Importance of Investors' Sentiment Where Significance of Micro and Macro Variables is Low for Building Trading Strategy

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Abstract

Many important variables are common to analysts for pricing of listed stocks in different buy or sell side institutions and brokers. These common variables are payout, revenue, profit, dividend, leverage, profit/dividend growth, and macro variables like industrial index, foreign investment, prime lending rate, exchange rate, and so forth. Since the 1970s, these variables have been ubiquitous in research. These are effective, but the importance of investor sentiment related to announcement and understanding of behavioral finance are reflecting in trading desks now. Sentiment of investors was traced long back, but it has not been explored or documented well. Significance of the behavior along with quantitative numbers for building trading strategies is the focus of this paper. Observation of the sentiment or behavioral aspect of stock price can help analysts predict valuation more accurately. Future research in this subject is catching attention, but it is still in an early phase, so this opens immense scope of projection and recommendation accuracy in equity research. The present research paper is based on the research conducted in the third quarter of financial year 2015-2016 with a data set from the financial years 2001 to 2015.

Keywords: **behavior finance, market efficiency, sentiment, trading strategy**

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Fundamental analysis is based on the concept that price of stock is dependent on financial and economic variables such as payout, revenue, profit, dividend, leverage, profit, and dividend growth; and macro-variables such as industrial index, foreign investment, prime lending rate and exchange rate. The presence of behavioral finance and Market Efficiency Hypothesis have raised questions on this relation between the return due to price movement and fundamental variables. Long back Friedman (1953) had pointed out that irrational asset price is due to irrational speculation. DeLong, Shleifer, Summers (1963) and Waldmann (1990) had the same thought about investor behavior or sentiments. Interestingly now behavioral theories are becoming popular when classical asset-pricing models such as Lintner (1965), arbitrage pricing theory (APT) (Ross,1976), capital asset pricing model (CAPM) (Sharpe,1963) or intertemporal capital asset pricing model (ICAPM) (Merton & Modigliani,1961) fail to explain asset pricing explicitly. Hence, 'behavioral' can be seen as a different approach from traditional theories. Jegadeesh and Titman (1993) showed that the momentum effect is one of the most prominent and utilized market anomalies.

Market Inefficiency

Fama (1997) believed that the trend of stock price does not have 'memory', so investors cannot predict future trends based on historical prices. If a market is efficient, it must meet three conditions :

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- ✦ Everyone is a rational investor in the market,
- ✦ Stock prices reflect the supply and demand of rational investors,
- ✦ Stock prices fully reflect the information of the asset.

Three kinds of market are visible in this hypothesis:

(1) Weak-form market efficiency where market prices fully reflect the information of historical price, including stock price, trading volume, and so on. It can be inferred that if the weak-form efficient market hypothesis is valid, technical analysis of stock price is useless and fundamental analysis may help investors gain excess profits.

(2) Semi-strong-form market efficiency where prices fully reflect all public information. This information include the transaction price, trading volume, company management status, and other financial information. It can be inferred that if the semi-strong-form efficiency hypothesis exists, technical analysis and fundamental analysis are useless. Some important information may reap excessive profits.

(3) Strong-form market efficiency where prices fully reflect all information in a market, whether public or private. It can be inferred that in strong-form efficient market, there is no way to help investors reap excessive profits (Sebastian, 2008).

Behavioral Finance

Behavioral finance is an amalgamation of psychology, decision-making theory, classical economics and finance. It tries to explain the anomalies found in financial markets and differences in investor decision-making. It helps to explain irrational behavior of investors and believes in the bias of investors that affect prices of securities leading to arbitrage. The difference between behavioral finance and the traditional assumption provides a new perspective to stock market efficiency (Fama & French, 1992). Traditional financial theory holds that decision-making is based on rational expectation, risk aversion, etc. But a lot of psychological research shows that actual investment decisions are not made this way.

