An Empirical Investigation of Market Reactions: Case of KSE 100 Index

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Abstract
This study is an effort to answer the questions which traditional finance theories have failed to answer. Stock markets are run by human decisions which are the lifeblood for Behavioral finance and their individual reaction ultimately reflects in the market reaction. Using the methodology implied by Thaler (1975) tendency of overreaction has been found in KSE-100 index where \( \text{ACAR}_L \) is always greater than \( \text{ACAR}_W \) showing losers in one period outperformed in other testing period due to overreaction of investors. The results revealed that the investors are not always rational and there are number of other psychological factors which effects their decision which makes them over or under react to a news. Continued reaction of investors makes the market over/under react.

Introduction
In recent past it has widely been observed that equity markets are facing high volatility and fluctuation issues. Macro-economic conditions largely hit the markets on a global scale. This higher volatility has made investor uncertain or unpredictable about the market behavior as market conditions cannot always be forecasted by using standard financial measures.

Eugene.F.Fama in 1970 came up with his well known theory “Efficient Markets Hypothesis” (EM) establishing that all the available private and public information regarding value of the firm are incorporated in stock prices in no time which reduces the chances of investor to find and exploit the mispricing of stocks to earn above market profits. The theory implies that price movements are random and immediately react to that day’s freshly arrived news whether that is any financial news or any information regarding some political, economic or social event making the market informationally efficient.

Contrary to the concept of market efficiency, stock prices are either found to drop down more than required level (and then gradually moves up) or delay its response to new information and take few days to incorporate it. In both these cases market participants get the chance to earn above market profit by exploiting higher returns for the mispriced securities.

Literature establishes that prices exhibit a positive serial correlation over the years (Lo and Mckinlay, 1988) and also the prices can be predicted by the publicly available information which does not constitute the fundamentals of assets. Such information includes earnings announcements (Livnat and Mendenhall, 2006), analyst forecast (Gleason and Lee, 2003), book to market value ratios (Lakonsihok et’al, 1994), Fama and French (1992). Though asset prices fully reflect the risk return profile of the asset, identification and exploitation of such phenomenon earns above market profits to the investors. Also past returns can be used to predict future returns.
How rationally market behaves has been a topic of special interest. An examination of the volatility of share prices relative to the volatility of the fundamental variables affecting share prices has been made to assess the rationality of market behavior. The magnitude of fluctuation in actual asset prices is found to be higher than the fluctuation in fundamental variables affecting the stock prices. The reason being trends or waves of optimistic or pessimistic market psychology (Shiller, 1981). Volatility tests have provided the evidence of movements in stock prices being not merely the result of rational expectations of investors rather an irrational component is also involved. Theory of limited arbitrage clearly mention that security prices are not determined merely by information but also by “changes in expectations or sentiments that are not fully justified by information” (Shleifer and Summers, 1990).

Reactions of Stock Market: Overreaction and Underreaction

Where Standard finance takes individuals as fully informed, aware and rational, behavioral finance presents the individuals as normal people that is not always rational and are influenced by emotions, trends, perceptions, heuristics and biases (Statman, 1999). Overreaction and Underreaction are the phenomenon which creates difference between standard finance and behavioral finance challenging the rationality of market participants.

DeBondt and Thaler (1985) formulated the idea of under and overreaction. By analyzing 3-5 year past monthly stock returns, they find, the winner tend to loose in future and vice versa. According to them, this long term return reversal basically shows investor overreaction as they seldom give importance to the future mean reversion of returns rather they heavily depend upon past performance of stock while making expectations.

Nicholas, Shleifer and Vishny (1998) identify two regimes i.e. “mean reverting regime” and “trending regime” in which firm’s returns move. It is more likely that firms earnings will stay in present regime therefore investors update their belief about which state they are in with every upcoming news. If good news followed by good news arrives in market investors believe they are in trending regime whereas if good news is followed by a bad news, they perceive they are in reverting regime. Continuation of a trend whether positive or negative for a short term i.e. 1-12 months refers to momentum. Momentum and reversions have often been associated with over- and underreaction. In case of positive momentum, it is possible that investors are under reacting to negative, non-conforming news and in case of negative momentum investors may be overreacting to negative circumstances and are ignoring positive signals (Spellman, 2009).

