The Use of Technical and Fundamental Analyses By Stock Exchange Brokers: Indian Evidence

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Abstract
This paper presents findings of an online questionnaire survey, conducted among stock brokers of Bombay Stock Exchange, India, over the use of technical and fundamental analysis to form forecasts of stock price movements. Findings reveal that at least 90 percent of the stock brokers place some weight on technical analysis when forming views at one or more time periods. It was noticed that at shorter time periods, there exists a skew towards reliance on technical analysis as compared to fundamental analysis, but as the length of time period increases the skew shifts to fundamental analysis. Most of the stock brokers view technical analysis as complementary to fundamental analysis.

Keywords: stock exchange; technical analysis; fundamental analysis; complementary

1. Introduction
The two general techniques for predicting stock market prices used by market professionals are "chartist" or "technical" analysis and fundamental or intrinsic value analysis. Technical, or chartist, analysis of financial markets involves providing forecasts of asset prices or buy/sell advice on the basis of visual observation and examination of the past history of price movements (Edwards et al., 1967), perhaps with the aid of certain quantitative techniques such as momentum indicators and moving averages (Murphy, 1986), without considering any fundamental factors. On the other hand fundamental analysis evaluates a stock by attempting to measure its intrinsic value. Fundamental analysts study everything from the overall economy and industry conditions, to the financial condition and management of companies. In other words, fundamental analysis is about using real data to evaluate a stock's value. The method uses revenues, earnings, future growth, return on equity, profit margins and other data to determine a company's underlying value and potential for future growth.

2. Literature Review
How we forecast stock market prices now and in the future influences major economic and social policy decisions that affect not only investors but also society at large, even the world. If we exaggerate the present value of the stock market, then as a society we may invest too much in business startups and expansions, and too little in infrastructure, education and other forms of human capital. If we think the market is worth more than it really is, we become complacent in funding our pension plans, in maintaining our savings rate, in legislating an improved social security system (Shiller, 2000).

The two general techniques for predicting stock market prices used by market professionals are "chartist" or "technical" analysis and fundamental or intrinsic value analysis.
“The technical approach to investment is essentially a reflection of the idea that prices move in trends which are determined by the changing attitudes of investors toward a variety of economic, monetary, political and psychological forces” (Pring, 1991).

Another approach which is rather different from technical approach is fundamental analysis or the intrinsic value method. The assumption of the fundamental analysis approach is that at any point in time an individual security has an intrinsic value which depends on the fundamentals of the security (earning potential of the security). The future earning potential of the security depends on factors like quality of management, outlook for the industry and the economy. Through a careful study of these fundamental factors the analyst should, be able to determine whether the actual market price of a security is above or below its intrinsic value (Fama, 1965).

Prices can exhibit substantial short-run deviations from fundamentals due to the role of market sentiment, noise traders and limits to arbitrage. The novel time-series framework reveals that the recognition of asymmetric dynamics over the cycle (bull and bear markets) is crucial for reconciling such apparently persistent deviations and the overall mean reversion in valuation ratios. Thus, the results not only underline the importance of noise trading and market sentiment in the short run but also corroborate that prices reflect fundamentals in the long run (Coakley et al., 2006).

Since the early 1980s, models based on economic fundamentals have been poor at explaining the movements in the exchange rates (Meese, 1990). In the Post-war period, financial economists have treated technical analysis with skepticism (Malkiel, 1985; Sharpe, 1985). This skepticism might have developed from the efficient markets hypothesis, which says that speculators who do not concentrate on underlying economic fundamentals when trading will be quickly driven out of the market by smart money.

As per Keynes (Keynes, 1936) financial markets are also influenced by non-fundamental factors. Any general analysis of exchange rates examines underlying economic fundamentals to explain the movements in the exchange rates, but there were situations where current fundamentals based models fail to explain the past completely, or forecast the future reliably (Dornbusch,(1976, 1987); Frankel et al., (1986, 1990a), suggest that technical analysis could have largely been responsible for the overvaluation of US dollar during the 1980’s, during which period, pressure in the opposite direction was signaled by the economic fundamentals.

