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# Impact of Investor sentiment on Mean-Variance Tradeoff in Pakistan

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## Abstract

Impact of investor sentiments on mean variance trade off with respect to Pakistani market has been investigated in this paper. Composite index for Investor Sentiments for Karachi stock exchange is developed. The six measures incorporated in the composite investor sentiment index are closed end fund discount, KSE turnover, the number of IPOs, average first day returns of IPOs, equity share in new issues and dividend premium. We find that the stock markets returns is not significantly related to low sentiments period variance rather it is negatively related to high sentiments period variance.

**Keywords:** High sentiment regime, mean-variance tradeoff, noise traders, excess returns.

## Introduction

Belief of investor about cash flow from investment and its risk in future although factually unjustified at hand is called investor sentiments. Stock market history is full with important and striking events. These events affected the prices of stock market dramatically. Model of standard finance in which the rational investors try to equalize the prices in the market with present value of expected future cash flows of the securities are being augmented by the behavioral finance researchers through some other models.

According to behavioral theory of Delong, Shellfire, summers, and Waldmann (1990), sentiment of noise traders can be persistently found in financial market. Predictions about changes in their sentiment are very difficult to avoid arbitrage. Such assets which are inappropriately exposed to the risk of noise traders are more risky and they have to offer more return to the investors as premium. Prediction of theory is that pricing of securities get influenced by the sentiment as follows: Noise traders hold assets predominantly and transaction cost of trading in such assets is very high due to which process of arbitrage by the arbitrageurs is prevented. The objective of this paper is to develop a composite investor sentiment index for Karachi stock exchange and then investigate the influence of investor sentiments on mean variance relationship. Following Baker & Wurgler (2006), six proxies are used to develop investor sentiment index for Pakistani market. This will help the researchers to better understand the behavioral side of Pakistani financial Market and will open new avenues for future research with respect to investor sentiment in Pakistan.

## Literature Review

A positive correlation between expected return and risk has been implied by the rational theories of assets pricing. While, the variance has been used as measure of risk in such studies (Merton (1980). Many other studies conducted on the topic have however shown mixed pattern of results

regarding this relationship and results in such studies have shown sensitivity about methodologies applied for calculating volatility. Impact of investor sentiments has however been posited by the theories which departed from rational principle of asset pricing. One of such study on this area is by De Long et al.1990. Impact of investor sentiments on expected returns of stock is found present in many empirical studies of the current era like study of Baker and Wurgler (2006).

Optimism or pessimism degree of investor about stock prices which is unjustified by the fundamentals of standard finance is called investor sentiment (Baker and Wurgler, 2006). According to standard finance theory, rational investors set the prices of assets in the market while theories of behavioral finance admit the importance of investor sentiments also to influence the stock prices. Overvaluation is the result of optimism and undervaluation is the result of pessimism of investors. Generally, this behavioral phenomenon creates mispricing in the market. This mispricing is due to sentiment of noise traders having biases about risk and returns of an investment and limits of arbitrage.

According to Daniel, Hirshleifer and Subrahmanyam (1998) and Barberis, Shleifer and Vishny (1998), certain biases of noise traders result in improper valuation of stock prices in the market. They have modeled certain biases of such noise traders in their studies. These biases include representativeness, conservatism, self attribution and overconfidence of investors. Divergence of prices from their fundamental values is due to correlation between noise traders sentiment because of noise traders risk to be at more extreme level in short run as they own short term investment horizon.

However, the prices will ultimately move to their fundamental values. Direct identification of mispricing of securities in the market is difficult. In order to confirm the impact of investor sentiment on stock prices, subsequent returns pattern relative to the level of investor's sentiment during certain time period is generally observed through empirical studies. If mispricing occurs in the market due to sentiment of investors, then relatively high returns will be observed after the period of investor's optimism and low returns will be observed after the period of pessimism (Delong, Shleifer, Summers and Waldmann 1990). It has also been investigated in various studies that there is negative correlation between investors' sentiment proxies and long run stock returns of the subsequent period (Brown and Cliff, 2005; Baker and Wurgler, 2006, 2007).

