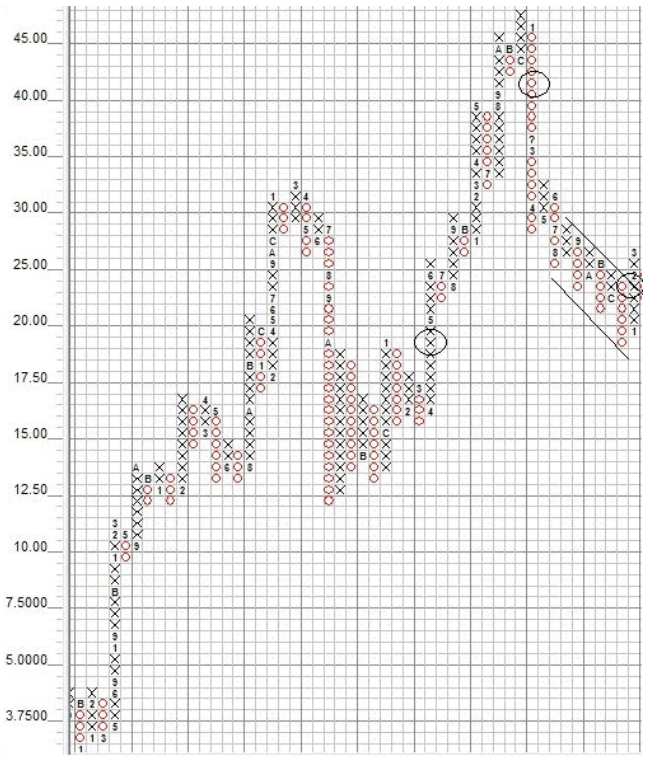
At point C: A bottoming higher lows formation can be seen, and the violation of the resistance level to the upside triggered the stock trend reversal to the upside.

At point D: Another positive trend line is confirmed until it was violated, triggering the stock decline. Also, the adjustment of the same trend line has given an earlier sell signal.

At point E: A downward channel that can be used for trading can be clearly seen, as well as the significance of its violation to the upside where a channel target can be measured.

Also, like the P&F chart, because of the price filtration method, as can be seen in Chart 15, a violation of a previous peak or bottom is considered very significant relative to other price charts, indicating significant declines or rises. Thus, the Points and Line chart will trigger the same significant buy/sell signals that are triggered by the P&F chart. (See Chart 16)

Chart 16: Commercial International Bank (COMI.CA) P&F chart (1 box size and 3 box reversal)



The Points and Line chart has extra information above the P&F chart in the volume and number of days display that confirm those signals.

As can be seen in Chart 16, the two positive trend lines and their adjustments that were drawn in the Points and Line chart (See Chart 15) cannot be drawn in the P&F chart due to its condensed display. Finally, unlike in the Points and Line chart, due to the vertical display, the change in momentum in any rise or decline is not shown.

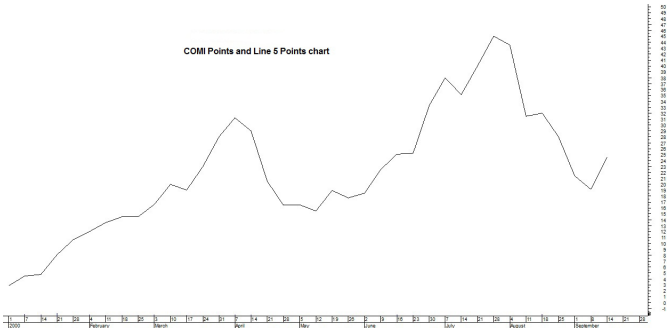
On the other hand, of course there will be other situations where a subjective trend line is drawn on both the Points and Line chart and the P&F chart (negative channel on the right in Charts 15 and 16).

The Points and Line chart has the advantage of applying the same target projections of the Line chart and the P&F chart. Although, it is easier to make the count on boxes than on Points, the Points and Line chart can still apply the Vertical and the Horizontal counts that are applied on the P&F chart. However, when it comes to the calculation of the horizontal count in the Points and Line chart, the number of upward and downward movements will be counted instead of the number of columns in the P&F chart. (See Charts A.10 and A.11 in Appendix A).

3.5 Points and Line weekly or "5 points" chart

The Points and Line chart can also show the very long-term trends by converting them to a weekly chart or what can be referred to as "5 Points chart". This will be done by plotting the fifth point of every 5 points, which is similar to the idea of the weekly normal Line chart (See Chart 17).

Chart 17: Commercial International Bank (COMI.CA) 5 Points chart



3.6 The filtration advantage of the Points and Line chart versus the monthly Line chart

It is very important to distinguish between the filtration that is explained in the Points and Line chart and the filtration that is obtained using the normal monthly Line chart. The monthly Line chart displays the closing price of the last day of every month. This data is displayed whether it is significant or not. Also, if there is any shorter term significant moves that happened during the month, they will not be shown in the monthly chart, as it displays only the last day.

The Points and Line chart is a mix of the daily, weekly and monthly data; a day can be plotted at a point, and the next point can represent a week and another point can represent a month. The following two examples (Charts 18 and 19) show the monthly Line chart and the Points and Line chart for the Commercial International Bank (COMI.CA).