Because of such failures, academicians and researchers have started to look into the role of non-fundamental factors influencing financial markets. Past prices data, when combined with other valuable information, can indeed be helpful in achieving unusual profit in the financial markets. However, it is the non-price information that creates the opportunity. The past prices serve only to aid its efficient exploitation (Treynor et al., 1984).

Allen et al., (1990) in their paper provides some empirical evidence concerning the nature and perceived importance of one particular kind of non-fundamentalist analysis namely chartism, in the London foreign exchange market. In questionnaire survey conducted in Germany among professional foreign exchange market participants found that rational participants use non-fundamental analysis to exploit less rational noise traders (Menkhoff, 1998). Frankel et al., (1988) developed a model that uses two approaches to forecast the exchange rate: the fundamentalist approach, which bases the forecast on economic fundamentals, and the chartist approach, which bases the forecast on the past behaviour of the exchange rate.

That 90% of the foreign exchange dealers based in London give some importance on this type of non-fundamental analysis (technical analysis) when forecasting exchange rates. Traders rely more on technical analysis vis-à-vis fundamental analysis at shorter forecasting horizons and rely more on fundamental analysis at longer forecasting horizons. Most of the traders view technical analysis as complementary to fundamental analysis and significant number of them suggests that technical analysis may be self-fulfilling (Taylor et al., 1992).
In a questionnaire survey conducted among foreign exchange dealers in Hong Kong on the usage of fundamental and technical analysis, more than 85% of them said that they use both fundamental and technical analysis for forecasting exchange rate movements at different time horizons. Traders rely more on technical analysis vis-à-vis fundamental analysis at shorter forecasting horizons and rely more on fundamental analysis at longer forecasting horizons. Technical analysis is considered somewhat more useful in forecasting trends than fundamental analysis, but significantly more useful in predicting turning points. Interest rate related news is found to be relatively important fundamental factor in exchange rate forecasting, while moving average and or other trend-following systems are most useful technical techniques. Nevertheless, they are both given less weight than news about central bank intervention in influencing intraday exchange rate movements. Their results also imply that the two analyses are complementary to each other (Lui et al., 1998).

In a questionnaire and an interview survey on the perceived importance of fundamental and technical analysis among foreign exchange traders and financial journalists in London, Frankfurt, Vienna, and Zurich finds that most of the traders use both forecasting approaches and shorter the forecasting horizon, the more important technical analysis is. Financial Journalists place more importance on fundamental analysis than do foreign exchange traders on all forecasting horizons investigated. Four distinct clusters of traders can be identified when you analyse over seven forecasting horizons (Intraday trading to more than 1 year) regarding use of technical and fundamental analyses (Oberlechner, 2001).

Surveys conducted later also confirm many of these early findings that traders use both technical and fundamental analysis and the usage of technical analysis is much more frequent than they do fundamental analysis at shorter horizons. Cheung et al., (2001) find that 30% of U.S. foreign exchange traders could best be characterised as technical analysts and that an increasing percentage use technical analysis. Cheung et al., (2004) confirm previous findings that traders pay more attention to non-fundamental factors at shorter horizons.

In survey evidence from 692 fund managers in five countries, found the vast majority rely on technical analysis. When the forecasting horizon was very short, technical analysis was the most important form of analysis and thus more important than fundamental analysis. Technical analysts were found to be as experienced, as educated, as successful in their career as others. Technical analysis was found to be more popular in smaller asset management firms. What they found most significant is the relation of technical analysis with the view that prices are heavily determined by psychological influences. Consequently, technicians apply trend-following behaviour (Menkhoff, 2010).

Irrational investor behaviour resulted in excess bond and stock market volatility (Shiller, 1984). Investor sentiment and limited arbitrage do play role in determining asset prices (Shleifer et al., 1990). Neely et al., (2003) examine the out-of-sample performance of intraday technical trading strategies selected using two methodologies, a genetic program and an optimised linear forecasting model. Trading rules discover some remarkably stable patterns in the data but when transaction costs and trading hours are taken into account, they find no evidence of excess returns to the trading rules derived with either methodology.

In a study conducted in U.S. equity market to test whether intraday technical analysis is profitable, it was found that market participants place more emphasis on technical analysis (and less on fundamental analysis) the shorter the time horizon. They found that using two bootstrap methodologies, that none of the 7846 popular technical trading rules tested are profitable after data snooping bias is taken into account. There is no evidence that the market is inefficient over this time horizon (Marshall et al., 2008).