Baker and Wurgler (2006, 2007) examined the cross section returns of various companies and found that impact of investors sentiment is much pronounced for stocks of highly subjective valuations like young, highly volatile, unprofitable, non-dividend paying, growing, and financially distressed firms.No correlation among the investors sentiment was assumed previously and there was no effect of investors' sentiment on the prices of securities in the market on the basis of this assumption because the difference in the investor's sentiment were considered to offset each other. On the other hand, if consensus is found among the investors sentiment, then it will not offset each other and ultimately will play an important role in setting the security prices in the market.

Literature argument that mean- variance relation during period of high sentiment is attenuated by the investors' sentiment is based on three assumptions. Firstly, sentimental investors' presence is found in the market. According to investigation of Lee, Shleifer and Thaler (1991), difference of close ended fund prices from their NAV is likely to be caused by such sentimental investors. Similarly, Ritter (1991) found in their study that reversal of IPO stocks in the long run is likely to be due to consequences of over optimism of investors for IPO firms stocks. Baker and Wurgler (2006) have also documented that most of the stock prices are affected by the sentimental traders. Secondly, sentiment traders avoid from taking short position as they have shown reluctance in this regard. Barber and Odean (2006) documented that portion of short position takers among the individual investors is only 0.29% and it has been empirically found that such sentimental traders are seemed to be more active in the market during period of high

sentiment. Thirdly, variance is wrongly estimated by the sentiment traders. Such investors are noise traders, having no proper experience and understanding of risk measurement. Resultantly, return variances are not properly estimated by these traders. These three assumptions lead to the implications that when more stocks are purchased by the sentiment traders, mean-variance relation is not strong due to wrong estimation of variance and thus prices of stocks are strongly affected. Moreover, due to reluctance of such traders to short and holding more stocks, they have very strong effect on the market due to higher aggregate sentiment. It can be concluded that presence of sentimental traders thus undermine mean-variance relation trade off in the market which is otherwise positive.

**Methodology**

Number of variables has been used in the prior studies as proxy of time series variables for investor sentiment. No consensus is there on such measures. We have developed a composite index of investor sentiment in this study following Baker & Wurgler (2006). It is based on the common variation in six underlying proxies for sentiment: the closed-end fund discount, KSE share turnover, number and average first-day returns on IPOs, equity share in new issues, and dividend premium. The sentiment proxies are measured annually from 2000 to 2010. We first introduce each one of them and then discuss how they are formed into overall sentiment indexes.

It has been investigated previously that there is inverse relation between close- ended fund discount and sentiment of investor. The average difference between Net Asset Value (NAV) and market value of fund is called Close End Fund Discount (CEFD). Zweig (1973) used CEFD in order to forecast reversion in the stocks of Dow Jones. Lee, Shleifer and Thaler (1991) argued that sentiment is behind various features of CEFD. When noise traders or sentiment investors are optimistic about the market, they take participation in the market and thus they add liquidity in the market. This is the phenomenon which can be observed in market having constraints of short sale. So, it can be said that turnover in the market or liquidity can serve as an index of sentiment and is considered as symptom of overvaluation (Baker and Stein, 2004). As market of IPO is considered as being sentiment. First day higher and low unsystematic returns of IPO are normally due to optimism of investors and market timing respectively (Stigler 1964 & Ritter 1991). Proportion of equity in long term funds which is defined as combination of long term debts and owner's equity can also predict some effect of market sentiment because it represents a part of firms financing. Baker and Wurgler (2000) found inverse relation between share of equity and subsequent returns of the market. Dividend premium $^{PD-ND,}$ which is considered as log difference of the average M/B ratio of dividend payers and non payers firms has been used as proxy of sixth measure of sentiment. This variable has been used to measure relative demand of investor for shares of dividend paying firms by Baker and Wurgler (2004).