Momentum traders only focus on past prices whereas news watchers rely upon any news about fundamentals of firm (earnings etc). With any positive or negative news newswatcher underreact (as fundamental information is spread slowly in market). Momentum trader accelerates this reaction and takes prices beyond equilibrium causing more sale or purchase of stocks and thus overreaction (Hong and Stein, 1999).

Most of the studies that tested market efficiency have confined their analysis to short term stock returns only assuming that there exist a short term lag between event and its adjustment in price. Recent studies are now focusing that market can be claimed inefficient only if long term returns are observed since prices take some time to adjust with the event. Only a long term analysis can help identifying inefficiency or long term underreaction or overreaction to information (Fama, 1998). This study covers a span of fifteen years to study the long term reactions of market to a good/ bad news and have found that investor reactions continues in long run and contributes to the overreaction of market.
Literature Review

Over Reaction Hypothesis

Most initial study regarding market reaction is credited to De Bondt and Thaler (1985) who used monthly common stock returns data for NYSE from January 1962 to December 1982. They formed two portfolios of 35 stocks, one of past extreme winners in last three years and one of past extreme losers in past three years. Results showed that past losers happen to outperform winners in next 4 years. Returns to past losers were 19.6 percent high whereas returns to past winners were 5% down relative to the market in general i.e asymmetric in nature (larger for losers as compared to winners). The study suggested that investors may cause market prices to deviate from fundamental values creating inefficient markets. Also a clear contradiction with baye’s rule was found as investors overreacted to unanticipated and dramatic news events While making decisions investors forget that mean returns revert in long run and this attitude shows the overreaction of investors to past returns. On these grounds, overreaction can be justified as behavioral finance alternative to the traditional market efficiency (Fama, 1998).

Where De Bondt and Thaler (1985) supported the price-earning ratio hypothesis confirming the overreaction of investors, De bondt and Thaler (1987) re-examined winner – looser effect by implying firm size and differences in risk, measured by CAPM beta. Their findings were again consistent with the overreaction hypothesis. Seasonal patterns of return’s investigation exhibited Excess returns in January as a function of short term and long term past performance and last year’s market returns.

Lakonishok et’al (1994) provides another example of the overreaction of the investors. They took financial ratios as the indicator firm’s performance. Stocks of the firms having high book to market ratio (BE/ME), earning to price ratio (E/P), and cash flow to price ratio (C/P) earns high profits. Some investors overreact to such stocks (that have done very well in the past). They perceive that these stocks will continue to earn good in future and thus they start buying them which make these "glamour" stocks overpriced. Similarly stocks of low BE/ME ratio, E/P ratio, C/P ratio firms earns low profits; investors expect their performance to be low in future and overreact to these value stocks. As a result they tend to oversell these stocks making them underpriced. Contrarian strategies succeed in outperforming the market because they invest disproportionately in underpriced stocks and under invest in overpriced stocks (De Bondt and Thaler, 1985).

In a psychological study, Kahneman and Tversky (1982) document individuals overreacting to new information, whether good or bad. If over-reaction behavior occurs, profitable contrarian trading strategies, buying past losers and selling past winners can be formed. In this paper this strategy earned, on average, 25% abnormal returns over the period from 1980 to 1997.

Evidences of overreaction have been found in UK stock market (Clare and Thomas, 1995) and (Campbell and Limmack, 1997), Canada, UK, Japan, Germany, France, and Italy (Baytas and Cakici, 1999), Brazilian equity market (Da Costa, 1994), Chinese stock market (He and Tan, 2009), Australian stock market (Leung and Li, 1998), Newzealand (Bowman, and Iverson (1998), Spanish stock market (Alonso and Rubio, 1990) etc. No support for overreaction has been found in Australian equity market (Beaver and Landsman, 1981) and United States (Baytas and Cakici, 1999).
Under Reaction Hypothesis

Underreaction to returns observed in market is stronger for a good news than for the negative or bad news (Welfens and Weber, 2004). Jegadeesh and Titman (1993) for the first time documented strategies which buy stocks that have performed well in the past and sold stocks that have performed poorly in the past almost 3 to 12 months holding periods while using the data from 1965-1989. They found that stocks with higher returns in last one year tend to earn high returns in next six months also. They attributed this attitude to momentum effect. This implies that stock prices react to high returns or earnings for about a year after they are being announced (Ball and Brown, 1968).