Studies show that this deviation is systematic and cannot be eliminated by statistical treatment. Traditional financial theory holds that rational investors can always catch the arbitrage opportunities which are created by non-rational investors in the market. Therefore, only rational investors can survive in the market. But in the real world, markets are not that perfect and have a large number of anomalies (Baker & Nofsinger, 2010). Behavior analysis should be incorporated in theoretical analysis and research to understand what actually happened. Finally, it will guide people in taking right decisions (Michael, 2006).

Review of Literature

Fisher (1961) in his paper estimated the influence of dividends, undistributed profits and company size on share price. Price is the function of last declared dividend per share, last declared undistributed profit per share and residual term; past value is also an important factor that affects share price. Share price is a linear function of two components of profits (dividend and undistributed profit). Haskel (1961) and Hong and Stein (1999) found that weighted average earning to market price in a year (y in a cross sectional regression analysis) is the function of three variables earning growth rate over time ($x1$) , market growth rate value ($x2$), and log dividend payout ($x3$). Haskel (1961) had suggested that statistically y is inversely related to $x3$ but Irwin and Marshal (1964) had considered lag effect of these variables on price. Same approach can be found in the papers of Eugene and Willard

(1964) and James (1967). They had studied the broad industry and found that the market has a slight preference for retaining earning in a growth industry but a mature industry prefers dividend.

Burton and John (1970) have considered risk and that term risk is justified by Sharpe(1963) and Lintner (1965) in portfolio selection model. Risk was mainly considered for the variance o variables such as profit f earning. They assumed in the paper that the returns from different securities are not correlated but the price of a security is linearly related to the expected return and finance (Burton & John,1970). Cunningham (1973) had indicated that an individual stock exhibits consistent behavior in relation to an index. Frederick (1974) had found that the price of stock is possibly a function of level and growth rate in earnings and dividend payout ratio. Black (1986) suggested stock return is negatively correlated to volatility.

Feldstein (1982) and Summers (1981) suggested that inflation rate was a cause of market decline. Poterba & Lawrence (1986) , Summers (1981) argued on the long duration effect of shock to volatility as the impact of volatility on stock is significant. According to them it can be inferred that stock price is a function of future dividend payment, risk free rate and risk premium.(Poterba & Lawrence, 1986 and Summers, 1981). Price stability depends on the average values of earnings. When the volatility of earnings exceed the earning expectation of the market, the value of stock changes. Profitability and return on equity have direct influence in change of stock price too (Poterba and Lawrence, 1986). Frank (1995) has also examined relationship between profitability (E/B), multiplier (P/E), growth, and volatility of earnings. According to him the irrational movement of P/E can be explained by 'U' characteristics i.e. price has relationship with basic earning power of stocks rather than current earning. Fama and Schwert (1977) showed in their paper that stock return has negative relation to inflation.

Day (1984) had shown that rate of return of a stock depends on inflation (explanatory variable). When the magnitude of the 'shock to the production process' increases, total output of economy too increases. Any increment in total output accrues to the shareholder of the firm either through dividend or through investment. Hence, the real rate of return is positively correlated to the production process. However, the production process itself is negatively correlated to inflation since supply of output increases relative to the supply of money. Hence, Day (1984) postulated theoretically that the real rate of return on a stock declines as inflation shoots up. Fama (1997) tested the relationship between real stock return, inflation and real economic activity.

Humpe and Macmillan (2009) had examined the influence of various macroeconomic variables on stock market taking the examples of US and Japan. Their model was based on the long term relationship between industrial production, CPI, money supply, long term interest rate and stock price. Stock prices in the US are positively related to industrial production but negatively related to consumer price index and long-term interest rate, but in Japan stock prices are positively correlated with industrial production and are negatively correlated with money supply. Humpe and Macmillan found that industrial production is negatively affected by CPI and long-term interest rate.