Measures used as proxy of investor sentiment in this study are supposed to include sentiment and non sentiment related or idiosyncratic component of the sentiment. In order to isolate the common component, principal component analysis has been used in this study. Standardized coefficient for Pakistani market has been calculated very first time in this paper by performing principal component analysis. The equation for sentiment index for Pakistani Market is as follows:

Sentiment Index = 0.1873DP + 0.5109NOIPO –0.3960CEMFD+0.3956FDRIPO+0.4672KSE T + 0.4151EQSHARE

**Data and Summary Statistics**

KSE 100 index has been used as proxy of market returns in this study. T-Bill return of one month has been used as interest rate. Yahoo finance has been used as data source which spans from January 2000 to December 2010. The summary statistics of market excess returns and monthly returns are reported in Table 1. The moments of returns and excess returns are different between the low and high-sentiment regimes. Mean return of the low-sentiment period is 2.36%. While, it is 0.87% during the period of high sentiment. It means that mean value

of low sentiment period is much higher than the value of the high sentiment period. Economic intuition and literature supports this pattern. When, prices of securities go up during the period of high sentiment, it ultimately depresses the market returns. For both returns and excess returns, skewness in the high regime is negative which leads to the conclusion that there is high probability of loss in high sentiment period. CV gives us the measure of relative risk. Relative risk is higher in high sentiment regime i.e. 10.08 as compared to 4.57 in the low sentiment regime.

**Table 1**

| **Returns** | | | | | |
|---|---|---|---|---|---|
| **Period** | **Mean** | **Stdv** | **CV** | **Skewness** | **Kurtosis** |
| High | 0.008696 | 0. 087692 | 10.08 | -1.344750 | 7.357596 |
| Low | 0.023678 | 0.108315 | 4.57 | 0.553432 | 3.122851 |
| **Excess Returns** | | | | | |
| High | -0.068400 | 0.102545 | | -1.327251 | 7.258653 |
| Low | -0.060194 | 0.116144 | | 0.462633 | 2.749193 |

Table 1 reveals that overall returns are negatively skewed during the periods of high sentiment as depicted by its value which is -1.344750. Likewise, excess returns value during the periods of high sentiment of -1.327251 also follows the same pattern. While, the positive skewness value for returns and excess returns which are 0.5534 and 0.4626 respectively document that both these are positively skewed during the periods of low sentiment. As, it is commonly perceived that investor sentiment should have the property of reverting to its mean, so the divergent results presented here are consistent with the hypothesis of sentiment. Within this framework, sentiment distribution should have longer right tail during the period of high sentiment. Left skewed return distribution is due to the reason that during the period of high sentiment, prices move upward which ultimately depresses the expected returns in that regime The equation for mean variance relationship given below:

$$R_{t+1} = a + bVar_t + \varepsilon_{t+1}$$

Where $R_{t+1}$ is the monthly excess return and $Var_t$ is the conditional variance. The following two- regime equation will be analyzed in order to test the hypothesis that high sentiment regime undermines the trade off:

$$R_{t+1} = a + bVar_t + cD_tVar_t + \varepsilon_{t+1}$$

Where Dt is a dummy variable for the high-sentiment regime, that is, Dt equals 1 if month t is in high- sentiment period. Result for the above two equations are as below:

**Table 2**
Dependent Variable: RETURNS

| One Regime | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | 0.046344 | 0.020584 | 2.251504 | 0.0509 |
| VAR | -3.378239 | 2.356511 | -1.433576 | 0.1855 |
| R-squared | 0.185899 | | | |

| **Table 3**<br>Dependent Variable: RETURNS | | | | |
|---|---|---|---|---|
| Two Regime | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | 0.047972 | 0.017131 | 2.800217 | 0.0232 |
| VAR | -1.840174 | 2.076365 | -0.886248 | 0.4013 |
| DUMMY | -4.357535 | 1.945595 | -2.239693 | 0.0555 |
| R-squared | 0.499639 | | | |

Table 2 and 3 report the estimates and t-statistics for equation (1) and (2) respectively. In the one-regime equation, it is found that mean-variance tradeoff is weak (not significant). The view that investor sentiment causes variations in the mean-variance tradeoff is supported by the above mentioned equation of two regimes. Significant negative tradeoff between is found by us during the period of high sentiment.

## Conclusion

The view presented by classical theories of finance that there is no role of investor sentiment in the cross section stock returns and prices or expected returns is challenged in this study. This paper finds that role of investor sentiment in predicting mean-variance relationship is very important. The paper suggests that otherwise positive tradeoff between mean and variance becomes negative in the high sentiment era with respect to Pakistani Market. Better understanding of investor sentiment is necessary for corporate managers as well in order to incorporate this behavioral aspect in the security issuance and other corporate finance decisions.

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