Schnusenberg, and Mdura (2001) investigated the short term over and under reaction of six US stock market indices (include Dow, S&P 500, NYSE, Sussell 3000, Wishire 5000, Nasdaq). They observed one day under reaction for winners and losers for all the six indexes. Extract of their study is an evidence of a sixty-day under reaction for winners. However as the period is extended, abnormal returns for losers turned from negative to positive and showed significant reversals over the sixty-day period. Thus the market under reacts in short run and reverses its direction in long run.

Not only developed markets all over the world have been studied in search of underreaction evidence, but Asian stock markets have also been the area of interest for researchers. An extensive study of ten Asian markets i-e Hongkong, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Singapore, Taiwan, and Thailand has been conducted by Mazouz, Joseph, and Palliere (2009). Their examination of short term price behaviors following large price changes or “shocks” found substantial discrepancies in the effects of shocks across the ten indices; however their results supported return continuation in markets. Short term underreaction has also been found in Indian stock market (Rastogi et’ al, 2009).

Cutler, Poterba and Summers (1991) has also reported positive autocorrelation while assessing excess returns of stocks, bonds and foreign exchange in different markets over the period of 1960 to 1988. These autocorrelation evidences were consistent with the underreaction hypothesis, which states that information is gradually incorporated into stock prices.

Development of Hypothesis

While underreaction defines a slow adjustment of prices to corporate events or announcements, overreaction deals with extreme stock price reactions to previous information or past performance. Or when investors underreact, prices reflect the new information, such as earning announcement, gradually whereas in case of overreaction future prices show a negative autocorrelation with the past prices.

Whenever any unexpected or dramatic news arrive in the market, investors tend to over react (De Bondt and Thaler, 1985). However investors are largely found simultaneously exhibiting short-term Underreaction to earnings announcements and long-term overreaction to past highly unexpected earnings (Kaestner, 2006). Pakistani market is an emerging market dominated by few large players. Also the investors are not sophisticated enough to keep market in equilibrium. Thus in light of the available evidences it is investigated whether investors in Pakistani market also tend to under or overreact in extreme market conditions.

H₀: In extreme market conditions, stock market does not react irrationally

With an alternative hypothesis as:

H₁: In extreme market conditions, stock market tend to react irrationally
Methodology

KSE - 100 Index companies being representative of 86% Karachi stock exchange has been analyzed for the period 2000 to 2014 for the study. Secondary data of daily share prices of KSE-100 index companies have been analyzed for testable hypothesis. Share Price data has been collected from the official web site of Karachi stock Exchange, Pakistan and business recorder.

Over / underreaction of Pakistani Investors has been investigated for KSE-100 index by analyzing autocorrelation between stock returns. In long run, a negative autocorrelation between returns indicate overreaction of investors to specific news. Positive autocorrelation between stock returns, in short run, has been associated to underreaction of investors.

According to Debondt and Thaler (1985) whether returns are calculated by implying market adjusted excess return model, market model residuals, or excess returns relative to Sharpe-Lintner version of CAPM, main findings of study remains the same. In order to test for autocorrelation, excess returns have been calculated from the monthly returns of market as well as stocks in following manner:

\[ \mu_{i,t} = R_{i,t} - R_{m,t} \]

Where:
- \( \mu_{i,t} \) = Return of a stock in excess of market for day \( t \)
- \( R_{i,t} \) = Continuously compounded return of a stock on day \( t \)
- \( R_{m,t} \) = Continuously compounded return of market on day \( t \)