Mitra (2009) in his paper analyses the profitability of moving average based trading rules in the Indian stock market using four stock index series. The results indicate that most technical trading rules are able to capture the direction of market movements reasonably well and give significant positive returns both in long and short positions however these returns cannot be exploited fully due to the presence of transaction costs.

Kakani et al., (2006) in their study used the Simple Moving Average (SMA) and the Displaced Moving Average (DMA) trading rules to test the weak form of efficiency on Indian stock market indexes.
and Poor (S & P) CNX Nifty, BSE Sensex as well as multiple individual stocks for a time period of 15 years (1991–2005). Their results indicate that even after adjusting for transaction costs there was sufficient evidence that the DMA indicator is a highly successful trading rule that generates profitable signals.

Pampana et al., (2005) in their study observed the profitability of applying technical trading rules using single moving averages of 5, 10, 30, 50, 100, 150 and 200 days, and dual moving averages (of various combinations) to the daily closing values of the S&P CNX Nifty index of the National Stock Exchange of India. Their results indicate that in spite of presence of transaction costs, making trading decisions based on moving average rules leads to significantly higher returns than the buy-and-hold policy. Another observation was that the shorter period single moving averages (5, 10, 30 days) and dual moving averages give better returns than longer period single moving averages.

In the study conducted for evaluating the economic feasibility of technical analysis in the Indian stock market, it was found that technical indicators do not outperform Simple Buy and Hold strategy on net return basis for individual stocks. Even though technical indicators seem to do better during market upturns compared to market downturns, technical based trading strategies are not feasible vis-à-vis passive strategy irrespective of market cycle conditions. Technical indicators also do not provide economically significant profit for industry as well as economy based data (Sehgal et al., 2007).

Bettman et al., (2009) propose an equity valuation model where they integrate both fundamental and technical analysis and, in doing so, recognise their potential as complements rather than as substitutes. While their findings relate to the valuation of shares, they also have implications for other valuation exercises. Zhong et al., (2003) used statistical procedure to formally test for the statistical significance of the non-fundamental component in stock prices and found that the non-fundamental component continues to achieve significance confirming presence of some form of market “irrationality”.

Lo et al., (2000), propose a systematic and automatic approach to technical pattern recognition using non-parametric kernel regression, and applied this method to a large number of U.S. stocks from 1962 to 1996 to evaluate the effectiveness of technical analysis. They find that over the 31-year sample period, several technical indicators do provide incremental information and may have some practical value. Wong et al., (2003) in their paper say that technical analysis has a role in signaling the timing of stock market entry and exit. Moving Average and Relative Strength Index were used on Singapore Straits Times Industrial Index (STII) data and the results indicate that the indicators can be used to generate significantly positive return. It is found that member firms of Singapore Stock Exchange (SES) (No transaction costs for members) tend to enjoy substantial profits by applying technical indicators and found that most member firms do have their own trading teams that rely heavily on technical analysis.

Research Gap

Despite the increasing professional interest in non-fundamental factors, there is little empirical evidence on the prevalence and importance of such techniques in the Indian stock market. Goodman (1980) examines the performance of technical analysts, but does not provide evidence on the importance which markets attaches to their advice. Mitra (2009), Kakani et al., (2006) and Pampana et al., (2005) analyses the profitability of different technical trading rules in the Indian stock market but, has not directly compared the usefulness of technical and fundamental analysis in the Indian stock market.

This is the first study concerned with how professional traders forecast stock rate movements in India. Given that India is the 2nd largest stock exchange market in terms of market capitalisation among emerging and developing countries and the fact that brokers’ views are an important factor driving stock price movements, this study may enhance understanding of stock price analysis and forecasting.

This study tries to extend the results of previous works done on the use of technical analysis and fundamental analysis among foreign exchange traders in London (Taylor et al., 1992) and work done in Hong Kong (Lui et al., 1998) and work done in the European foreign exchange market (Oberlechner, 2001) to a new geographic location and to a new financial market. This is the first study which determines the use of technical and fundamental analysis by brokers in the Indian stock market.
Objectives & Scope

The study was conducted primarily to examine the importance that brokers personally give to fundamental and technical analysis over seven forecasting horizons: intraday, 1 week, 1 month, 3 months, 6 months, 1 year, and beyond 1 year. Attempt was made to understand the relative importance brokers attach to chartist/technical analysis versus fundamental analysis of stocks over seven forecasting horizons.