Chart 18: Commercial International Bank (COMI.CA) monthly Line chart from February 2002 to February 2012

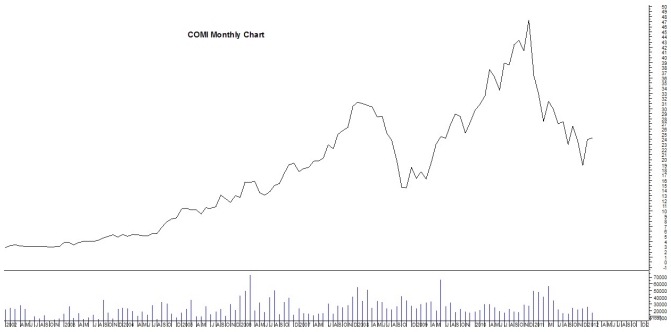
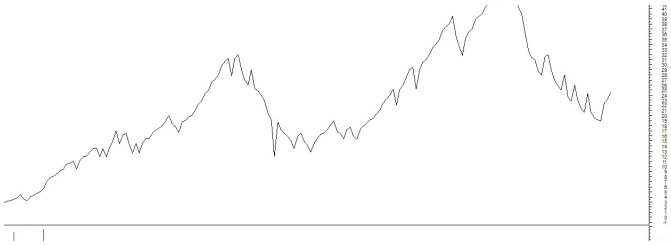


Chart 19: Commercial International Bank (COMI.CA) Points and Line chart from February 2002 to February 2012



As can be seen in Charts 18 and 19, unlike the Line chart, the Points and Line chart displays prices based on the significance of the move, whether this move is made in a day, week, month or even more than one month. Thus, it can be clearly seen that both charts are different in structure, although both charts filter the price action but based on different criteria.

3.7 Changing Points and Line box size and box criteria

The box size used in the Points and Line chart is the standard box size and the 3 box reversals on the closing price. The 3 box reversals are recommended so as not to increase the filtration process in a way that decreases the number of trades. On the other hand, it does not decrease the box reversal to the extent that it loses the filtration advantage.

However, box size and box criteria can be changed according to user preferences, taking into consideration that the larger the box size and criteria, the more the filtration in prices. On the other hand, the smaller the box size and box criteria, the more noise and false breakouts will be in the chart.

4. The Points and Line Chart and Technical Analysis Indicators and Oscillators

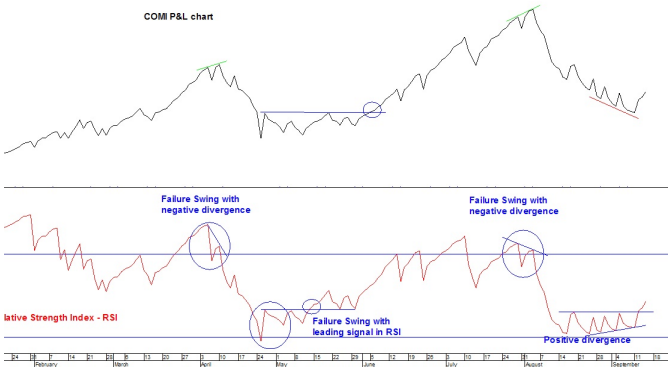
Technical Analysis indicators and oscillators applied on the Points and Line chart will be filtered from noise, owing to the filtration advantage of the chart. Thus, the Points and Line chart indicators will provide clearer buy and sell signals compared to the Line chart.

It is worth mentioning here that the Points and Line chart has an advantage over the P&F chart in that the Technical Analysis indicators will be calculated based on the number of points not on the number of columns. Thus, despite the same filtration criteria applied on both charts, as a result of the descending/ascending display of the Points and Line chart, indicators that are calculated from the Points and Line chart will show details that may not be visible on the indicators that are calculated from the P&F chart; this is because the indicators that are calculated from the P&F chart will use only one point from the center of each column. Thus, the Technical Analysis indicators with their default settings will be much smoother and informative on the Points and Line chart relative to the P&F chart. For example, in the P&F chart, a movement that consists of 16 Xs will be represented by only one point in the calculation of an indicator, whereas in the Points and Line chart, the 16 Points will be used in the calculation of an indicator.

The following sections will clarify in more detail the advantages of applying the Technical Analysis indicators on the Points and Line chart over the Line chart and the P&F chart.

4.1 The Points and Line chart with the relative strength index – RSI

Chart 20: Commercial International Bank (COMI.CA) Points and Line chart with the relative strength index (14 Points)



As can be seen in Chart 20, the RSI, which is a fast and volatile indicator, becomes more filtered from noise by calculating it from the Points and Line chart, providing clearer buy and sell signals. In addition, the divergences, failure swings, leading moves and trend identification are very clear, unlike the case with the Line chart. (See Charts 21 and 22).

Chart 21: Commercial International Bank (COMI.CA) Line Daily chart with the relative strength index (14 days)

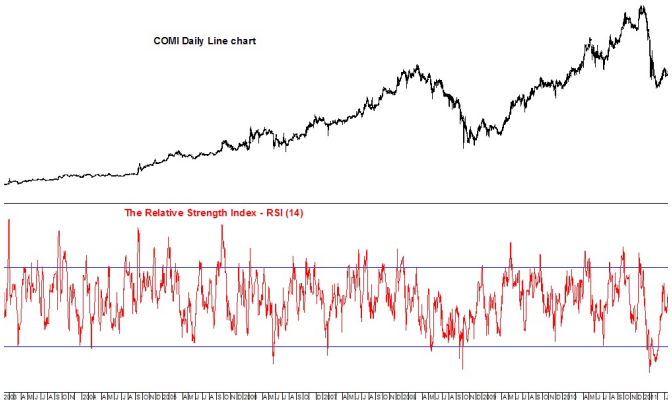
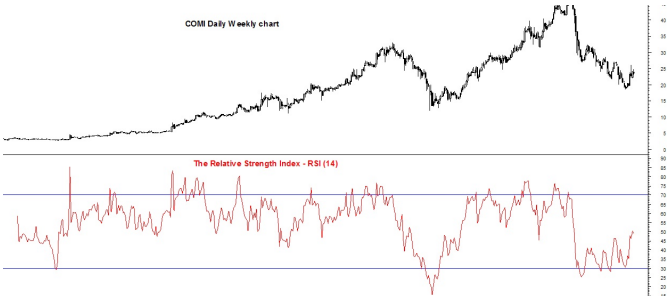


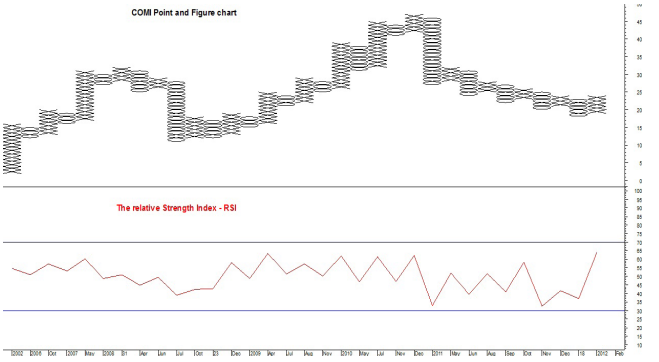
Chart 21 shows how volatile the RSI is when calculated from the Line chart. In Chart 22, the RSI is calculated using weekly data, yet a lot of insignificant noise is still present.