Following Debondt and Thaler (1985), this study is also using a strategy of non-overlapping 3/3 years that is three year holding period and three year testing period. Portfolio formation dates have been defined as December 2002, December 2005, and December 2008. On each portfolio formation date, Cumulative excess returns are calculated for non-overlapping three year as follows:

\[ \text{CAR}_i = \sum_{t=0}^{0} \mu_{i,t} \]

Where:
- \( \text{CAR}_i \) = Cumulative Excess Returns for stock \( i \)
- \( \mu_{i,t} \) = Excess return of a stock for month \( t \)

On each of the portfolio formation date, stocks are ranked on the basis of Cumulative Excess Returns (CARs). Different studies have documented different thresholds for identification of winners and losers such as extreme 5% stocks performing best (chopra et al, 1992), best and worst 35 performing stocks (Debondt and Thaler, 1985), top and bottom deciles (Jegadeesh, (1990); Debondt and Thaler, (1985)) etc. Since our sample includes 100 companies, it is reasonable enough to use a ratio of 10% to identify winners and losers which makes the winner and loser portfolio as top ten stocks (with highest CARs) and bottom ten stocks (with lowest CARs) respectively.

In order to test the performance of each portfolio, cumulative excess returns (CARs) of each stock has been worked out for the testing period i-e next 36 months (\( t = 1,2,3,4 \ldots \ldots \ldots \ldots \ldots \ldots 36 \)) starting next to the portfolio formation date (\( t=0 \)) for winner as well as loser portfolio. Cumulative Excess Returns i-e \( \text{CAR}_{w,n,t} \) and \( \text{CAR}_{l,n,t} \) have been calculated as follows:
Using CARs for all three testing periods, average cumulative excess returns (ACARs) have been calculated for both Winner and Loser portfolio (ACAR\(_{W,t}\) and ACAR\(_{L,t}\) respectively) as follows:

\[
ACAR_{p,t} = \frac{1}{N} \sum_{i=1}^{N} \mu_{i,t}
\]

Where:
- \(CAR_{p,z,t}\) = Cumulative Average Abnormal Return for test period z at month t
- \(\mu_{i,t}\) = Excess return of a stock for month t
- \(N\) = Number of stocks in portfolio

The Overreaction Hypothesis predicts that for any \(t>0\):

\[
ACAR_{W,t} < 0 \quad ACAR_{L,t} > 0 \quad \text{and} \quad (ACAR_{L,t} - ACAR_{W,t}) > 0.
\]

In order to assess the statistical significance of difference in portfolio performance, and to find out whether for any month \(t\), the average residual return makes a contribution to either ACAR\(_{W,t}\) and ACAR\(_{L,t}\), T-stat has been calculated as:

\[
T_{p,t} = \frac{AR_{p,t}}{S_p / \sqrt{N}}
\]

Where:
- \(T_{p,t}\) = \(t\)-value of the month \(t\) in portfolio
- \(AR_{p,t}\) = Average cumulative abnormal return of the portfolio at time \(t\)
- \(N\) = Number of observations
- \(S_p\) = Standard deviation of average returns of portfolio and has been defined as:

\[
S_p = \sqrt{\frac{\sum_{n=1}^{N} (CAR_{p,z,t} - AR_{p,t})^2}{N - 1}}
\]

Also for the study, a pooled estimate of population variance in CAR\(_t\) will be required which is estimated as:

\[
S_t^2 = \left[ \sum_{n=1}^{N} (CAR_{W,n,t} - ACAR_{W,t})^2 + \sum_{n=1}^{N} (CAR_{L,n,t} - ACAR_{L,t})^2 \right] / 2(N - 1)
\]

Where:
- ACAR\(_{w,t}\) = Avergae Cumulative Abnormal Returns of winner portfolio at time \(t\)
- CAR\(_{w,n,t}\) = Cumulative Average Abnormal Return for winner portfolio at month \(t\)
- \(N\) = Number of observations
With two samples of equal size N, the variance of the difference of sample means equals \(2S^2_t/N\) and T-stat is:

\[
T_t = \frac{[\text{ACAR}_{L,t} - \text{ACAR}_{W,t}]}{\sqrt{2S^2_t/N}}
\]

Where:
- \(\text{ACAR}_{W,t} = \text{Average Cumulative Abnormal Returns of winner portfolio at time } t\)
- \(\text{ACAR}_{L,t} = \text{Average Cumulative Abnormal Returns of Looser portfolio at time } t\)
- \(S^2_t = \text{Population Variance}\)
- \(N = \text{Number of observations}\)

Similar procedure applies to the portfolio of Loser for the formation period of 36 months (t=1,2,3,……….36).