The next idea was to examine the importance of brokers’ views of the degree of complementarity of fundamental and technical analysis in stock price forecasting. Attempt was made to understand the degree to which brokers view chartist/technical analysis and fundamental analysis to be complementary tools of analysis in stock exchange trading.

3. Research Methodology

The results presented in this paper are based on a well-structured online questionnaire survey conducted among stock brokers of Bombay stock exchange, India. The data was collected in spring summer 2011 from corporate stock brokers registered with Bombay Stock Exchange. A total of 262 online questionnaires were distributed among the corporate stock brokers of Bombay Stock Exchange. Bombay Stock Exchange is one of the two largest national stock exchanges in India. The sample size of 262 is justified using the most popularly used equation based on precision rate and confidence level (Kothari, 2004). Probability random sampling technique was used to select the respondents. Of the 262 online questionnaires distributed to corporate brokers, 152 were returned, resulting in a return rate of 58%.

A large part of the respondents consists of senior and middle level brokers (80.26%) and a smaller part of junior level brokers (19.74%). The sample consists of 93.4% male and 6.6% female brokers. In the questionnaire, brokers were asked background information about their professional and personal status, location of the institution, professional rank, work area, age, years of work experience, and gender. In a later part of the questionnaire, participants were asked to evaluate the importance they attach to chartist versus technical analysis on a series of forecasting horizons ranging from intraday to longer than 1 year. The survey also included questions about complementarity of technical and fundamental techniques.

Questionnaire was designed with the help of stock exchange experts from the trading side. All respondents were assured that their answers given in the questionnaires would remain confidential and would be used only for academic research purpose and that the quantitative data would be analysed only on group and not on individual levels.

For objective one, brokers were asked to indicate on the 10 point Likert scale the relative importance they attach to technical analysis versus fundamental analysis of stocks over seven forecasting horizons: intraday, 1 week, 1 month, 3 months, 6 months, 1 year, and beyond 1 year. A score of zero would indicate the use of pure chartist (technical) analysis alone at that horizon and a score of ten would indicate the use of pure fundamental analysis and an intermediate score would indicate a weighted mix of technical analysis and fundamental analysis.

For objective two, brokers were asked to indicate on 10 point Likert scale the degree to which they view technical analysis and fundamental analysis to be complementary tools of analysis in stock exchange trading. A score of ten implied a view that the two approaches are mutually exclusive, a score of zero implied a view that they are strongly complementary and an intermediate score an intermediate degree of complementarity.

4. Data Analysis & Interpretation

Demographic Analysis

For conducting the research on the use of technical and fundamental analysis among corporate brokers of Bombay Stock Exchange, a sample of 262 respondents (Table 1.2) were selected using probability
random sampling technique. The sample size of 262 was justified using the most popularly used equation based on precision rate and confidence level (Kothari, 2004). Among 262 corporate brokers 152 corporate brokers participated in the survey. Response rate was 58%.

Gender

Out of 152 responses males were 142 (93.4%) and the rest 10 were females (6.6%). Following table and subsequent Chart present this data:

**TABLE 1.3**

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>93.4%</td>
<td>142</td>
</tr>
<tr>
<td>Female</td>
<td>6.6%</td>
<td>10</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td>152</td>
</tr>
</tbody>
</table>

**CHART 1.1**

Gender Composition in the Sample

Age Groups

Next important demographic information of the respondents was their age group.

**TABLE 1.4**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25</td>
<td>7.9%</td>
<td>12</td>
</tr>
<tr>
<td>26 to 35</td>
<td>50.7%</td>
<td>77</td>
</tr>
<tr>
<td>36 to 45</td>
<td>25.0%</td>
<td>38</td>
</tr>
<tr>
<td>46 to 55</td>
<td>13.2%</td>
<td>20</td>
</tr>
<tr>
<td>56 to 65</td>
<td>3.3%</td>
<td>5</td>
</tr>
<tr>
<td>66 to 75</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Over 75</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td>152</td>
</tr>
</tbody>
</table>
The above table and Chart present the age groups of the respondents who participated in the survey. Out of 152 respondents, 7.9% were less than 25 age, 50.7% in the age group of 26-35, 25.0% in the age group of 36-45, 13.2% in the age group of 46-55, 3.3% in the age group of 56-65 and 0% in the age group of 66-75 and over 75. Most of the respondents were in the age group of 26-35.

