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Investor's Sentiments and Stock Market Volatility: an empirical evidence from emerging stock market

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Abstract

The concept of efficient market hypothesis has prevailed the financial markets for a long time which says that the prices of the securities reflect all available information. This approach was mainly followed by the rational investors but with the passage of time, the concept of behavioral finance emerged due to some of the major global financial crashes. This concept states that there are investors trading in the market making decisions on the basis of sentiments not on any fundamental information. Such class of traders is called the noise traders and they are mainly responsible for any disruption in the returns of the securities. In this paper we will try to find whether these sentiments of the investors affect the returns of the securities listed on the Karachi stock exchange. We will use the investor sentiment index that uses the six proxies the data on which has been collected mainly from the Karachi stock exchange. Volatility of the stock market returns will be calculated and regressed with the sentimental equation discussed above as the independent variable. This study will help us to find out the extent to which these sentiments influence the stock market returns in weak form efficient market and also it will help us to identify the presence of such irrational noise traders in our financial market.

Keywords: Investor sentiments, stock market volatility, noise traders, volatility, stock market returns.

1. Introduction

Traditionally the concept of efficient market hypothesis based on the principle that the prices of stock incorporate all available information and no investor can earn abnormal returns on the basis of some private information has prevailed for a long time in explaining the stock returns. Fama (1991) was one of the major proponents of the efficient market hypothesis and his work mainly contributed to the literature. During the last century some major financial crashes in 1929, 1962, 1987, 1998 and 2000 forced the researchers in financial community to think beyond the financial and economic variables to include some emotional aspects of the investors. In the last two decades, the field of behavioral finance has contributed to the literature in explaining the role of emotional aspects on the decision making process of the investors. Human sentiments are better indicators in the determination of final security prices than any economic variables (Wang et al 2009). Now, the challenge that the previous researchers have faced is how to operationalize the sentimental aspect to measure their impact on stock market returns.

There can be explicit sentimental proxies that directly tap the investor's response or can be implicit sentimental proxies that use trading patterns or market statistics as used by Finter and Ruenzi (2010), Lux (2008), Glaser et al (2009), Lahmiri (2011) etc. There can be many implicit sentimental proxies that helps to measure an impact on the volatility of stock returns but in this paper we will try to identify those proxies which not only are capable of measuring the impact but also are suitable to the prevailing conditions of the under study emerging market. Another consideration for the previous researchers was either the anomalies have impact on mature markets as well.

Many of the researchers found significant impact of these anomalies on the volatility of returns in developed markets Lux (2008), Finter and Ruenzi (2010) and Michelfelder and Pandya (2005). Therefore in studying the impact of these sentiments in a developing market, the selection of sentiments is crucial. Emerging markets in the world have higher volatility but the persistence is low as compared to the developed markets (Pandya 2005). Also the volatility in stock returns does influence the investor's sentiments in shaping their emotional perception about that particular company, but in this paper we will focus on measuring the impact of these sentiments on the volatility of stock returns. Huiwen (2012) divided the states of the stock markets into bull and bear markets to distinguish the various impacts of the investor sentiments on the volatility of the stock returns.

1.1 Significance of the study

Significance of this study is to measure the impact of investor's sentiments on the volatility of stock market returns on Karachi Stock Exchange so that it will help investors by highlighting those sentiments that play a major role in the volatility of stock market returns and also the statistical analysis will highlight the persistence of these sentimental shocks.

1.2 Aim of the study

Aim of this paper is to highlight the impact of investor's sentiments on the stock market returns and to construct investor's sentiment index by selecting the most relevant sentimental proxies influencing stock market volatility.

1.3 Research question

- To what extent the stock market volatility can be explained by the investor's sentiments?
- To what extent we can summarize the investor sentiments in an index to explain the volatility in stock market returns?

1.4 Delimitations of the study

There can be many other sentimental proxies that may have influence on the stock market return volatility but we will only highlight those having major impact on the volatility of stock returns. Also there can be many explicit sentimental proxies that can be obtained by direct investor's surveys, interviews and questionnaires but in this study we have only taken implicit market sentimental proxies and this is our delimitation of the study.