**Data Analysis**

Implying the methodology of Thaler (1975), monthly stock returns and excess returns for the period 2000 - 2014 have been analyzed for non overlapping three year formation period by identifying winners and losers in the market at a threshold of 10%. The results obtained are presented as under:

*Table 1*

**Average Cumulative Excess Returns for Winner and Loser Portfolio**

<table>
<thead>
<tr>
<th>Period</th>
<th>\text{ACAR}_{W}</th>
<th>\text{ACAR}_{L}</th>
<th>\text{ACAR}<em>{L} - \text{ACAR}</em>{W}</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-2008</td>
<td>-0.0455</td>
<td>-0.0231</td>
<td>0.0225</td>
</tr>
<tr>
<td>2009-2011</td>
<td>-0.0077</td>
<td>0.0255</td>
<td>0.0332</td>
</tr>
<tr>
<td>2012-2014</td>
<td>-0.0058</td>
<td>-0.0013</td>
<td>-0.0013</td>
</tr>
</tbody>
</table>

\(\text{ACAR}_{W}\) is the Average Cumulative excess returns for portfolio of winners

\(\text{ACAR}_{L}\) is the Average Cumulative excess returns for portfolio of Losers

Table 1 shows the values of Average cumulative excess returns for each portfolio of winners and losers for three distinct formation periods in sample i-e from 2006 to 2008, 2009 to 2011 and 2012 to 2014. As suggested by the theory, evidence of overreaction can be obtained when \(\text{ACAR}_{W} < 0, \text{ACAR}_{L} > 0\) and thus by implication \(\text{ACAR}_{L} - \text{ACAR}_{W} > 0\). Results have revealed that ACARs for winner portfolio have constantly been negative for the three formation period that is less than zero which is consistent with overreaction hypothesis. ACARs for loser portfolio have shown a controversial trend where ACARs of loser portfolio for the formation period of 2006-2008 and 2012-2014 are negative (-0.0231 and -0.0013 respectively). However for the formation period 2009-2011, \(\text{ACAR}_{L} = 0.0255\) i-e greater than zero. Analysis of \(\text{ACAR}_{L} - \text{ACAR}_{W}\) also shows a mix trend that is positive for the formation period of 2006 -2008 and 2009 – 2011 but negative for the period 2012-2014 exhibiting overreaction of investors in
periods 2006-2008 and 2009-2011 however no evidence for overreaction in 2012-2014 has been found.

The analysis of cumulative average excess returns of the winner and looser portfolios of three distinct formation periods 2006-2008, 2009-2011 and 2012-2014, based on the holding period of previous three year’s excess returns, reveals that winners of holding periods tend to lose in all three formation periods as depicted by negative cumulative average excess returns in each period. This condition is exactly what overreaction hypothesis states that is \( ACAR_W < 0 \). Losers of holding period, on the other hand, kept on loosing in formation periods 2006-2008 and 2012-2014 as well which is contrary to overreaction hypothesis. However losers of holding period 2006-2008 turned out to be the winners in formation period 2009-2011 as shown by positive value of average cumulative excess returns. This condition is in accordance to the condition of overreaction. Positive value for the difference between \( ACAR_L \) and \( ACAR_W \) confirms that magnitude of winning is higher than the magnitude of losing in formation period. Same is the position in period 2006-2008 however in 2012-2014 winners outperformed the losers as shown by value of \( ACAR_L - ACAR_W < 0 \). The results implies that overreaction of investors is strongly observed in case of winner portfolios. A month wise detailed analysis of results is presented as under.