Relevant Work Experience

Next important demographic information of the respondents was the relevant work experience they had. We categorised them into three groups based on the work experience they had. These categories were Junior Level, Middle Level and Senior Level.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior Level</td>
<td>19.74%</td>
<td>30</td>
</tr>
<tr>
<td>Middle Level</td>
<td>40.13%</td>
<td>61</td>
</tr>
<tr>
<td>Senior Level</td>
<td>40.13%</td>
<td>61</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>100%</td>
<td>152</td>
</tr>
</tbody>
</table>

The above table and Chart present the categorisation of relevant work experience of the respondents who participated in the survey. Out of 152 respondents, 19.74% were in the Junior Level category, 40.13% were in the Middle Level category and 40.13% were in the Senior Level category. Most of the respondents were in the Middle and Senior Level category.
Objective 1-Time Period Analysis

ANOVA One Way Using SPSS

First objective of the current research was to examine the importance that brokers’ personally give to fundamental and technical analysis over seven forecasting horizons: intraday, 1 week, 1 month, 3 months, 6 months, 1 year and beyond 1 year. Hence it was decided to conduct means test using one way ANOVA (Oberlechner, 2001). For this purpose, basing on the literature available, following hypotheses were set up and further tested

Hypothesis

Ho: Mean Importance ratings over seven forecasting horizons are equal i.e.

\[ \mu_{\text{intraday}} = \mu_{\text{1 week}} = \mu_{\text{1 month}} = \mu_{\text{3 months}} = \mu_{\text{6 months}} = \mu_{\text{1 year}} = \mu_{>1\text{year}} \]

Ha: Mean Importance ratings over seven forecasting horizons are not equal i.e.

\[ \mu_{\text{intraday}} \neq \mu_{\text{1 week}} \neq \mu_{\text{1 month}} \neq \mu_{\text{3 months}} \neq \mu_{\text{6 months}} \neq \mu_{\text{1 year}} \neq \mu_{>1\text{year}} \]

A one way ANOVA was used to test the influence of Time Period (Hypothesis), on importance ratings in stock price forecasting.

**TABLE 1.6**  
One Way Anova of Time Period

<table>
<thead>
<tr>
<th>Dependent Variable: Importance Rating</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>5783.352</td>
<td>6</td>
<td>963.892</td>
<td>126.138</td>
<td>0.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>8077.151</td>
<td>1057</td>
<td>7.642</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>13860.503</td>
<td>1063</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 1.7**  
Robust Tests of Equality of Means-Time Period

<table>
<thead>
<tr>
<th>Dependent Variable: Rating</th>
<th>Statistica</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welch</td>
<td>120.722</td>
<td>6</td>
<td>469.203</td>
<td>.000</td>
</tr>
<tr>
<td>Brown-Forsythe</td>
<td>126.138</td>
<td>6</td>
<td>1009.821</td>
<td>.000</td>
</tr>
</tbody>
</table>

a. Asymptotically F distributed.

One way ANOVA of Time Period was found to be significant at p<.05, (F (6, 1057) = 126.138, p=.000). Welch test of Homogeneity of Variances was also found to be significant at p < .05, (Welch (6, 469.203) =120.722, p=.000) and Brown Forsythe test of Homogeneity of Variances was also found to be significant at p < .05, (Brown-Forsythe (6, 1009.81) =126.138, p=.000). These two tests say that variances among groups are Homogeneous.

As One way ANOVA of Time Period was significant, we then conducted Post Hoc Tests to find out between which pairs’ of Time Period significance exists.

Tamhane post-hoc comparisons of the seven forecasting horizons indicate that the Intraday (M = 2.92, SD= 3.168) is statistically significant with respect to the 1Month (M =4.82, SD=2.812, p=.000), 3 Months (M = 5.74, SD=2.654, p=.000), 6 Months (M = 7.14, SD=2.437, p=.000), 1 Year (M = 8.54, SD=2.350, p=.000) and > 1 Year (M = 9.43, SD=2.666, p=.000). Comparisons between the Intraday and 1 Week was not statistically significant at p<.05.

