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Factors That Lead to Investor's Overconfidence: Pakistan Stock Exchange Case

Yatırımcı Aşırı Özgüvenine Yol Açan Faktörler: Pakistan Pay Piyasası Örneği

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Abstract: The argument of why some investors may theoretically outperform the market in efficient markets raises questions about market efficiency. Behavioral Finance is an emerging field in finance. According to the behavioral finance approach, the moods, behaviors, feelings and attitudes of the investors are very important. Followers of the inefficient market concept try to prove market inefficiency by conducting research on factors specific to market activities. In order to test this arguments, many studies are conducted to test market anomalies. The purpose of this research is to apply the study conducted in 2008, which investigates the relationship between investors' sense of happiness and excessive trust, in the Pakistani Equity Market. The purpose of the research is to review the results of study conducted in 2008 that claim to investigate the relationship of investors' happy sentiment and overconfidence effect. Cloud coverage, temperature and temperature change, former returns, and short term loan change rate are used as proxies for happy sentiment. Data from Pakistan Stock Exchange and Meteorological Department is collected to check the relation. Data from Pakistan Equity Market and Pakistan Meteorology Department between 2007-2016 were used in this study. The happy sentiment index is divided into two categories: "natural environment happiness" and "investment atmosphere happiness." The results suggest that short term loan rates, previous day turnover and previous day activities have significant low effect on investment overconfidence of investor so trading activities are affected. Natural environment factors have less impact while investment atmosphere happiness has moderately high effect on market activities of investors.

Structured Abstract: The argument of why some investors can perform better in market in theoretically efficient markets leads to raise questions on market efficiency. Behavioral Finance is an emerging field in finance. Moods, behavior, sentiments and attitudes of investor are very important according to behavioral finance approach. The followers of inefficient market concept are trying to prove market inefficiencies by conducting researches on factors which are unique to market activities.

The paper is a type of review research and is an effort to check the claim that happy investors are overconfident as claimed by Chih-Lun Huang and Yeong-Jia Goo in their paper published in 2008. Instead of directly involving investors, the behavior change of investors is observed by keeping in mind few factors. According to some researchers the weather has effect on investor that leads him to perform overconfidently in

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market and thus market activities fluctuates between Bearish to bullish and vice versa. Brown and Cliff argue that investor sentiment "represents the expectations of market participants relative to a norm: a bullish (bearish) investor expects returns to be above (below) average, whatever 'average' may be" (2004, p. 2). Much of the existing literature on behavioral biases indicates the limited research in emerging economies in this area, the dominance of secondary data-based empirical research, the lack of empirical research on individuals (Satish and Nisha, 2014). This research is conducted on data collected from developing economy of Asia from year 2007 to 2016. Although the results are significant but shows that not very strong evidence could be gathered on such claims. Market variables such as daily close and open readings, market volume change, weather change and other climate variables are analyzed to check the accuracy of claim. However the research provokes a desire to check the relation of these unique variables on sector wise and seasonal businesses as somewhat a moderate relationship is evident from the research which shows there are few sectors that might be fashion industry or food and cement industries where investor could be affected by these changes.

In the light of literature reviewed, the study tries to check the affect of factors influencing overconfidence. It tests the hypothesis that overconfident investors are happy investors and overconfidence of investor could be determined by using fundamental values. Although overconfidence is behavioral phenomenon but some market variables and climate variables can be helpful to get an idea that how active investors are on that day. For happiness, two proxies "Natural Environment Happiness" and "Investment Atmosphere Happiness" is used. Natural Environment factors include the cloud coverage and temperature changes while Investment Atmosphere Happiness include the Lag of Market turnover, lag of previous day open values and short term loan rates of that day. It was assumed that if cloud coverage is low and temperature is not too high or too low beside a positive change in previous day market turnover, previous day opening readings and interbank loan offer rates, the investor will feel happy and become overconfident leads to changed values of market turnover.

This study intends to evaluate the relation between investor activity level and one of the irrational investment behaviors i.e. over confidence using data from Pakistan.

Ten years data of Pakistan stock market from year 2007 to 2016 is used. For weather, daily cloud coverage and average daily temperature in city where the largest stock exchange of country is located. Cloud coverage is measured in OKT having value 0 to 9. 0 is for clear sky while 9 is for sky obstructed from view. Data is collected from Metrological department on daily bases. Stock exchange works 5 days in week from Monday to Friday and also remain close on public holidays while the data of temperature and cloud coverage was on continuous daily basis, 7 days in a week.

The study assumed that investors are more confident when there is good weather (Model 1) and an optimistic investment atmosphere stimulates stock trading (Model 2). The results show that when the sky is not too cloudy (negative value of coefficient) the activity of investor is high as suggested by Kumar & Nish, (2008) that investment atmosphere affects mood and mood affects stock trading. When there is a happy investment atmosphere, investors are more optimistic, able to bear higher risk, and likely to act in a way that causes overconfidence. Frequent trading causes investors to assets at higher prices. However the short term loan rates and previous day loan rates also affect the investment mood of investors, they tend to be less active and decrease trading on days having high rates. However, the significant values although showing low correlation suggest that nontechnical factors like weather, temperature or cloud coverage change are not strongly effecting investor's overconfidence in all sectors but they might have strong influence on few sectors where season has effect on business activities.