Optimistic judgments and choices come from people with positive sentiment and people having negative sentiment show pessimistic judgments and choices (Wright & Bower, 1992). Hong and Stein (1999) had established that momentum is created by reaction and actions of 'news-watchers'. According to Malcolm and Wurgler (2007), this sentiment measure should be free from macroeconomic influences. Chordia and Shivakumar (2002) showed that the state of market momentum and inter-temporal differences in the presence of macroeconomic factors (and most likely risk) are strong basis of momentum profits. Momentum profits in the presence of short-term interest rates, yield, term spread, and default spread do not acquire asymmetry. But there is a strong connection between investor sentiment and corporate disclosure (Bergman & Roychowdhury, 2008), post earnings announcement drift (Livnat & Petrovic,2009), IPOs (Cornelli, Goldreich, & Ljungqvist, 2006), fund flows, and the value effect (Andrea & Lamont, 2008), and the size of firm (Malcolm & Wurgler, 2007).

Stock market efficiency can be quantified by the capacity of the stock market. Capacity can be absolute capacity or relative. Absolute capacity means the total flow of financial assets (or capital) in financial markets. It

reflects the scale of stock market. Relative capacity is the ratio of absolute capacity to GDP or GNP. This indicator specifically indicates the breadth and depth of stock market. It is mainly determined by the number of stock market participants, types of stock market trading and specialization of the stock market (Paul, 2009). Quality is the level of inherent quality of the stock market. Compared with quantitative indicators, quality indicators have more profound meaning. Based on existing research results, the following areas can be considered like internal market mechanism. That is the way to balance stock market prices of various financial instruments. Market sensitivity or stock price sensitivity is questionable if information changes related to financing capacity such as the need of listing of stocks in stock market for financing in form of equity. Risk of stock market is a factor of stock market efficiency. So, the ability of reducing risk becomes an important indicator along with market cost, which is the cost of commission charge, information cost, cost of taxes, and so on (Miller & Sedor, 2014).

Objectives of the Study

The objectives of the study is to find out the significance of these variables to explain abnormal return gained by holding a stock. Several micro-variables such as payout, revenue, profit, dividend, leverage, profit, and dividend growth; and macro-variables such as industrial index, foreign investment, prime lending rate, and exchange rate are used to test the explanatory power of individual variables and combination of variables in a significant relation. This study using National Stock Exchange (NSE) stocks is important because importance of recent developments in behavioral theory and market efficiency theory is felt by analysts at buy or sell side research houses.

Methodology

BSE auto index component stocks, 10 variables, and 15 years of yearly time series data were considered. Data set is yearly because of consideration of dividend and for this reason we changed higher frequency data to yearly data, hence the fluctuation of return is also yearly. We used OLS and logit regression methods here. 5 stocks were of BSE Auto Index were considered for the sample. Because of the finite data set we used the z-test. Population standard deviation is could be calculated from the yearly return.

✦ **Data Sources :** Data were collected from Capitaline plus, Prowess, Business Beacon, and websites of companies ; 15 years of yearly data till 2015 were used for analysis. Here, five most weighted stocks included in the auto index were considered for analysis.

✦ **Assumptions**

(1) Capital market is uncertain and Indian market is not efficient.

(2) Dividend>0 and dividend + retained earning>= 0.

(3) Investment in stock and index is based on the trend of financial performance of a company.

(4) The regression model follows the assumptions of OLS. Variance of independent variables used in regression model is assumed stationary.

(5) Independent variables have Linear combination.

Analysis and Results

Return is a function of payout, revenue, profit, dividend, leverage, industrial index, foreign investment, rate

(prime lending rate or PLR), and exchange rate. Independent variables such as net profit (which is measured in profit after tax or PAT), payout (the ratio of dividend to profit), leverage (ratio of debt to equity), industrial production index (IIP) and exchange rate are ratio type data but return, which is a dependent variable, is measured as a percentage change.

In this model, variable profit after tax (PAT) is taken in two different ways, as growth and as volatility. Volatility is calculated as standard deviation from average. Here, to calculate the volatility of dividend, I considered the average dividend for the last 15 years and standard deviation for every year.

