

# An Empirical study applying Chart patterns to Indian Stock Market Crashes

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### Abstract

Charting techniques are used by analysts to predict the movements of prices in Financial Markets. However, most of them are based on the gradual movements of prices though the uncertain environment of today calls for an analysis of the rapid movements. This paper examines Kagi Charting technique to analyze the Crashes of Indian stock markets based on Qualitative parameter of Predictive Efficiency. The period of study is from 1997 to 2011. A crash is defined as a drop of 25% or above from the peak value of Sensex within a duration of 60 days from the peak. The results of the study show that Kagi Charts are able to predict the crash with 100% predictive efficiency for one of the three crashes analyzed in the study.

### Keywords:

Stock Market, Crashes, India, Financial Markets.

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### Introduction

The analysis of securities has been done for years together with the use of charting techniques or technical analysis. Technical analysis involves making the use of recording the historical data on charts, studying these charts to find meaningful patterns and then further using the same to predict the future prices. There are different techniques which are used by professional analysts to recognize the specific pattern of the movements in order to apply it for predictive purposes. The importance lies in the identification of trends and recognition of the end of a trend and start of the movement of prices in the opposite direction. It is essential to identify the different figures and patterns in order to construct charts. Kagi charting employed in 1994 by Nison was used for the first time in the 1800s by the Japanese. It is based on the premise that changes in prices occur gradually and due to this changes in trends can be identified.

### What Kagi Charts are all about?

The Kagi charts display a series on vertical lines where the thickness and direction of the lines are dependent on the underlying security's price action. A movement of the closing prices in the direction of the Kagi line made previously leads to an extension in the line. However, a reversal in the closing prices leads to a formation of a new line in the opposite direction. It can be used as a utility tool to pinpoint the

changes in the sentiments or timing the turnover of sentiments. The best way however to use the charts is to use them in combination with candlesticks and a combination of technical indicators. These indicators used in such a style are capable of making a distinct contribution towards analyzing price movements.

The term “Kagi” originates from the Japanese word key which means that these are used as a key to detect the turns in sentiments more efficiently. Once the direction of the next trade has been decided the trader can effectively use the Kagi charts. After this the challenge which remains is to locate an optimal entry point. The effectiveness of the Kagi charts is on its ability to be used as an entry trigger, since it is capable of exactly defining where the sentiment has turned.

#### Following are certain characteristics of the Kagi charts:

1. Yin and Yang: - These are the Kagi chart lines which alternate between the thin and thick. The name associated with the sentiment being bearish and favoring selling is Yin whereas Yang lines indicate the buying sentiment being over. Also these lines are thicker than the Yin lines.
2. Shoulders: - The change of line from thin to thick results into the formation of a Kagi shoulder generating a down reversal.
3. Kagi Waistlines: - They are characterized by a change in lines from thick to thin, generating an upward reversal.
4. Turning – the main Kagi chart event – The relationship between Yin and Yang is best understood through the Kagi charts. They show the nature of the existing balance of sentiments more clearly.
5. Reversal Amount: - This refers to the amount which if equaled or exceeded by a price results into a reversal. They must be small enough or else reliable signals in sentiment must not be developed.
6. Reversal Location: - The reversal location is a key criterion for the trader. It helps in knowing whether the reversal is a key Fibonacci resistance line or other technical parameter?

#### Literature Review

The Kagi charts have been created around the time when the Japanese stock market started trading in the 1870s. It is also referred to as the price range chart, the hook chart, the delta chart and the string chart. The thickness and the direction of the Kagi lines are dependent on the action of the markets. With the penetration of the prices into prior low or prior high there is corresponding impact on the thickness of the Kagi line too. Thick line is referred to as the yang line whereas the thin line is addressed as the yin line. The Kagi charts are trending tools and their goal is to catch longer term trends

(Nison, 1994a).

**Kettering (2005)** has investigated the viability of the use of simple charting technique Kagi to analyze the gold and silver prices. The results of the charting technique suggest that the technique is best suited for interpreting the rapid movements of the prices. Also, investors using this technique have been able to earn higher returns over the time span of 1999 to 2004.