Chart 22: Commercial International Bank (COMI.CA) Line Weekly chart with the relative strength index (14 weeks)



As can be seen in Chart 23, the RSI signals from the P&F chart are insignificant relative to the Points and Line chart and the Line chart, as the RSI is calculated based on the number of columns, which is too small to make it informative.

Chart 23: Commercial International Bank (COMI.CA) Point and Figure chart (Box size 1 and box reversal 3) with the relative strength index (14 columns)



4.2 The Points and Line chart with the moving average convergence divergence (MACD) and MACD histogram

Chart 24: Commercial International Bank (COMI.CA) Points and Line chart with MACD and MACD histogram

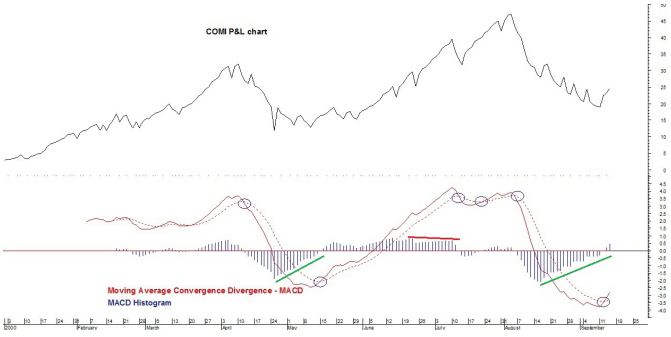


Chart 25: Commercial International Bank (COMI.CA) Line chart with MACD and MACD histogram

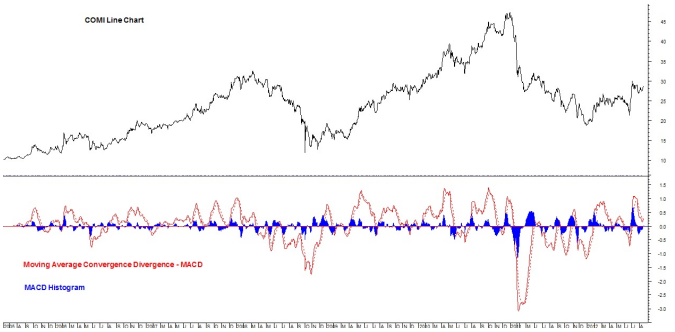
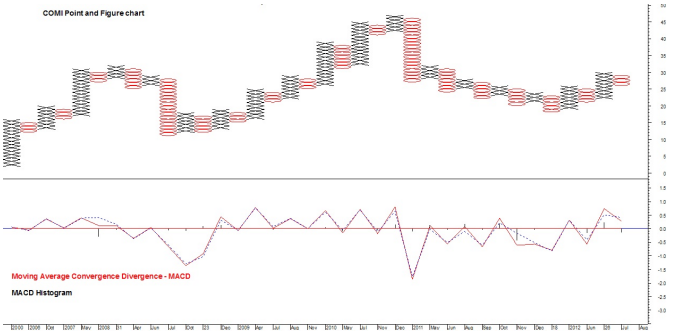


Chart 26: Commercial International Bank (COMI.CA) Point and Figure chart (box size 1 and box reversal 3) with MACD and MACD histogram



As can be seen in Charts 24 through 26, unlike the Line chart, the Points and Line chart provided significant clearer buy/sell signals. On the other hand, the P&F chart filtration and vertical display compressed the MACD and MACD histogram, which makes it difficult to provide any significant signals.

4.3 The Points and Line chart with the slow stochastic oscillator and the commodity channel index (CCI)

Concerning the indicators or oscillators that use the high and low values in their calculations, the open, high and low values could be available in the database of the Points and Line chart. This could be done by entering in the database the open, high and low values of the significant plotted closing price of the Points and Line chart.

The same advantage scenario of the Points and Line chart over the Line chart and The P&F chart explained in the RSI and the MACD indicators applies to the slow stochastic oscillator and the commodity channel index. (See Charts 27 through 29)

Chart 27: Commercial International Bank (COMI.CA) Points and Line chart with the stochastic oscillator (9,5,3)

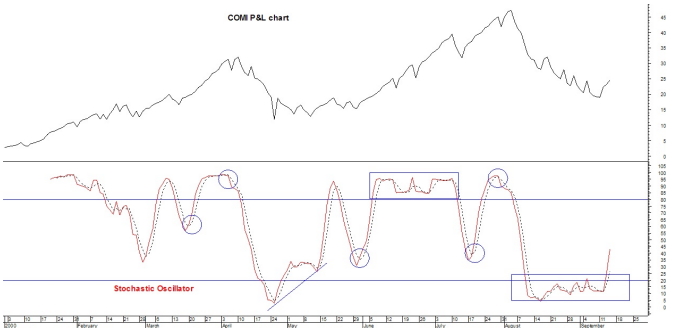


Chart 28: Commercial International Bank (COMI.CA) Points and Line chart with the commodity channel index—CCI (14)