2. Literature Review

Previous market crashes have mainly focused on the concept of efficient market hypothesis thus ignoring the effect and importance of investor's sentiments but now increasing number of investors do believe on noise trader's theory and sentimental

approaches of the investors (Li et al 2008). Financial markets are composed of mainly three types of investor's first one are the rational traders whose decisions are solely based on fundamental knowledge, then second type are the emotional investors making decision on emotions, self perceptions and finally the noise traders who make random decisions without any logical basis (Kuzmina 2010). Noise traders are present in almost every stock market but their impact is influenced by whether the market is emerging or stable enough to absorb such disorders or distortions caused by these noise traders. If the effect of these noise traders does not cancel out in aggregate, then the risk for arbitragers increases. Noise traders have a major role in the disruption in regularity of the rational investors as their non-fundamental knowledge makes it more risky for the arbitrageur, thus having noise impact on the stock market returns and vice versa. These noise traders have no sophisticated or specialized knowledge and their emotions play a major role in their investment decisions in stock markets (Glaser et al 2009).

The sentiments of these noise traders are of much importance in making their decision about the stock trading as they have no sophisticated knowledge, thus earning inferior returns and are eventually driven out of the market in the long run (Schmitz et al 2005). There are stocks listed in different stock markets with trading in relatively different prices. This difference can be attributed to the local sentiments prevailing in the respective markets in which these shares are being operating. Also capital flow of different markets is a way to judge sentiments that are involved in the difference in prices of these stocks. (Baker et al 2009). Mutual funds flows have also been considered as a substitute of investor sentiments while measuring the impact of investor sentiments on the Chinese markets, however the results were slightly inconsistent with the previous researches as the Chinese markets are not considered as efficient markets therefore exhibiting stronger impact on the stock market returns (Chi *et al*, 2012).

Closed end funds are also considered as negative sentimental factor as these are normally known to be held by individual investors. Small firms are more sensitive to noise traders having low institutional ownership (Qiu and Welch 2005). Investor sentiments have a major role in the investment decisions made by the companies as due to the sentimental decisions the market pricing of the stocks is influenced and as a result the stocks are underpriced or overpriced, resulting in a change in manager's attitude towards the investment decisions (Polk and Sapienza 2004). More sentiment sensitive stocks are smaller, younger, growing with lower dividend yield. According to him, if the sentimental aspect is to be priced then the high sentimental sensitive stocks should earn greater yields than the lower sentimental sensitive stocks (Glushkov 2005).

Huiwen (2012) measured the impact of investor sentiments under different states of the markets on the returns and volatilities of the stock markets. His results shows that when the noise traders having misperceptions about the prices of the assets accumulate, their behavior makes the prices of the assets deviate from their fundamental values, however optimistic noise traders will make the fundamental values deviate further. Many studies in the behavioral finance area tried to bring to surface proxies for investor's sentiments that were thought to play a significant role in investor's decision making regarding the stock returns but in making a comparative analysis of the techniques able to predict stock returns and behaviors, majority of them did not succeed (Lahmiri 2011). There exists a positive correlation between the buy sell imbalances i.e., when investors buy (sell) one group of securities, they tend to buy (sell) the other group of securities. Similarly, there

exists a positive correlation between two investors group, i.e., if one buy (sell) the stocks, the other group also buy (sell) the same stock (Kumar and Lee 2006). Investors sentiments are also quite difficult to calculate and different researchers used different proxies to measure the investor's sentiments e.g. consumers confidence, IPO returns, trading volume etc, but calculating the proxies alone without differentiating the stocks is not sufficient, for example there is also a need to differentiate between stocks that are more sensitive to these sentiments compared to the ones that are not prone to these noise trader's sentiments i.e. more insensitive stocks (Finter *et al*, 2010). According to Glushkov (2005), stock's sensitivity can be attributed to the sentimental beta so that some stocks are more sensitive to the sentiments than others. The correlation in the returns of two different stocks depends upon the correlation in their fundamental values with no sentiments playing any role as the impact of such sentiments is cancelled by the arbitragers (Kumar and Lee 2006).

Bialkowski *et al* (2012) observed that the Muslim countries stock markets have low volatility and high returns during the month of Ramadan without any fundamental justification therefore presenting common optimistic beliefs leading investment decisions. Calendar anomalies also play an important role in the stock prices and the variation is different in different parts of the world. These patterns of anomalies in different parts of the world differ according to their relative markets and thus fail to constitute worldwide similar phenomena (Depenchuk *et al* 2010). Yang and Wu (2010) checked the relationship between stock prices and investor sentiment in a Taiwanese stock market and found a sequential relationship. For calendar anomalies, day of the week effect is crucial only in those financial markets where shares trading is thick and normalized and in those markets where deviations from the normality exists. So globally, these days of the week, or Monday effects does not play significant role as the investors are not rational and neither have fundamental knowledge nor play the role of the arbitrageur. The Saturday effect or so called Monday effect is not visible in emerging markets where stock trading is infrequent, thin and its manifestation is not visible (Al Khazali *et al* 2010). Media is also one of the important sentimental factors responsible in fluctuations of the stock market returns, trading in the stock markets and so has the ability of the media to have reflection on the price changes in the stock market. However, the content of the media is important and also the reputation of the media among the potential investors that are prone to such pessimism news (Tetlock 2005).