**Cofnas (2010)** has given the construction logic for Kagi charts which follow the rules given by **Nison (1994)**. First of all the reversal price is set then the base close price is read by the system if the chart is made by software.

#### Research Methodology

According to Gopalakrishnan (2010) the reversal amount depends on various factors namely volatility, time frame of investment, price of security and the risk taking ability of the investor. Thus, if the difference between the base price and closing price of the second session is equal to or greater than the reversal amount then only the first line can be drawn and if Closing price of second Session  $\geq$  Base price, Then First **Thick** Vertical line (Yang) of Kagi Chart is drawn, instead if,

Closing price of second Session  $\leq$  Base price, Then First **Thin** Vertical line (Yin) of Kagi Chart is drawn.

If the difference between the two is less than the reversal amount then no line is drawn and comparison with the third session is done and then further lines are drawn. After drawing the first line it is to be given importance that an inflection line, which is a short horizontal line, is to be drawn, before thick or thin vertical line, whenever there is a move in the opposite direction that is greater than or equal to the reversal amount. There are large kinds of buy and sell signals produced by Kagi charts, one of them is trend line. A Kagi-based signal is produced at the break of a trend line.

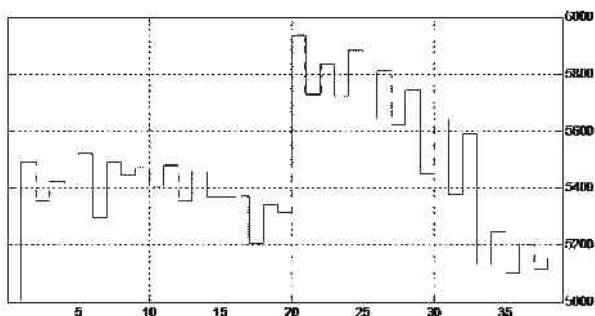
According to Nison (1994) the thickness and course of yang or yin lines are dependent on the market's action. The line is extended when the market maintains the movement in the direction of the preceding Kagi line. A fresh Kagi line is drawn in the next column in the reverse direction when the market changes its direction by a pre-decided amount. When the prices break in a prior low or high, the thickness of the Kagi line transforms. Kagi technique is used to identify the crash. MATLAB software is used to prepare Kagi charts.

In defining a crash Bree and Joseph (2007) have used the following facts, firstly, that the period before the peak for which there is no upper value than the value of the peak is one year of weekdays (262). Secondly a downfall in price of twenty five percent that is, it must have reached down to 0.75 of the peak price, and finally time duration of sixty weekdays within which the drop in price is required to occur. The same concept to define a crash has been used here.

Predictive Efficiency is used as a Quantitative parameter to analyze stock market crashes. Predictive Efficiency of a signal is defined here as its capacity to predict the trend reversal correctly. Thus, Predictive Efficiency = Number of True signals generated in a particular time ÷ Total Number of Signals Generated in that time.

**Results and Discussion**

**Study of signals generated prior to downward trend**



Before the start of the crash there is no up or downtrend, so there is no trend line. There is only continuation trend. Thus this crash was not signaled by Kagi chart.

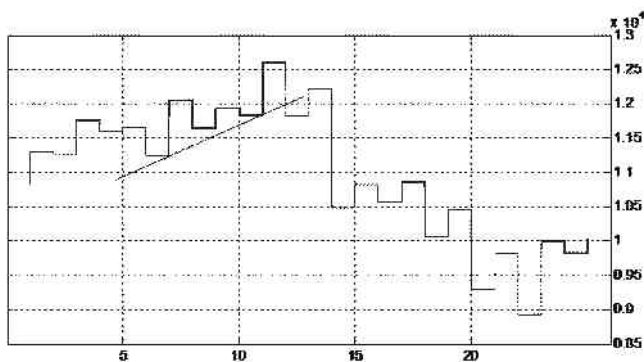
**reversals on BSE Sensex using Kagi Charts**

**Study of crash which started on 11<sup>th</sup> Feb 2000**

Analysis of crash which started on 11<sup>th</sup> February 2000 is done using Kagi Chart Pattern. The following graph show the relevant chart for 30 days prior and post the starting date of crash.