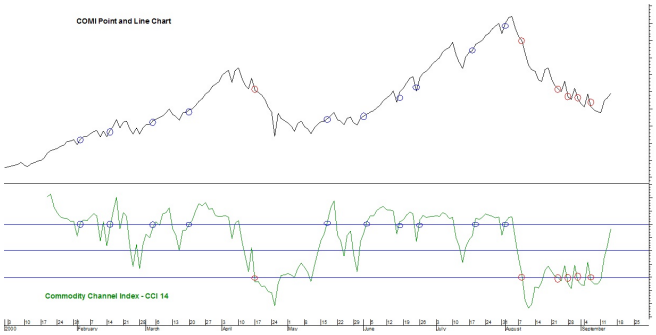
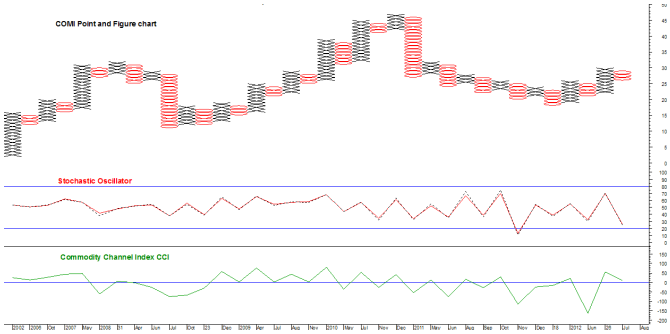


Chart 29: Commercial International Bank (COMI.CA) Point and Figure chart (box size 1 and box reversal 3) with the stochastic oscillator (9,5,3) and the commodity channel index — CCI (14)



4.4 Moving averages, Bollinger bands, and the parabolic stop and reverse (SAR) with the Points and Line chart

As previously explained in Section 2.3.8, the moving averages, the Bollinger bands, and the parabolic stop and reverse (SAR) are well applied on the P&F chart, so in the Points and Line chart, the only difference will be the length of the indicators. The P&F chart will use smaller parameters relative to the Points and Line chart because the number of columns in the P&F chart is smaller relative to the number of points in the Points and Line chart.

The following two charts compare the Points and Line chart to the P&F chart when applying the moving average indicator.

Chart 30: Commercial International Bank (COMI.CA) Points and Line chart with simple moving average (20)

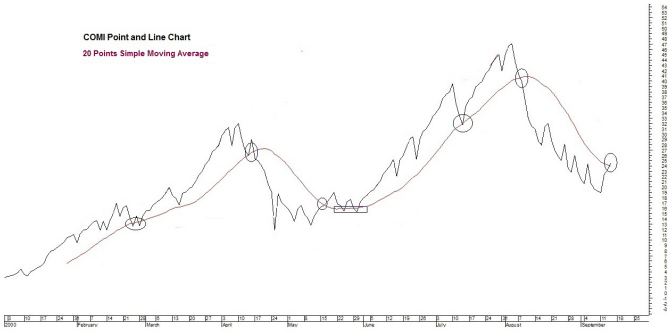
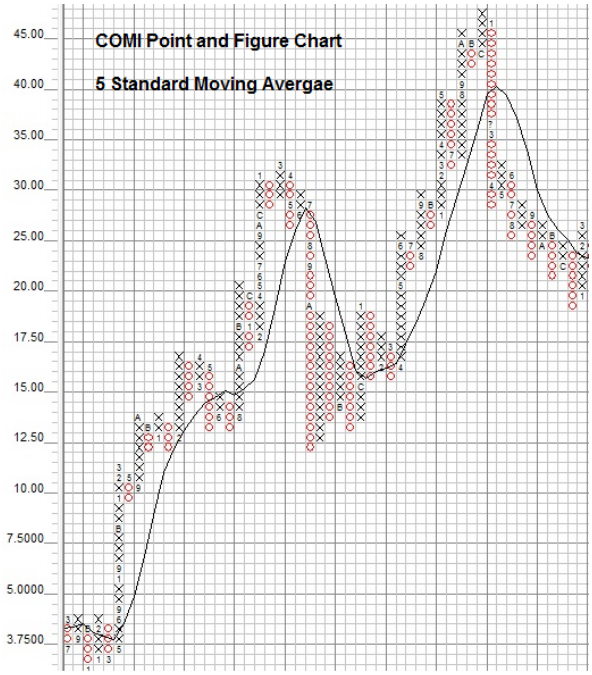
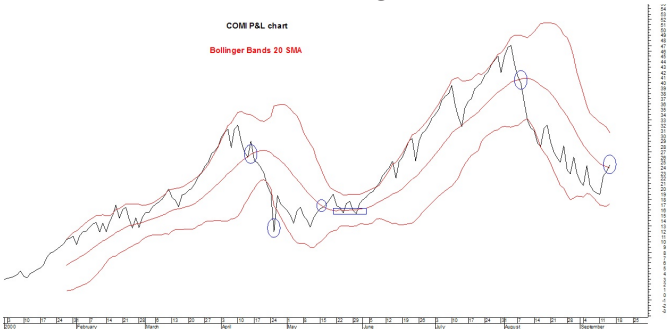


Chart 31: Commercial International Bank (COMI.CA) Point and Figure chart with simple moving average (5)



As can be seen in Charts 30 and 31, the Points and Line chart will give nearly the same results as the P&F chart when the moving average indicator is applied, but the length of the moving average will be smaller in the P&F chart (5 standard moving average) than the Points and Line chart (20 points simple moving average).

Chart 32: Commercial International Bank (COMI.CA) Points and Line chart with Bollinger bands



Bollinger bands used a 20-day simple moving average with two standard deviation bands. These settings will normally be used when applied on the Points and Line chart, as shown in Chart 32, but will be calculated using 20 points instead of 20 days.

On the other hand, when applied on the P&F chart, the Bollinger bands settings must be changed, as Du Plessis pointed out, "In column terms, you will find that around half the suggested moving average length is better for Point and Figure charts, although it is dependent on the make-up of the Point and Figure chart itself. 1 box reversal, and charts constructed with high/low data have wider congestion areas and, therefore, fewer long columns, requiring you to lengthen the moving average." [24] It is important here to understand that when the

1 box reversal is used in the P&F chart, the chart will lose its filtration advantage and will show a lot of insignificant short-term movements.