Model (1) Return = 4.8 + 0.35(yearly growth of profit after tax or PAT)

Model (1) is significant at 95% confidence level. But introducing the other variables *change in exchange rate, change in Foreign Investment, change in IIP index* makes the model insignificant.

Model (2) Return = -4.3 + 0.384(yearly growth of profit after tax) + 1.4 (change in exchange rate)

After introducing another new variable 'exchange rate', model(2) was improved. But marginal contribution of this macroeconomic variable in this model is statistically insignificant as *F* test we get value is less than 4.49 at 95% confidence level.

Question can be raised whether the effect of macroeconomic factors are there in stock return.
Test of significance of different macroeconomic variables:

Model (3) Return = 11.43 + 0.338(yearly growth of profit after tax) - 0.07 (change in Fund of FI)

In model(3), *t* value of profit after tax (PAT) change is 2.22 ($p = 0.041$) and that of foreign Investment (FI) fund change is -0.794 ($p = 0.44$). R^2 is 0.28 and the model is insignificant as *F* is statistically insignificant.

Model (4) Return = 42 + 0.39(yearly growth of profit after tax) – 5.79 (change in IIP index)

Model (4) is also insignificant considering the test R^2 and *F* when data from 2001 to 2010 are considered.

Model (5) Return = 25 + 0.61(yearly change in DIV)

Model (5) shows that change in dividend value has effect on market price. As per the output, R^2 value is low, and *F* and *t* both are statistically insignificant. The model is insignificant (as *F* is in accepted zone). This can be improved by considering another variable like fund flow change by financial institution.

But profit growth, payout change, revenue growth, dividend growth, volatility of dividend, leverage, and macroeconomic factors such as prime lending rate (PLR) growth and volatility, exchange rate growth, volatility of exchange rate, industrial index growth, and inflation have no significance as the *t*-values of these variables are statistically insignificant. Here we get that dividend growth and dividend volatility are both insignificant to the return, whereas payout volatility is significant. Important observation here is that foreign investment, growth, and volatility are significant in this model.

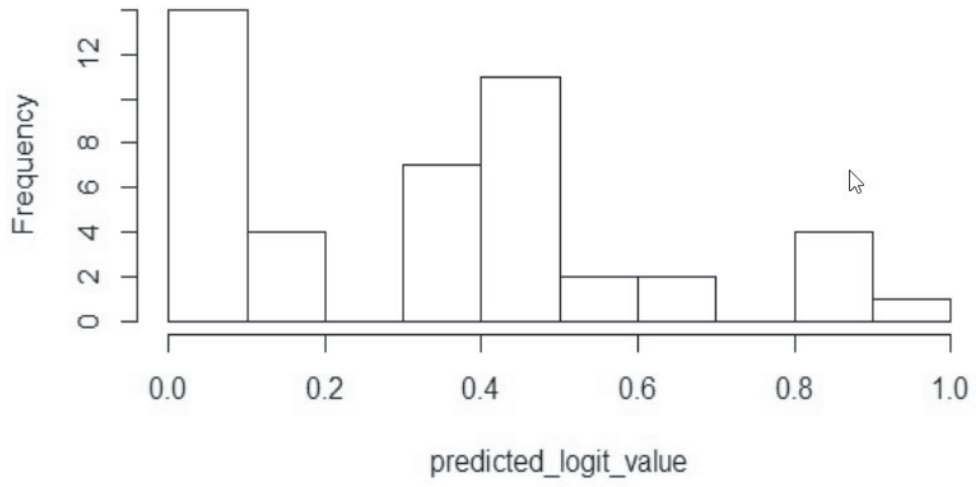
Table 1. Return Model of Profit After Tax (Yearly Change)

	Estimate Std.	Error	*T* value	Pr (>|*t*|)
(Intercept	642.63342	120.14639	5.35	<.0001
PATch	-889.57311	298.18984	-2.98	0.0083