Analysis of ACARs

Average Cumulative excess returns (ACARs) for all the three portfolios of winners and losers have been tested for their statistical significance. Aggregate results for the portfolio average cumulative excess returns and their T- values has been given as under.

**Table 2**

ACARs of Winners, Losers and Their Difference

<table>
<thead>
<tr>
<th>Period</th>
<th>( ACAR_W )</th>
<th>t – value</th>
<th>( ACAR_L )</th>
<th>t - value</th>
<th>( ACAR_L - ACAR_W )</th>
<th>t - value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-0.0372</td>
<td>-0.6347</td>
<td>0.0765</td>
<td>1.6491***</td>
<td>0.1137</td>
<td>2.1509**</td>
</tr>
<tr>
<td>2</td>
<td>-0.0602</td>
<td>-0.9884</td>
<td>0.0563</td>
<td>1.5124</td>
<td>0.1165</td>
<td>2.3077**</td>
</tr>
<tr>
<td>3</td>
<td>-0.1333</td>
<td>-1.4161</td>
<td>0.0522</td>
<td>1.1918</td>
<td>0.1855</td>
<td>2.5267**</td>
</tr>
<tr>
<td>4</td>
<td>-0.1633</td>
<td>-2.3590**</td>
<td>0.0326</td>
<td>0.6105</td>
<td>0.1960</td>
<td>3.1682*</td>
</tr>
<tr>
<td>5</td>
<td>-0.2499</td>
<td>-2.7097*</td>
<td>-0.0119</td>
<td>-0.1325</td>
<td>0.2380</td>
<td>2.6176*</td>
</tr>
<tr>
<td>6</td>
<td>-0.2617</td>
<td>-2.9148*</td>
<td>-0.0235</td>
<td>-0.2672</td>
<td>0.2381</td>
<td>2.6772*</td>
</tr>
<tr>
<td>7</td>
<td>-0.2282</td>
<td>-3.3434*</td>
<td>0.0204</td>
<td>0.2147</td>
<td>0.2486</td>
<td>3.0011*</td>
</tr>
<tr>
<td>8</td>
<td>-0.2429</td>
<td>-2.2300**</td>
<td>0.0029</td>
<td>0.0242</td>
<td>0.2458</td>
<td>2.1392**</td>
</tr>
<tr>
<td>9</td>
<td>-0.2515</td>
<td>-2.4408**</td>
<td>0.0174</td>
<td>0.1381</td>
<td>0.2689</td>
<td>2.3333**</td>
</tr>
<tr>
<td>10</td>
<td>-0.2897</td>
<td>-2.4500**</td>
<td>0.0359</td>
<td>0.2687</td>
<td>0.3256</td>
<td>2.5807*</td>
</tr>
<tr>
<td>11</td>
<td>-0.3273</td>
<td>-2.2725**</td>
<td>0.0310</td>
<td>0.1973</td>
<td>0.3583</td>
<td>2.3768**</td>
</tr>
<tr>
<td>12</td>
<td>-0.3484</td>
<td>-2.0164**</td>
<td>0.0035</td>
<td>0.0199</td>
<td>0.3519</td>
<td>2.0190**</td>
</tr>
<tr>
<td>13</td>
<td>-0.3584</td>
<td>-2.1209**</td>
<td>0.0410</td>
<td>0.2503</td>
<td>0.3995</td>
<td>2.3996**</td>
</tr>
<tr>
<td>14</td>
<td>-0.3666</td>
<td>-2.0919**</td>
<td>0.0405</td>
<td>0.2331</td>
<td>0.4071</td>
<td>2.3339**</td>
</tr>
<tr>
<td>15</td>
<td>-0.3927</td>
<td>-2.1914**</td>
<td>0.0542</td>
<td>0.3022</td>
<td>0.4468</td>
<td>2.4931**</td>
</tr>
<tr>
<td>16</td>
<td>-0.3643</td>
<td>-2.3456**</td>
<td>0.0774</td>
<td>0.4584</td>
<td>0.4417</td>
<td>2.7233*</td>
</tr>
</tbody>
</table>
Table 2 above shows the Average Cumulative Excess Returns for the winner (ACAR\(_W\)) and loser portfolio (ACAR\(_L\)) at time \(t=1,2,3,4,\ldots,36\) along with their respective \(t\)-values to test their statistical significance. Difference of ACAR\(_L\) and ACAR\(_W\) has also been presented with their \(t\)-values. Results shows ACAR of winner portfolios remain negative throughout the 36 months depicting negative mean returns for the winners in formation period. To test the statistical significance, confidence interval has been defined at three different levels to indicate the strength of significance i.e at 90%, 95% and 99%. Mean values obtained for the portfolios of winners are found to be statistically significant after \(t=2\) and remain significant till \(t=35\). Value obtained for \(t=36\) turned to be statistically insignificant (mean = -0.7090, \(t\)-value = -1.5232). Significantly negative returns in the months following the holding period of winner stocks is exactly what is brought forward by overreaction hypothesis that past winners tend to loose in future due to mean reversion. Investors thus prefer to follow contrarian strategy to get maximum benefits.