5. The Points and Line Chart Versus the Point and Figure Chart (Practical Example)

After illustrating the Points and Line chart, the following example will focus on the Points and Line chart advantage over the P&F chart in a practical example. (See Charts 33 and 34)

Chart 33: Facebook Inc. (FB.O) Points and Line chart with Total Volume, Number of Days and one point momentum, May to August 2012

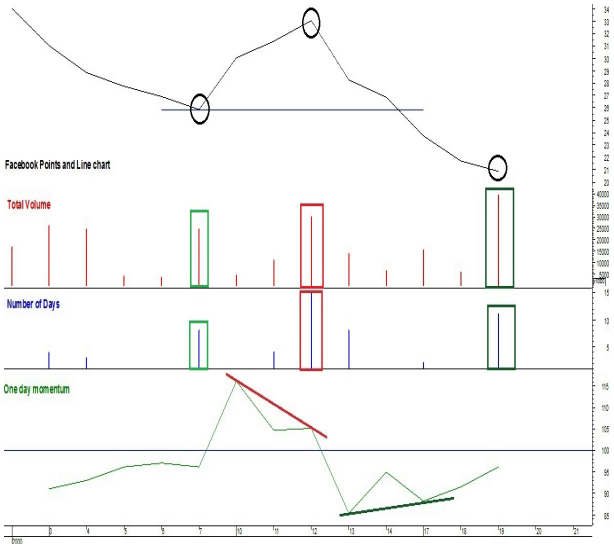
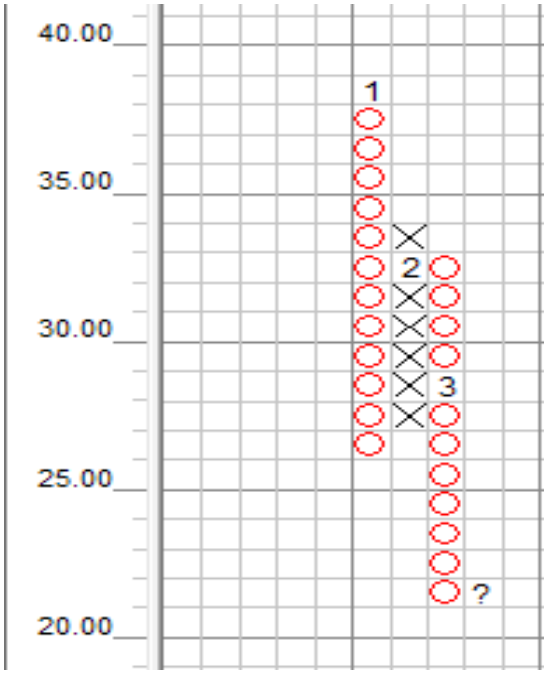


Chart 34: Facebook Inc. (FB.O) P&F chart, May to August 2012



The Facebook stock was selected to focus on the benefits of the Points and Line chart over the P&F chart in each move, as it includes only two significant declines and one rise. As can be observed, the Points and Line chart recorded the same data as the P&F chart, and the same simple sell signal is triggered on both charts. But the Points and Line chart showed the weakness in the stock rise from 25.50 level to 33 level, where the rise slope decreased; the one-point momentum confirmed this weakness. Also, during the decline from 33 to 22, it is clearly shown from the Points and Line chart that this fall is getting weaker, and the momentum indicator is showing the change in the rate of speed of this decline. The number of days and the total volume confirms the significance of the support level at 25.50 as well as the resistance level at 33. Also, both the number of days and the total volume have risen significantly in the last point.

On the other hand, the P&F chart did not show any strength or weakness in the rise or the fall because it has only recorded the rise as a vertical column of Xs and the fall as a vertical column of Os. Furthermore, due to its condensed display, a one-column momentum will not be informative. Finally, volume and number of days are not displayed and thus, all price levels have the same importance.

Conclusion

The paper attempts to introduce a new type of charting technique: the Points and Line chart. This chart can be created by applying the P&F chart calculations on the normal Line chart with specific adjustments. By doing so, the Points and Line chart has the benefit of filtering the price action like the P&F chart to provide clear buy/sell signals while benefiting from the smooth display of the Line chart. Plotting the Points and Line chart in a similar fashion as the Line chart solved the problem of the P&F chart in showing the change in price momentum and trend slope. New concepts have been introduced (the total volume and the number of days), which help in figuring out the significant price levels. The Points and Line chart can be analyzed normally and much more easily than the Line chart because it excludes noise. Target projections applied by the Line chart and the P&F chart can also be applied on the Points and Line chart. It can also be converted to what can be referred to as a 5 points chart. Though the paper has used the standard box size and the 3 box reversal in the calculation of the Points and Line chart, those criteria can be changed according to user preferences. Technical Analysis indicators and oscillators applied on Points and Line chart were found to be filtered from noise owing to the filtration advantage of the chart. Thus, indicators provide clearer buy and sell signals relative to the Line chart and are more easily applicable and efficient compared with the P&F charts. Also, it has been recommended to plot the open, high and low values of the Points and Line closing prices in the database for using them in the indicators or oscillators that use those values in their calculation, like the stochastic oscillator.

Appendix A: Points and Line Chart Examples

This appendix provides additional examples for the Points and Line chart and its applicability on different markets.

The Dow Jones Industrial Average – (.DJI)

Chart A.1 DJIA Points and Line chart with Number of Days from January 1977 to March 2012

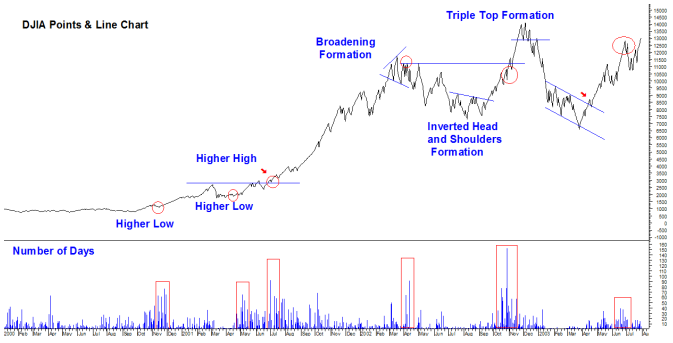
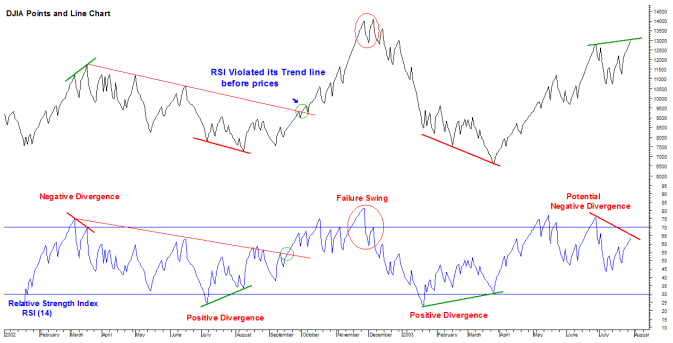