Tamhane post-hoc comparisons of the seven forecasting horizons indicate that the 1 Week (M = 3.25, SD= 3.152) is statistically significant with respect to the 1Month (M =4.82, SD=2.812, p=.000), 3 Months (M = 5.74, SD=2.654, p=.000), 6 Months (M = 7.14, SD=2.437, p=.000), 1 Year (M = 8.54, SD=2.350, p=.000) and > 1 Year (M = 9.43, SD=2.666, p=.000). Comparisons between the Intraday and 1 Week was not statistically significant at p<.05.
Tamhane post-hoc comparisons of the seven forecasting horizons indicate that the 1Month ($M=4.82$, $SD=2.812$) is statistically significant with respect to the Intraday ($M = 2.92$, $SD=3.168$), 1 Week ($M = 3.25$, $SD=3.152$, $p=.000$), 6 Months ($M = 7.14$, $SD=2.437$, $p=.000$), 1 Year ($M = 8.54$, $SD=2.350$, $p=.000$) and > 1 Year ($M = 9.43$, $SD=2.666$, $p=.000$). Comparisons between the 1Month and 3 Months were not statistically significant at $p<.05$.

Tamhane post-hoc comparisons of the seven forecasting horizons indicate that the 3 Months ($M = 5.74$, $SD=2.654$), is statistically significant with respect to the Intraday ($M = 2.92$, $SD=3.168$), 1 Week ($M = 3.25$, $SD=3.152$, $p=.000$), 6 Months ($M = 7.14$, $SD=2.437$, $p=.000$), 1 Year ($M = 8.54$, $SD=2.350$, $p=.000$) and > 1 Year ($M = 9.43$, $SD=2.666$, $p=.000$). Comparisons between the 3 Months and 1 Month were not statistically significant at $p<.05$.

Tamhane post-hoc comparisons of the seven forecasting horizons indicate that the 6 Months ($M = 7.14$, $SD=2.437$) is statistically significant with respect to the Intraday ($M = 2.92$, $SD=3.168$, $p=.000$), 1 Week ($M = 3.25$, $SD=3.152$, $p=.000$), 1Month ($M=4.82$, $SD=2.812$, $p=.000$), 3 Months ($M = 5.74$, $SD=2.654$, $p=.000$), 1 Year ($M = 8.54$, $SD=2.350$, $p=.000$) and > 1 Year ($M = 9.43$, $SD=2.666$, $p=.000$).

Tamhane post-hoc comparisons of the seven forecasting horizons indicate that the 1 Year ($M = 8.54$, $SD=2.350$) is statistically significant with respect to the Intraday ($M = 2.92$, $SD=3.168$, $p=.000$), 1 Week ($M = 3.25$, $SD=3.152$, $p=.000$), 1Month ($M=4.82$, $SD=2.812$, $p=.000$), 3 Months ($M = 5.74$, $SD=2.654$, $p=.000$), 6 Months($M=7.14$, $SD=2.437$, $p=.000$) and > 1 Year ($M = 9.43$, $SD=2.666$, $p=.000$).

Tamhane post-hoc comparisons of the seven forecasting horizons indicate that the > 1 Year ($M = 9.43$, $SD=2.666$) is statistically significant with respect to the Intraday ($M = 2.92$, $SD=3.168$, $p=.000$), 1 Week ($M = 3.25$, $SD=3.152$, $p=.000$), 1Month ($M=4.82$, $SD=2.812$, $p=.000$), 3 Months ($M = 5.74$, $SD=2.654$, $p=.000$), 6 Months $M = 7.14$, $SD=2.437$, $p=.000$) and 1 Year ($M = 8.54$, $SD=2.350$, $p=.000$)

<table>
<thead>
<tr>
<th>TABLE-1.8</th>
<th>Overall Means of Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Period</td>
<td>Overall Mean</td>
</tr>
<tr>
<td>Intraday</td>
<td>2.92</td>
</tr>
<tr>
<td>1 Week</td>
<td>3.25</td>
</tr>
<tr>
<td>1 Month</td>
<td>4.82</td>
</tr>
<tr>
<td>3 Months</td>
<td>5.73</td>
</tr>
<tr>
<td>6 Months</td>
<td>7.14</td>
</tr>
<tr>
<td>1 Year</td>
<td>8.53</td>
</tr>
<tr>
<td>&gt; 1 Year</td>
<td>9.43</td>
</tr>
</tbody>
</table>

From overall means of seven forecasting horizons (Table-1.8) it can be interpreted that at shorter horizons the skew is towards use of Pure Chartist Analysis and with increase in duration the skew shifts towards use of Pure Fundamental Analysis.