Results for the ACAR\(_L\) reveals that average excess returns for the portfolio for past losers performed better in formation period and earned positive profits throughout 36 months except for month 5 and 6. Since \(t\)-values for all the periods are statistically insignificant no statistical importance can be assigned to these results except for the first month with ACAR\(_L\) mean = 0.0765 and \(t\)-value = 1.6491 that is significant with 90% confidence interval. This trend of average

<table>
<thead>
<tr>
<th></th>
<th>ACAR(_W)</th>
<th>ACAR(_L)</th>
<th>ACAR(_W)</th>
<th>ACAR(_L)</th>
<th>ACAR(_W)</th>
<th>ACAR(_L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>-0.3454</td>
<td>-2.5126**</td>
<td>0.0928</td>
<td>0.6410</td>
<td>0.4382</td>
<td>3.1043*</td>
</tr>
<tr>
<td>18</td>
<td>-0.3059</td>
<td>-2.4192**</td>
<td>0.1429</td>
<td>1.0329</td>
<td>0.4488</td>
<td>3.3866*</td>
</tr>
<tr>
<td>19</td>
<td>-0.2953</td>
<td>-2.6493*</td>
<td>0.1662</td>
<td>1.1252</td>
<td>0.4615</td>
<td>3.5272*</td>
</tr>
<tr>
<td>20</td>
<td>-0.3345</td>
<td>-2.9242*</td>
<td>0.1393</td>
<td>0.7019</td>
<td>0.4738</td>
<td>2.9250*</td>
</tr>
<tr>
<td>21</td>
<td>-0.3476</td>
<td>-3.1785*</td>
<td>0.1569</td>
<td>0.7979</td>
<td>0.5045</td>
<td>3.1711*</td>
</tr>
<tr>
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*significant at 1% level of significance
**significant at 5% level of significance
***Significant at 10% level of significance

Period represents each month over 3 years
ACAR\(_W\), ACAR\(_L\) are the Average Cumulative Excess Returns of winner and loser portfolio
\(t\)-values in parenthesis
cumulative excess returns for the portfolio of past losers has been supported by overreaction hypothesis but since results are found statistically insignificant, these cannot be generally accepted.

Results for the ACAR_L - ACAR_W shows positive excess returns for period 1 to period 36 and the values obtained have also been supported by statistical significance except for the month 36 where mean value obtained is 0.7224 and t-value is found as 1.4861. These findings are in accordance with the overreaction hypothesis which states ACAR_L-ACAR_W>0 and rejects our null hypothesis.

**Graphical Presentation**

Same results can more easily be understood by having a graphical presentation rather than messing up with a lot of numbers. Chart depicting comparative movement of ACARs of winner and loser portfolios for all the non over lapping three year formation period has been presented as under:

![Figure 1: Average Cumulative Excess Returns for the Winner and Loser Portfolio with non over lapping three year formation period](image)

Months of formation period referring to t = 1, 2, 3 ..........36 have been taken along X-axis and along Y-axis Cumulative excess returns of the portfolios for the next 36 months after the portfolio formation date have been presented. It is clearly evident that movement in the ACARs of winners and losers is absolutely in opposite direction. Winners tend to loose over time whereas Losers tend to improve.