Chart A.2 DJIA Points and Line chart with the relative strength index – RSI (14 Points) from June 1998 to March 2012



Gold – (XAU=D)

Chart A.3 Gold Points and Line chart with Number of Days from August 2003 to March 2012

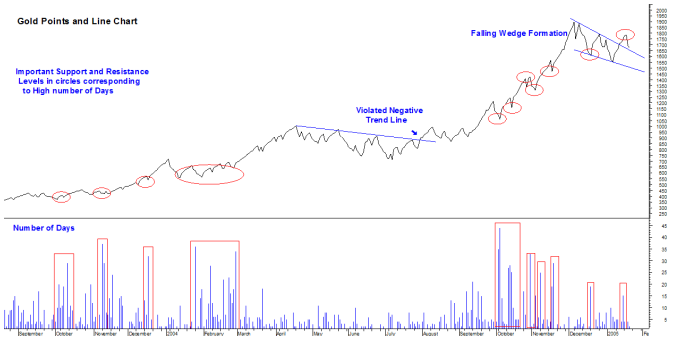
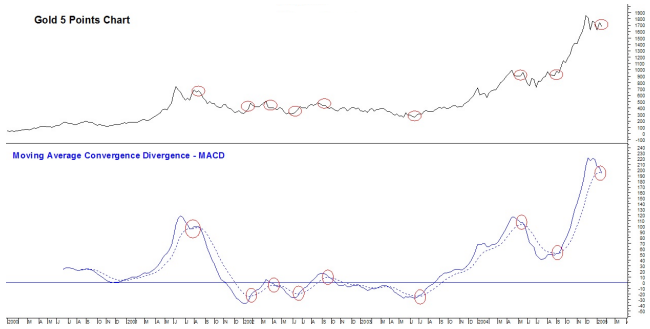


Chart A.4 Gold 5 point chart with moving average convergence divergence (MACD) from March 1968 to March 2012



The Dubai Financial Market General Index—(.DFMGI)

Chart A.5 Dubai Financial Market General Index (DFMGI) Points and Line chart analysis with 10 and 20 Points exponential moving averages from January 2004 to October 2010

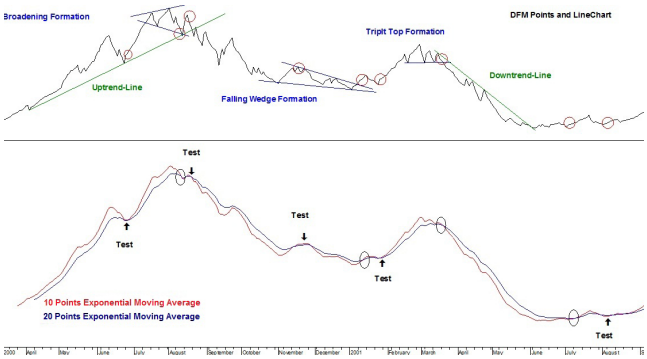
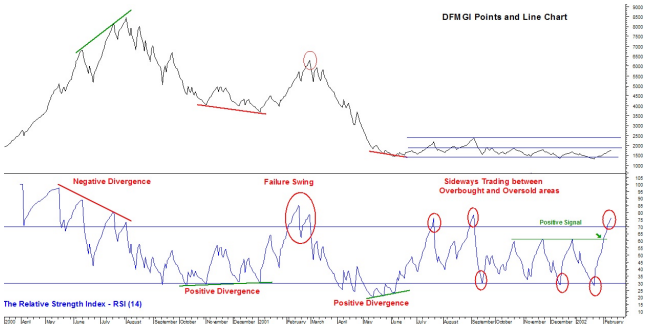


Chart A.6 Dubai Financial Market General Index (DFMGI) Points and Line chart with the relative strength index – RSI (14 Points) from January 2004 to March 2012



The Egyptian Stock Market Index – (.EGX30)

Chart A.7 EGX 30 Points and Line chart with Total Volume from January 2005 to March 2012

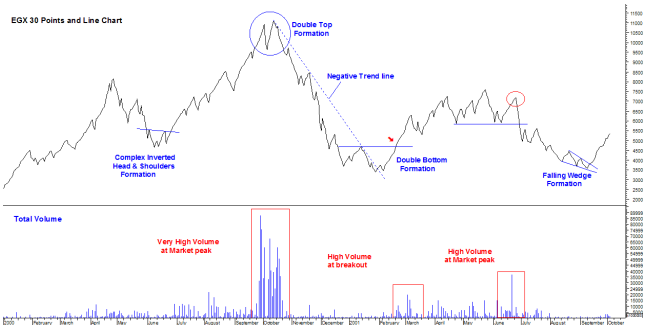


Chart A.8 EGX 30 Points and Line chart with the relative strength index – RSI (14 Points) from January 2005 to March 2012