**Cluster Analysis**

Brokers’ overall forecasting approaches were determined by the mean value of their individual ratings given on the seven forecasting horizons. Cluster analysis was done to arrive at different classification of forecasting styles. This statistical method determines homogeneous groups of brokers using similar forecasting styles across the different time horizons examined. Cluster analysis is able to differentiate between brokers who arrived at same mean value of ratings by the use of different forecasting styles across the seven forecasting periods.

A hierarchical cluster analysis using Ward’s clustering method and squared Euclidean distance measures suggested a solution of four relatively homogeneous clusters of forecasting styles. Then k-means, non-hierarchical cluster analysis was conducted to divide brokers optimally into the four clusters. Chart 1.4 gives a picture of the four identified forecasting styles.
CHART 1.4

The largest cluster (54.60%) of brokers represents the forecasting profile termed ‘chartist, ascending’ which starts with a very technical (chartist) approach at intraday and 1 week forecasts (1 on the scale from 0= pure chartist analysis to 10= pure fundamental analysis). The longer the forecasting period, the more fundamental this forecasting approach becomes, and brokers in this cluster progress to a purely fundamental forecasting approach in forecasting periods greater than 1 year (Mean=10 on the 0-10 scale). Brokers in the ‘fundamental, ascending’ cluster (21.05%) have a forecasting profile which looks like the ‘chartist, ascending’ profile described above. However, brokers in this cluster begin with a relatively more fundamental forecasting approach in intraday forecasts (Mean=3 on the 0-10 scale) and, with increasingly longer forecasting horizons, apply a progressively more fundamental approach, ending with purely fundamental approach in forecasting horizons greater than 1 year (Mean= 10 on the 0-10 scale).

Brokers in the ‘constant chartist’ cluster (13.81%) apply a constantly chartist forecasting approach across all time periods (Mean=4 over all forecasting periods on the 0-10 scale). The last category of brokers (10.52%) is termed as ‘constant fundamental’ apply a constantly fundamental forecasting approach across all time periods (Mean=10 mostly over all forecasting periods on the 0-10 scale).

Detailed analyses of these four forecasting styles and brokers’ demographic variables show that like the overall chartism versus fundamentalism approaches, these forecasting styles do also not correlate with brokers’ age($\chi^2=11.020$, $p=.527$), gender ($\chi^2=4.941$, $p=.176$) and experience($\chi^2=11.386$, $p=.250$).

Objective 2 - Complementarity Analysis

Second objective of the current research was to examine the importance of brokers’ views of the degree of complementarity of fundamental and technical analysis in stock price forecasting. Hence it was decided to analyse this objective based on percentages from the data (Taylor et al., 1992 and Lui et al., 1998).

The degree of complementarity levels were: Complementary, Somewhat Complementary, Neutral, Somewhat Mutually Exclusive and Mutually Exclusive (Lui et al., 1998).
From the charts 1.5 and 1.6 we can say that 38.82% of the brokers would like to take Complementary position, 26.32% of the brokers would like to take Somewhat Complementary position, 6.58% of the brokers would like to take Neutral position, 11.18% of the brokers would like to take Somewhat Mutually Exclusive position and 17.11% would like to take Mutually Exclusive position.

Practical Implications

These findings have some practical implications. First, as professional traders do not trade purely on the basis of the economic fundamentals, but also take into account market movements generated by other factors (noise trading), knowledge of technical analysis is important to anyone who would like to participate successfully in the stock market. Second, the existence of a skew towards reliance on technical analysis at shorter horizons suggests that models based on short term considerations (noise) will be more important in the short term.
Third, the identification of different investment styles of brokers would help in understanding functioning of stock market better. Fourth, the general investors need to know that most of the brokers treat technical and fundamental analysis as complementary tools.