ACAR_W started with the negative average excess returns in t = 1 and remain negative till t = 36. This continuous trend of declining average cumulative excess returns of winner’s portfolio in each period, as plotted above, shows how investors overreact to unanticipated news in long run and drift the stock prices in an anomalous manner. Irrationally increased stock prices ultimately correct to its fundamental value in long run and apparent decreased returns transforms a winning stock into a loser stock.

Series of ACAR_L, when plotted, shows that average cumulative excess returns for loser portfolio starts from 0.0764 in t = 1 that is greater than “Zero” and remain positive till t = 4. In t=5 and t=6, a downward movement is observed in average cumulative returns as evident by negative values. The condition improved in t=7 but again in t=8 the mean value becomes equal to zero. After another hype in returns, average cumulative returns again found equal to zero in
t=12. However t=13 onwards, the excess returns remain positive for the loser portfolio. It is observed that despite the ups and downs in excess returns of loser value, it remain positive for most of the period and the curve depicting excess returns for losers remain above that for past winners. This trend is in accordance to what overreaction hypothesis suggest i.e past losers tend to win in future in long run.

Overreaction phenomenon implies loser stocks in long run adjust their prices and earns higher profits which transform them into a winning stock. This is the pattern observed in average excess returns for past losers with minor ups and downs all over the formation period. Winner portfolio also shows a strong evidence of overreaction of investors with a mean reversion effect as to which continuous negative excess return in formation period are earned. Thus the study confirms the overreaction of investors for the past loser stocks of KSE-100 index during the sample period of 2000 to 2014 by rejecting our null hypothesis that in extreme market conditions, investors does not tend to react irrationally.

**Conclusion**

How rationally market behaves has been a topic of special interest since long. Theories presented by traditional finance base on set of assumptions such as the concept of homo economicus: the rational economic man making perfectly rational decisions all the time. Where standard finance explains how the investor “should” behave, Behavioral finance deals with the how an investor “actually” behaves. This study aims at highlighting the psychological factors that affect the thought process of the investors and lead them to make irrational decisions, leading to over and underreaction of investors and resultantly volatile market conditions.

An investigation of market reaction has been made by forming three testing periods i.e 2006-2008, 2009-2011, 2012-2014. It has been found that past winners turned out to be losers in next testing period and vice versa except for period 2012-2014 which depicted underreaction of investors in market. An examination of ACAR or loser portfolios and ACAR of winner portfolios provided the evidence that ACAR\(L\) – ACAR\(W\) > 0 for all 36 periods depicting market overreaction during sample period.

These are the findings in accordance to the Thaler (1975) who also found that losers tend to outperform past winners in testing period and vice versa. The reason being investor’s continued overreaction to a good news. This implies that investor is not always rational enough to base its decision on fundamentals rather human perception, moods, psychology, fears etc also plays role in this regard and since stock markets are constituted by humans, it cannot be isolated from such human factors and behaves irrationally.

This study can serve the Pakistani investor not only by identify their prolonged overreaction but also by providing them a chance to forecast the future trading pattern with an opportunity to outperform the market. Also the investors may work out on the strategies to eliminate the effect of biased decisions made by them to stay rational. This could serve as a step towards achieving market efficiency.

The study has been carried out with certain limitations such as only three holding and formation periods have been formed and analyzed due to non availability of share price data beyond year 2000. Also the study has relied upon secondary data for evaluating human behavior due to time involved in primary data collection and limited response from investors.

An improvement to the present research may be to use primary data, collected directly from the investors. This will not only provide a better insight into the investor behavior but also will improve the reliability of the statistical tests implied. An analysis of longer time period may also help to identify some diversified investor reactions. Testing and holding periods with
different intervals such as 1/1, 5/5 overlapping and non-overlapping etc may also be formed and tested to better analyze the investor reaction. The behavioral factors behind the biased and irrational decision making may also be identified to better understand what makes the investor over/underreact.

References