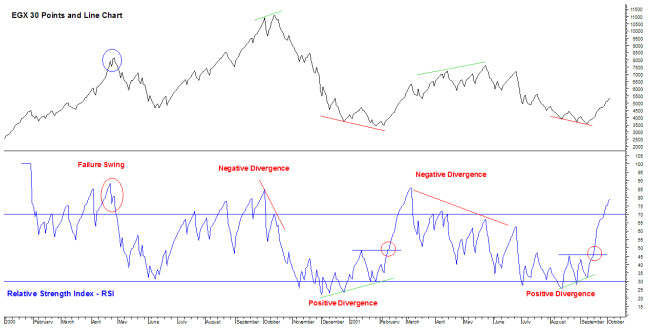
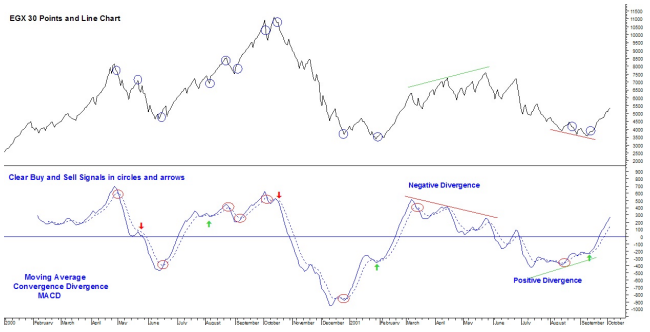


Chart A.9 EGX 30 Points and Line chart with the moving average convergence divergence (MACD) from January 2005 to March 2012



Commercial International Bank (COMI.CA) – Vertical and Horizontal counts

Chart A.10 Commercial International Bank (COMI.CA) Points and Line chart Vertical Count

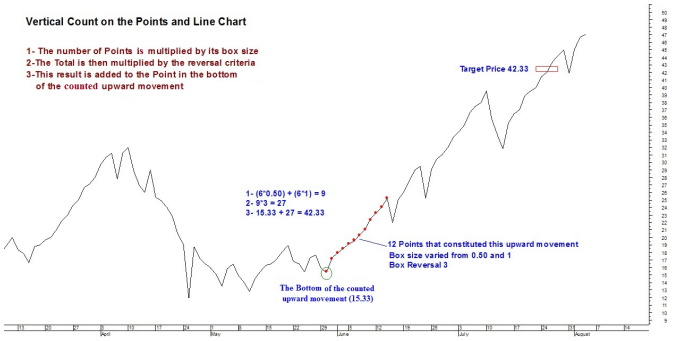
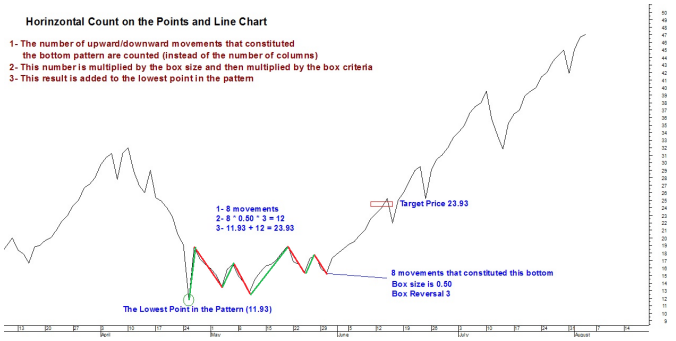


Chart A.11 Commercial International Bank (COMI.CA) Points and Line chart Horizontal Count



Appendix B: Other Filtration Concepts

As explained previously, the aim of this paper is to apply the P&F filtration criteria on the Line chart to benefit from the Line chart smooth display while filtering its noise. This appendix attempts to review other charting techniques that filter the price movements like the P&F chart but with different concepts or criteria. For further studies, those concepts, including its volume and number of days, can be applied on the Points and Line chart.

The 3-day chart Moves

The 3-day chart filtration concept depends on the market action itself, not on a specific box size and box reversal like the P&F chart. It filters the market action depending on the number of positive days and negative days; thus, all the moves depend only on calendar days, not on the percentage of rise or decline. The only exception is when there is a significant movement that exceeded the high or the low of the positive or negative days, as W.D. Gann explains, "When a market is advancing and starts up from a low point and makes higher Bottoms and higher tops for 3 consecutive days, the chart is moved up to the top of the third day. Should the market then react for 2 days, you would not record this movement on the chart, but when it moved up above the First Top, continue to move the line up to the top of each day until there were 3 days lower Bottoms. Then you would move the line down to the low of the third day and continue to follow up it down as long as prices went lower. If 2-day rallies occurred,

you would ignore them, except when the market is near extreme high or extreme low prices. In cases of this kind you would record the 2-day moves, especially if the fluctuations were very wide. After a market has been advancing for a considerable time and makes a Double or Triple Top and breaks the last low on the 3-Day chart, you consider that the minor trends, at least, have turned down. When a market is declining and crosses the last Top on the 3-Day chart, you would consider that the trend had turned up at least temporarily."[25] The 3-day criteria can be adjusted, and that is why Gann calls it "the 3-day chart or more" in his book.

The 9-Point chart Swings

W.D. Gann has also introduced another kind of chart that includes an idea similar to the box reversal of the P&F chart, which is the 9-Points criteria. This kind of chart does not introduce the box size concept of the P&F chart, and thus, it plots the actual prices. It helps in studying how often the market moves from 9 to 10 points. He based it on the stock market averages, which is why it is measured in points.

"When the market is advancing the chart continues to move up until there is a reaction of 9 points or more. When the market is declining, the chart moves down on the line until there is a rally of at least 9 points or more, which is a reversal on the 9-Point chart."[26]

The Kagi chart

There are similarities between the Kagi charts and the 3-day Moves and the 9-Point chart swings, in that their line displays are similar and also dependent on the market direction. To draw a Kagi chart, a reversal amount must be chosen similar to the 9-Point and the P&F chart ideas.

"The Kagi charts are most commonly based on closing prices. Before starting the Kagi chart, a turnaround (i.e., or reversal) amount must be chosen. This is the minimum price movement that is needed before a new reversal line can be drawn in the next column."[27]

For example, if prices were rising and the reversal amount was 3$, when prices fall, the chart will not record this decline or change direction until the prices fall below this predetermined amount. On the other hand, if prices continue in the same direction as the prior line, the line will be extended in the same direction, no matter how small the move.

What makes the Kagi chart different compared to the 9-Point chart is that when prices penetrate a prior low or high, the thickness of the of the Kagi lines changes, where the thick Kagi line is called "yang" line and the thin Kagi Line is called a "yin" line.