5. Conclusions & Recommendations

Time Period

A one-way Analysis of Variance of Time Period to examine the importance that brokers’ personally give to fundamental and technical analysis over seven forecasting horizons: intraday, 1 week, 1 month, 3 months, 6 months, 1 year and beyond 1 year reveal that Time Period did had a significant effect (Hypothesis testing, Table 1.6).

As one-way Analysis of Variance of Time Period was found to be significant (Hypothesis testing, Table 1.6), we then conducted Post Hoc Tests of Time period to find out between which pairs of Time period significance exists. Post Hoc Tests of Time period was also found to be significant. Thus it could be interpreted that the importance that brokers’ personally give to fundamental and technical analysis over seven forecasting horizons: intraday, 1 week, 1 month, 3 months, 6 months, 1 year and beyond 1 year is not the same. Brokers’ rating differed depending on the forecasting horizon.

From the overall means of seven forecasting horizons (Table-1.8) it can be interpreted that at shorter time periods (Intraday, 1 week and 1 month), there exists a skew towards reliance on technical analysis as compared to fundamental analysis, but as the length of time period increases (6 months, 1 year and > 1 year) the skew shifts to fundamental analysis. This suggests that models that focus on fundamentals may perform poorly over short horizons because they miss the effect of technical analysis based decision on the market in the short period.

As professional traders do not trade purely on the basis of the economic fundamentals, but also take into account market movements generated by other factors (noise trading), hence it is recommended that knowledge of technical signals is important to anyone who would like to participate successfully in the stock market.

It is also recommended that Technical analysis tools should be taught in Management Programmes along with fundamental analysis tools.

The existence of a skew towards reliance on technical analysis at shorter horizons, suggest that models based on short term considerations (noise) will be more important in the short term hence, it is suggested that technical analysis should be used mainly for short term stock price prediction.

The existence of a skew towards reliance on fundamental analysis at longer horizons suggests that models based on economic considerations will be more important on the long run hence; it is recommended that fundamental analysis should be used mainly for long term stock price prediction.

Degree of Complementarily

Second objective of the current research was to examine the importance of brokers’ views of the degree of complementarily of fundamental and technical analysis in stock price forecasting. Hence it was decided to analyse this objective based on percentages from the data (Taylor et al., 1992 and Lui et al., 1998). The degree of complementarily levels were: Complementary, Somewhat Complementary, Neutral, Somewhat Mutually Exclusive and Mutually Exclusive (Lui et al., 1998).

Thus it can be interpreted that the brokers clearly take different positions with respect to degree of complementarily. Brokers distinctly belong to one class or other of the Complementarily Degree.

Specifically our results suggest that the most of the market participants would like to take Complementary (38.82%) and Somewhat Complementary (26.32%) position with respect to degree of complementarily (CHART 1.6).
This also suggests that Most of the stock market participants see fundamental analysis and technical analysis as complementary tools and hence it is recommended that technical analysis should be used in conjunction with fundamental analysis. This work supports previous findings that financial market participants see fundamental analysis and technical analysis as complementary tools (Bettman, Sault and Schultz, 2009; Taylor and Allen, 1992; Lui and Mole, 1998).

**Limitations of the Study**

Researcher has conducted online questionnaire survey among corporate stock brokermakers registered with Bombay Stock Exchange in India only. Online survey was conducted for this purpose as the brokers were geographically distributed all over India and the cost and time involved in reaching them personally was huge. Attempt was made to understand the relative importance brokers attach to chartist / technical analysis versus fundamental analysis of stocks over seven forecasting horizons. Attempt was made to understand degree to which brokers view chartist / technical analysis and fundamental analysis to be complementary tools of analysis in stock exchange trading. The study was limited to only select approaches namely technical approach and fundamental approach. Another limitation of the study was economic conditions might have varied over time as the survey was taken quite some time to complete.

**Scope for Further Research**

Further study can be done by comparing developed stock markets with emerging and developing stock markets across countries investigating the differences in usage of technical and fundamental analysis among different players in the stock market like Mutual Fund Managers, Brokers, Investment Bankers, Financial News Reporters, and Financial Analysts etc.

**References**