**Study of crash which started on 10th May 2006**

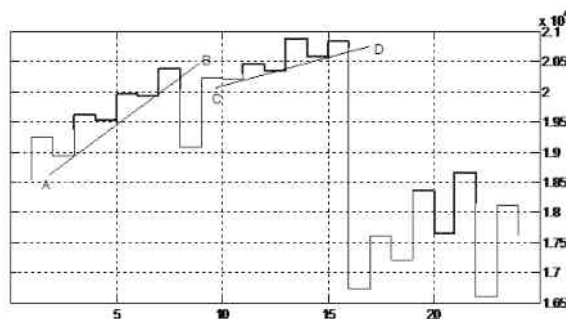
Now analysis of crash which started on 10th May 2006 is done using Kagi Chart Pattern. The following graph show the relevant chart for 30 days prior and post the starting date of crash.



When a trend line gets severed, a Kagi-based signal is said to be created. The trend line joining the Kagi waists in the above figure gets broken by the Kagi chart which was indicating a trend reversal that actually happened in the next few weeks.

**Study of crash which started on 08th January 2008**

Now analysis of crash which started on 08 January 2008 is done using Kagi Chart Pattern. The following graph show the relevant chart for 30 days prior and post the starting date of crash.



The trend line AB joining the Kagi waists in the above figure gets broken by the Kagi chart and generates a signal of break in trend and there was a considerable fall. Another trend line CD gets

broken to generate a true signal before the start of the crash. This signal was indicating a trend reversal which happened in the next few days.

Period Of Crash	Value of Crash	Particulars	Kagi
11 <sup>th</sup> Feb 2000 to 11 <sup>th</sup> May 2000	28.35%	Predictive Efficiency=(Number of True signals generated in a particular time/Total Number of Signals Generated in a particular time)*100	No signal generated
10 <sup>th</sup> May 2006 to 14 <sup>th</sup> June 2006	29.20%	Predictive Efficiency=(Number of True signals generated in a particular time/Total Number of Signals Generated in a particular time)*100	100%
8 <sup>th</sup> Jan 2008 to 17 <sup>th</sup> Mar 2008	29.05%	Predictive Efficiency=(Number of True signals generated in a particular time/Total Number of Signals Generated in a particular	50%

#### Period of Crash (11<sup>th</sup> Feb 2000 to 11<sup>th</sup> May 2000)

It is clear from the above results that for this crash Kagi Charts were not able to generate the signal.

#### Period of Crash (10<sup>th</sup> May 2006 to 14<sup>th</sup> June 2006)

It is clear from the above results that for this particular crash Kagi charts were able to generate sell signal with 100% predictive efficiency.

#### Period of Crash (8<sup>th</sup> Jan 2008 to 17<sup>th</sup> Mar 2008)

It is clear from the above results that for this crash Kagi Charts were also able to generate the sell signal but with 50% predictive efficiency.

Thus out of the three crashes Kagi Charts were able to generate sell signal with 0%, 100% and 50% respectively.

#### Conclusion

The Kagi charts have helped in focusing attention on only the important price movements which have an effect on the future movements of prices. The movements of the lines have been able to generate useful information about the future of the prices and how profitable trading signals can be used. According to the definition of the crash used in the study three crashes were analyzed during the period of the study on Indian Stock Market. Kagi Charts were able to predict one crash with 100% predictive efficiency and another crash with 50% predictive efficiency and third one was not predicted by Kagi Charts. Thus it may be concluded that Kagi Charts have a limited application in as far as prediction of Stock Market crashes is concerned. Further study may be done in other Financial Markets like Foreign Exchange

Market and Commodities Market using Kagi Charts. Also tick size data which is generally available for a fee, may be used in order to increase the precision of results.

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