Contrary to efficient market hypothesis there are two assumptions that need to be focused, first the rational investors that have complete and more sophisticated knowledge and the second one is the existence of these irrational trading investors that have no fundamental beliefs and so the arbitrageurs cannot control the noise created by these irrational investors and therefore these noise traders affect the security returns (Shleifer and Summers 1990). In the context of classical finance, the rational calculations about the stock returns bring estimated value close to the intrinsic value of the security, unlike in case of noise traders where the sentimental judgments about the stock returns overvalue or undervalue any asset far extent (Lahmiri 2011). Short term effects are hold more and price pressure effects whereas long term effects are volatility in the returns following the actions of variations in sentiments (Lei *et al* 2011). The stock markets in reality are too vast and complicated that selecting merely few factors of these biases (sentiments) will not serve the purpose. The main goal is to pinpoint those factors that shape the sentiments

in making decision about stock trading rather than pointing that these sentiments affect the stock market returns (Baker and Wurgler 2006). In behavioral finance studies, many proxies of the investor's sentiments i.e., investor's mood, trading volume and closed end fund discount have been identified to measure the impact of these sentiments in the decision making process of the investors (Lahmiri 2011). Baker and Wurgler (2006) mentioned some proxies that play a major role in shaping the sentiments of these irrational traders. These proxies are investors surveys, retail investor traders, investor mood, trading volumes, mutual fund flows, dividend premium, closed end fund discount, option implied volatility, IPO's first day returns, IPO's volume, insider trading and equity issues over total new issues. In real markets, investor's sentiments are treated as a proxy measure of the noise trader's behaviors. These sentiments can affect the returns both in the long and short term.

The sentiments of investors do play an important role in returns of the stock market if the retail investors are in great number but in developed markets, the institutional investors are in dominant position and therefore minimize the influence of this volatility of returns due to the sentiments of these irrational traders (Fintner et al 2010). But, even in the developed market, the investors spend less time in investment analysis and more time on trading activities mainly based on the information from their counterparts, resulting in a deviation from the market co movements and therefore assets dominated by such kind of investors could be characterized by pricing anomalies (Kumar and Lee 2006). Noise traders have the capability to limit the activities of the arbitrageurs and therefore they themselves earn smart money. So, sentiments of the noise traders do explain the excessive returns by the retail investors as it is the systematic part of the risk present in the market (Lux 2008). According to him, sentiments do not provide any additional information about the stocks except the information content and past returns of the stocks. So, if any additional information is available, then the process of the arbitrage will be evoked. Noise traders risk exists in most of the markets and these noise traders have above average returns than the rational investors.

Stocks that have not been performing well or having low current market prices are perceived by the irrational investors to have low returns in the future also, whereas any stock that is not performing well is expected to have low price to earning ratio, but indirectly with this low ratio they are earning more on the market price of a specific stock, so investors usually make investment decisions based on beliefs held by them (Liang and Ouyang 2010). According to Michelfelder and Pandya (2005), the volatility shocks are persistent for smaller time in mature markets than the emerging markets and similarly non trading days have less impact on the mature markets as in these markets the developed information systems do not allow such information to accumulate for a long time to eventually have a collective volatility effect. Conditional volatility of stocks is more influenced by negative shift in sentiments as compared to positive shift in sentiments. Sentiments do have an influence on the prices of the stock especially in the emerging stock markets (Huerta and Liston 2011). Sentiments do have forecasting power about the stock returns but it is limited and the more volatility is shown by the negative stock returns. The sentiments and negative shocks to the returns are neutralized by the arbitrageurs, still the sentiments play additional role in such transactions (Wang et al 2009).

3. Methodology

As identified in the literature, there can be many proxies that can be included in the sentimental index and many of the previous researchers used different proxies according to their understanding having major impact on stock market returns. In this study six sentimental proxies have been included in the investor sentimental index and these are number of initial public offerings in a year, first day returns on these initial public offerings, closed end fund discount, dividend premium, equity/debt ratio and average daily turnover in Karachi stock exchange. Chi et al (2012) also constructed the measure of investor sentiments based on the flow of mutual funds for individual stocks and after that also measured the relationship between the investor sentiments, stock market returns and also the stock market volatility.