Table 2. Return Model of Other Variables

	Intercept	Coefficient	Pr (>|*t*|<0.005
Volatility of profit	306.46842	142.5445	yes
Volatility of payout	303.26128	-339.72	yes
Change in leverage	277.50768	0.71	yes
FI change	77.54735	-0.68496	yes
Volatility of revenue	306.46842	216.4324	yes
Volatility of FI	308.75991	81.54091	yes
Change in payout	306.66868	-1.55181	no
Revenue growth	234.64485	5.00843	no
Dividend growth	312.04076	-0.06552	no
PLR growth	319.24006	9.66137	no
Exchange rate growth	322.68031	-2.83068	no
Volatility of dividend	286.83969	27.09091	no
Industrial index growth	168.06659	21.08745	no
Volatility of PLR	47.69472	259.0075	no
Volatility of exchange rate	-72.98511	868.01238	no
inflation	351.3371	-7.21533	no

Figure 1. Predicted Logit Value of Change in Direction of Index (Up/Down)



On an individual basis, revenue growth, profit after tax (PAT) growth, dividend growth are more significant than the other variables.

Hence, the final model (6) can be proposed as price of the stock as dependent variable and profit after tax or PAT growth and Dividend growth as explanatory variables.

Model (6) Return= V1*Profit after tax growth + V2*Dividend growth + V3*Revenue Growth

Profit, revenue and dividend growth either in positive or negative direction are important for stock return. But their explanatory power is low.

Table 2 shows that revenue, profitability, change in distribution policy of dividend, and change in leverage are important factors that impact return. Foreign investment is also a significant macro level factor but it has no importance in combination with the micro level variables revenue, profitability, dividend, and leverage. This is reflected in model (6). Also, an important point to mention is that overall goodness of fit is low for all the significant variables listed in Table 2.

Using logit regression we get the model:

(7) Change in Direction Up/Down =logit (FCFs+CR+DE)

FCF = free cash flow,
CR = current ratio,
DE = debt to equity ratio.

These variables are the only significant variables present in logit model (7) but the mean probability of higher closing of price than previous closing value is only 54%. This probability of higher closing is very low as shown in Figure 1.

The research outcome that stock price is inversely related to payout matches that of Haskel (1961). But the result is different from Frederick (1974), according to him the price of stock is possibly a function of price level, growth rate in earnings and dividend payout ratio. Stock return is negatively correlated with volatility of stock price and exchange rate but this relation is positive when volatility of profit and revenue is considered (Black,1986). I get the result that stock return is negatively relation to inflation which is the same as that reached by Fama & Schwert (1977).

✦ **Mathematical Results Explain the Presence of Sentiment :** Lower value of R^2 and low probability of logit value showed low goodness of fit. Low level of fitness that we found from mathematical results here in the form of regression and logit analysis truly explain the real life scenario according to behavioral finance and sentiment in pricing of stocks. Jegadeesh and Titman (1993) proposed the short-run cross sectional momentum in stock returns, whereas De Bondt and Thaler (1985) proposed the long-run cross sectional reversal in stock-returns. Important concepts such as momentum anomaly also prove that mathematically low significance of dependent variables is truly matching the practical trading scenario (Antoniou, Doukas, & Subrahmanyam, 2013; Daniel, David, & Subrahmanyam,1998; Hong & Stein,1999). They had explained the anomaly from the perspective of different behavioral and cognitive theories. So investor sentiment plays an important role even after accounting in clarifying momentum induced profits and market returns.

Research Implications

The strategies based on momentum depict the method to buy stocks that have surpassed the market in the past months. The stocks of companies which are known as winners surpass the market in the past months. It was observed that the yield got after using these strategies is excess even when market risk exists and this observation is statistically significant (Fama & French, 2008).

As per Lee and Swaminathan (2000) late cycle momentum trading produces negative profits. Investing in different moment cycles can result in average return of zero and that can be seen for the holding period of nearly six quarters. The distribution momentum may have return of zero excess. The Hong and Stein model shows that the momentum profits which should be high in up markets are better than down markets for any previous specified market state (Hong and Stein,1999). As per Sagi and Seasholes (2007) model, higher return autocorrelation is caused by higher growth options in up markets that bring about higher momentum profits pursuing these markets. Depending on the previous market state there would be higher momentum profit in the

next state of market; higher profit if previous state of market was up rather than down . Both the above models predict a higher momentum profit in the up state than the down state but the situation is different with lower momentum profits in down state.