The three-line break chart

The three-line break chart has the same filtration concept similar to the past reviewed charts, where it depends on the market action itself. However, it differs in its appearance, as the three-line breaks apply the same candlestick appearance concept of white and black blocks.

"The three-line break chart looks like a series of white and black blocks of varying heights. A new block is in a separate column. Each of these blocks is called a line. Using the closing price, a new white line is added if the previous high is exceeded and a new black line is drawn if the market reaches a new low for the move. If there is neither a new high nor a low, nothing is drawn."[28]

To shift from a column to another, the market has to break above (or below) the prior three lines, from where the three-line break name is derived. Volume and time are also not included as in the P&F chart.

The Renko chart

The Renko chart is similar to the three-line breaks in its display, as it is also formed of white and black blocks (referred to as bricks). At the same time, the Renko chart is similar to the P&F chart, as it filters the price action by a predetermined amount but unlike the P&F chart this amount is fixed all the time.

The Renko chart fixed amount filtration criteria is used in moving the previous brick higher (or lower), and it is also used as the reversal criteria that shifts the market in the opposite direction, which is why its bricks are all the same size. Volume and time are also not included as in the P&F chart.

References

1. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.2.
2. Kirkpatrick, Charles D., and Dahlquist, Julie R. *The Complete Resource for Financial Market Technicians*. New Jersey: Pearson Education, Inc., 2007, P.342
3. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.30.
4. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.36.
5. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.266.
6. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.162.
7. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.92.
8. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.274.
9. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.282.
10. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.266.
11. Du Plessis, Jeremy, *The Definitive Guide to Point and Figure: A comprehensive Guide to the Theory and Practical Use of the Point and Figure Charting Method*, Petersfield: Harriman House Publishing, 2006, P.56.
12. Keller, David, *Breakthroughs in Technical Analysis: New Thinking from the World's Top Minds*. Bloomberg Financial, 2007, P. 126.
13. Keller, David, *Breakthroughs in Technical Analysis: New Thinking from the World's Top Minds*. Bloomberg Financial, 2007, P.126.
14. Du Plessis, Jeremy, *The Definitive Guide to Point and Figure: A comprehensive Guide to the Theory and Practical Use of the Point and Figure Charting Method*, Petersfield: Harriman House Publishing, 2006, P.405.
15. Du Plessis, Jeremy, *The Definitive Guide to Point and Figure: A comprehensive Guide to the Theory and Practical Use of the Point and Figure Charting Method*, Petersfield: Harriman House Publishing, 2006, P.435.

16. Du Plessis, Jeremy, *The Definitive Guide to Point and Figure: A comprehensive Guide to the Theory and Practical Use of the Point and Figure Charting Method*, Petersfield: Harriman House Publishing, 2006, P.404.
17. Dorsey, Thomas J. *Point & Figure charting: The Essential Application for Forecasting and Tracking Market Prices*. Hoboken, New Jersey: John Wiley & Sons, Inc., 2007, P.27.
18. Kirkpatrick, Charles D., and Dahlquist, Julie R. *The Complete Resource for Financial Market Technicians*. New Jersey: Pearson Education, Inc., 2007, P.364.
19. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.49.
20. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.41.
21. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.60.
22. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.57.
23. Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999, P.60.
24. Du Plessis, Jeremy, *The Definitive Guide to Point and Figure: A comprehensive Guide to the Theory and Practical Use of the Point and Figure Charting Method*, Petersfield: Harriman House Publishing, 2006, P.427.
25. Gann, William D., *45 Years in Wall Street*, Lambert-Gann Publishing co., Inc., 1949, P.63-64.
26. Gann, William D., *45 Years in Wall Street*, Lambert-Gann Publishing co., Inc., 1949, P.75.
27. Nison, Steve. *Beyond Candlesticks: New Japanese Charting Techniques*. New York: John Wiley and Sons, Inc., 1994, P.215.
28. Nison, Steve. *Beyond Candlesticks: New Japanese Charting Techniques*. New York: John Wiley and Sons, Inc., 1994, P.167.

Bibliography

Bollinger, John. *Bollinger on Bollinger Bands*. New York: McGraw-hill, 2002.

Dorsey, Thomas J. *Point & Figure charting: The Essential Application for Forecasting and Tracking Market Prices*. Hoboken, New Jersey: John Wiley & Sons, Inc., 2007

Du Plessis, Jeremy, *The Definitive Guide to Point and Figure: A comprehensive Guide to the Theory and Practical Use of the Point and Figure Charting Method*, Petersfield: Harriman House Publishing, 2006.

Edwards, Robert D. and Magee, John and Bassetti, W.H.C., *Technical Analysis of Stock Trends*. Boca Raton: Taylor & Francis Group, 2007.

Elder, Dr. Alexander, *Trading For a Living*: Psychology — Trading Tactics — Money Management, New York: John Wiley and Sons. Inc., 2003.

Gann, William D., *45 Years in Wall Street*, Lambert-Gann Publishing co., Inc., 1949.

Keller, David, *Breakthroughs in Technical Analysis: New Thinking from the World's Top Minds*. Bloomberg Financial, 2007.

Kirkpatrick, Charles D., and Dahlquist, Julie R. *The Complete Resource for Financial Market Technicians*. New Jersey: Pearson Education, Inc., 2007.

Murphy, John J. *The Visual Investor: How to Spot Market Trends*. New York: John Wiley & Sons. Inc., 1996.

Murphy, John J. *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*. New York: New York Institute of Finance, 1999.

Nison, Steve. *Beyond Candlesticks: New Japanese Charting Techniques*. New York: John Wiley and Sons, Inc., 1994.

Pring, Martin J., *Technical Analysis Explained : The successful Investor's Guide to Spotting Investment Trends and Turning Points*, Fourth Edition, New York: McGraw-Hill, 2002.

Wilder Jr., J. Welles, *New Concepts in Technical Trading Systems*, North Carolina: Hunted Publishing Company, 1978.

Technical Software and data

Metastock, Equis international, a Reuters company.
Bull's-Eye Broker, Professional Edition, Version 4.00.
MS Office, 2003 Microsoft office.
Data provided by Reuters.