The above mentioned proxies have been included by different researchers in measuring the impact of these proxies on the stock market volatility. According to Baker et al (2009), low long term returns are suggestive of perfect market timings relative to the market index. Initial public offerings are the number of initial public offerings made during a year. Returns on initial public offerings are the average first day returns on these IPO's during the year. According to Baker and Wurgler (2006), initial public offerings earn sometimes remarkable returns that it becomes very much difficult to define the role of investor's enthusiasm behind it. According to Finter et al (2010), the return on the initial public offering is defined as the difference between the IPO's offer price and the initial price of the stock at the first trading day. Closed end fund discount is defined as the difference between the net asset value of the closed end mutual funds and their market price. The closed end fund discount proxy has been defined by many of the past researchers including Baker and Wurgler (2006), Neal and Wheatley (1998) and Lee, Shleifer and Thaler (1991). According to these researchers, disproportionately holding the closed end mutual funds, the average value of closed end funds may be a sentimental index if the behavior of retail investors is bearish.

Average daily turnover is defined as total volume over the year divided by the total capitalization at the end of the prior year. Baker and Wurgler (2006) defined market turnover as the trading volume divided by the number of shares listed on the stock exchange. We have calculated the turnover of the shares listed on the Karachi stock exchange following this definition of Baker and Wurgler (2006).

Dividend premium is defined as the difference between the average market to book values of dividend paying and non paying dividend stocks (Baker and Wurgler 2006). An analogy to the dividend premium is volatility premium is also used by Baker et al (2009) which simply defines the time when the valuations of the high volatile stocks are high or low as compared to the valuations of the low volatility stocks. Equity to debt ratio has also been used by Baker and Wurgler (2006), and is defined as the proportion of equity issuance to the total equity and long term debt issuance.

The investor sentiment equation resulting from the above mentioned discussion and including all the highlighted proxies is given below.

Investor's Sentiments and Stock Market Volatility

$$\text{Sentiment Index} = 0.1873\text{DP} + 0.5109\text{NOIPO} - 0.3960\text{CEMFD} + 0.3956\text{FDRIPO} + 0.4672\text{KSET} + 0.4151\text{EQSHARE}$$

Where,

DP=Dividend Premium

NOIPO= Number of initial public issues in a single year

CEMFD= Closed end mutual fund discount

FDRIPO= First day return on initial public offering

KSET= Share turnover in Karachi stock exchange

EQSHARE= Equity share in total equity and long term debt issuance

This above mentioned sentiment equation has been taken from the Shah (2011) work and principal component analysis (PCA) has been applied on the variables to form the sentiment equation. We have measured the volatility in stock market returns attributed to our independent sentimental proxies. The stock market volatility is calculated using the Eviews software and generalized auto regressive conditional heteroscedasticity model (GARCH) has been applied whereas the data on the sentimental proxies was not directly available so these sentimental proxies were calculated and the data for calculation was taken from the State bank of Pakistan website, the securities and exchange commission of Pakistan, and the returns on the stocks were calculated from Karachi stock exchange website. Through the use of sentimental equation mentioned above, daily value of the sentimental index is computed and then the stock market volatility was regressed through this sentimental value as an independent variable. Monthly data is obtained from 2001 to 2011 for the stock market returns as well as for all the independent variables.

4. Data Analysis and Interpretation

Table: 1 Descriptive Statistics

<i>Descriptive Statistics</i>	<i>Number of IPO's</i>	<i>Avg. 1st Day Returns on IPO's</i>	<i>Avg. Daily Turnover</i>	<i>Equity/Debt Ratio</i>	<i>Closed End Fund Discount</i>	<i>Dividend Premium</i>
Mean	3.948	14.966	326.166	28.482	3.537	0.905
Standard Error	0.224	0.601	38.976	0.233	0.235	0.011
Median	3.065	15.314	2.137	29.478	2.201	0.935
Mode	2.044	15.314	0.753	28.874	2.201	0.749
Standard Dev	2.570	6.907	447.798	2.674	2.706	0.126
Sample Var.	6.604	47.709	200,523.477	7.148	7.320	0.016
Kurtosis	-0.021	0.109	0.390	-0.669	0.975	-1.099
Skewness	1.119	-0.949	1.210	-0.919	1.343	-0.537
Count	132.000	132.000	132.000	132.000	132.000	132.000