Cooper, Gutierrez, and Hameed (2004) showed that up to the median level, momentum profits boost earlier market performance and after that performance starts falling off beyond the median market performance. The situation was explained as ending of high market by coinciding with overreaction phase that usually starts the correctional reverse phase and this reversal has greater chance of reducing profit. It reveals that when markets remain in up conditions, momentum profits are higher than when the markets remain in down conditions (Daniel, David, & Subrahmanyam,1998).

We get a relation between sentiment and momentum (Hong & Stein,1999). This relation can be established by considering the presence of news. But the news should be identified as company specific or macroeconomic specific. Company specific news should be free from macroeconomic influences (Malcolm & Wurgler, 2007). Different strategies including momentum strategies can be developed in the future using technical indicators, earning, revenue, inflation, exchange rate, yield, term spread, default spread and news related to company, macroeconomic (Chordia & Shivakumar, 2002), and sentiments as inputs. We find from earlier research the presence of strong connection between investor sentiment and corporate disclosure (Bergman & Roychowdhury, 2008), post earnings announcement drift (Livnat & Petrovic, 2009), IPOs (Cornelli, Goldreich, & Ljungqvist, 2006), fund flows (Andrea & Lamont, 2008), and the size of the firm (Malcolm & Wurgler, 2007).

Conclusion

In market after a gain investors stacks up more confidence (sometimes overconfidence) in aggregate, as a result they go for long position for profit. But informed and skilled traders go short to get profit in that market looking for stronger overreaction in near future. This results in anomaly (Gervais & Odean, 2001). Price reverts back to the fundamental level in the long run after many overreactions to news in trading activity and m ay generate subsequent positive serial correlation in returns. Hong and Stein (1999) model forecasts comparative changes in price dynamics, that depends on the market states. They analyzed the impact of shifting the risk aversion of momentum traders. They observed that declining risk aversion initiates greater delayed overreaction, and thus, improved momentum profits. Campbell and Cochrane (1999) and others suggest that risk aversion decreases when wealth increases.

In practice numerous proxies such as trading volume, investors surveys, retail investor trades, premium on dividend-paying stocks, mood proxies, closed-end fund discounts, volume of initial public offerings, mutual fund flows, new equity issues, option implied volatility, insider trading and first-day returns on initial public offerings (IPOs) are available. These different proxies are combined in a sentiment index. Malcolm and Wurgler (2007) had formed an index by taking the six proxies equity share in new issues, the dividend premium, the number and first-day returns on IPOs, trading volume as measured by NYSE turnover and the closed-end fund discount.

Limitations of the Study

(1) Variance of independent variables used in regression model is assumed stationary.

(2) Analysis was done assuming these independent variables have linear combination. Durand and Johnson, Shapiro and O'Meara used non-linear functions in their research which is more realistic.

(3) Implied volatility factor and volatility of market are not considered in this research, as these are beyond the scope of regression model and can be explained through numerous methods such as GARCH, ARIMA.

Other major common limitations were limited data points, limited set of companies and interrelated nature of predictors.

Scope for Future Research

Importance of sentiment analysis is accepted due to its profitable outcome in theory and practice. The present research showed that fundamental data from statements is important but we need to consider sentiment and behavior of investors. Return and profit model can be improved by considering fundamental variables, macroeconomic variables, and sentiments. Research can be further extended by applying machine learning for prediction using these three sets of inputs. Innovation of stock market is that it not only introduces competition, but also introduces the inevitable choice for improving the efficiency of the stock market (Miller & Sedor, 2014). Improvement of predictive modeling can help analysts make better recommendations with more accuracy in forecasting.

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