Regression Equation

$$Y = \alpha + \beta x$$

Where,

Y=Stock Market Volatility

$$x \text{ (Investor's sentiments)} = 0.1873DP + 0.5109NOIPO - 0.3960CEMFD + 0.3956FDRIPO + 0.4672KSET + 0.4151EQSHARE$$

Table: 2. Regression Statistics

<i>Regression Statistics</i>	
Multiple R	0.619362
R Square	0.383609
Adjusted R Square	0.375975
Standard Error	0.005041
Observations	132

The volatility of the stock market returns is regressed by the investor's sentiments and the value of R square is 0.3760 showing that 37.60 percent of the volatility in the stock market returns is explained by the investor's sentiments that we have taken in our study. So it shows the overall measure of the strength of the association. In the analysis of variance table, the p value associated with the F value is very small i.e., 0.000 which shows that the independent variable reliably predict the dependent variable or we can say that the group of independent variable shows a statistically significant relationship with the dependent variable, whereas t value is also 9.029 with p value of 0.000 which is also significant. There can be many other independent variables that can be included when forming the sentiment equation through the principal component analysis and therefore the value of R square can be increased through it if such independent variables account for significance variation in the volatility of the stock market returns.

Table: 3 Analysis of Variance (I)

ANOVA	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.002	0.002	81.527	0.000
Residual	131	0.003	0.000		
Total	132	0.005			

Table: 3 Analysis of Variance (II)

	Coefficients	Standard Error	t Stat	P-value
X Variable 1	6.79718E-06	7.52795E-07	9.029254769	1.9E-15

Table: 4 Cross Correlation Table

	<i>Number of IPO's</i>	<i>Avg. 1st Day Returns on IPO's</i>	<i>Avg. Daily Turnover</i>	<i>Equity/Debt Ratio</i>	<i>Closed End Fund Discount</i>	<i>Dividend Premium</i>
<i>Number of IPO's</i>	1					
<i>Avg. 1st Day Returns on IPO's</i>	0.3530	1				
<i>Avg. Daily Turnover</i>	-0.0307	0.4643	1			
<i>Equity/Debt Ratio</i>	0.5206	0.0538	-0.3209	1		
<i>Closed End Fund Discount</i>	0.2821	0.0037	-0.4123	0.3812	1	
<i>Dividend Premium</i>	0.1915	0.7093	0.5535	-0.2549	-0.5856	1

The correlation between all the independent variables is positive except for the correlation between closed end fund discount and average daily turnover which has a negative value of -0.4124 which shows that both of these proxies are negatively correlated. The positive correlation between all the proxies indicated that these proxies do share some common underlying component.

5. Practical implications

This study has a practical implication in the sense that it will allow the investors especially in the developing markets to also consider the behavioral aspects that play the major role in the returns of the securities along with the consideration of efficient market hypothesis. Although the variation of the sentimental aspects is less than fifty percent, it strongly suggests the presence of efficient market hypothesis.

6. Social implications

This study will help in highlighting the behavioral aspects involved in the security returns and will provide accurate information about the more prevalent sentiments present in the markets that have a significant role in the stock market returns.

7. Originality/value

The formulation and use of a sentimental index in the developing market is originality and this will help in generalizing the involvement of sentiments that mold the decisions of the investors in their stock market trading.

8. Conclusion

In the lights of the above results it can be concluded that the sentiments of the investors do play an important role in the stock market returns in the Karachi stock exchange. So, the effect of investor's sentiments on the stock market returns even in the weak efficient form of market is observable. There is a debate that whether stock market returns are affected by investor's sentiments and our tests on Karachi stock exchange data confirms that. Although the level of variation is low, i.e. 37.60 percent suggesting that the remaining variation can be attributed to the other proxies that we have not included in our sentiment equation. Also sentimental factor is not the only factor responsible for the volatility in the stock market returns, therefore the low variation due to the regressors also confirms that the fundamental analysis of the listed stocks companies by the investors is also important in shaping their decision to purchase these shares. Even in efficient market hypothesis is unable to convince all the investors that prices of the securities fully reflect all available information just because even in weak efficient and semi strong efficient form, the association between past and the current securities returns can be observed. So, even the fundamental or technical analysis of the companies to calculate the true or intrinsic value of the stock based on the available information is not sufficient to explain the volatility of stock market returns but investors sentiments also play an important role in the volatility of stock market returns.

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