Keywords: Behavioral finance, weather effect, investors' overconfidence, market turnover, stock markets,

Öz: Bazı yatırımcıların teorik olarak etkin piyasalarda piyasaya göre neden daha iyi performans gösterebildikleri argümanı, piyasa etkinliği hakkında soruların ortaya çıkmasına neden olmaktadır. Davranışsal Finans, finansta gelişmekte olan bir alandır. Davranışsal finans yaklaşımına göre yatırımcıların ruh halleri, davranışları, duyguları ve tutumları çok önemlidir. Etkin olmayan piyasa konseptinin takipçileri, piyasa faaliyetlerine özgü faktörler üzerine araştırmalar yaparak piyasa etkinsizliğini kanıtlamaya çalışmaktadırlar. Bu argümanın test edilmesi için piyasa anomalilerini test etmeye yönelik pek çok çalışma yapılmaktadır. Bu araştırmanın amacı, 2008 yılında yapılan ve yatırımcıların mutluluk duygusu ve aşırı güven etkisi arasındaki ilişkiyi araştıran çalışmayı Pakistan Pay Piyasasında uygulamaktır. Bulutluluk durumu, sıcaklık ve sıcaklık

değişimi, eski getiriler ve kısa vadeli kredi değişim oranı, mutlu duyguların açıklayıcısı olarak kullanılmıştır. İlişkileri kontrol etmek için veriler Pakistan Borsası ve Meteoroloji Departmanından elde edilmiştir. Bu çalışmada Pakistan Pay Piyasası ile Pakistan Meteoroloji Departmanından elde edilen 2007-2016 yılları arasına ait veriler kullanılmıştır. Mutlu duygu endeksi iki kategoriye ayrılır: "doğal çevre mutluluğu" ve "yatırım ortamı mutluluğu". Sonuçlar, kısa vadeli kredi oranlarının, önceki gün hacmi ve önceki gün faaliyetlerinin yatırımcının aşırı güveni üzerinde düşük olmakla birlikte anlamlı etkiye sahip olduğunu ve dolayısıyla yatırım kararlarının etkilendiğini göstermektedir. *Doğal ortam faktörleri* daha az etkiye sahipken, *yatırım ortamı mutluluğu* yatırımcıların piyasa faaliyetleri üzerinde orta derecede etkiye sahiptir.

Anahtar Kelimeler: Davranışsal finans, hava durumu etkisi, yatırımcı aşırı özgüveni, piyasa işlem hacmi, pay piyasaları

Introduction

Market efficiency is a topic of debate from several decades. The argument that if all markets are efficient then why some investors can perform better in market leads to raise several questions on market efficiency. Behavioral Finance is an emerging field in theory of knowledge. Moods, behavior, sentiments and attitudes of investor are very important. The follower of inefficient market concept is trying to proof market inefficiencies by conducting researches on factors which are unique to market activities. Odean describes overconfidence as "a belief that a trader's information is more precise than it actually is" (1998, p. 1893).

The paper is a type of review research and is an effort to check the claim that happy investors are overconfident as claimed by Chih-Lun Huang and Yeong-Jia Goo in their paper published in 2008. Instead of directly involving investors, the behavior change of investors is observed by keeping in mind few factors. According to some researchers the weather has effect on investor that leads him to perform overconfidently in market and thus market activities fluctuates between Bearish to bullish and Vice Versa. Brown and Cliff argue that investor sentiment "represents the expectations of market participants relative to a norm: a bullish (bearish) investor expects returns to be above (below) average, whatever 'average' may be" (2004, p. 2). Much of the existing literature on behavioral biases indicates the limited research in emerging economies in this area, the dominance of secondary data-based empirical research, the lack of empirical research on individuals (Satish and Nisha, 2014). This research is conducted on data collected from developing economy of Asia from year 2007 to 2016. Although the results are significant but shows that not very strong evidence could be gathered on such claims. Market variables such as daily close and open readings, market volume change, weather change and other climate variables are analyzed to check the accuracy of claim. However the research provokes a desire to check the relation of these unique variables on sector wise and seasonal businesses as somewhat a moderate relationship is evident from the research which shows there are few sectors that might be fashion industry or food and cement industries where investor could be affected by these changes.

Methodology

In the light of literature reviewed, the study tries to check the affect of factors influencing overconfidence. It tests the hypothesis that overconfident investors are happy investors and overconfidence of investor could be determined by using fundamental values. Although overconfidence is behavioral phenomenon but some market variables and climate variables can be helpful to get an idea that how active investors are on that day. For happiness, two proxies "Natural Environment Happiness" and "Investment Atmosphere Happiness" is used. Natural Environment factors include the cloud coverage and temperature changes while Investment Atmosphere Happiness include the Lag of Market turnover, lag of previous day open values and short term loan rates of that day. It was assumed that if cloud coverage is low and temperature is not too high or too low beside a positive change in previous day market turnover, previous day opening readings and

interbank loan offer rates, the investor will feel happy and become overconfident leads to changed values of market turnover.

This study intends to evaluate the relation between investor activity level and one of the irrational investment behaviors i.e. over confidence using data from Pakistan.

Overconfidence, $OC = \text{Market Turnover (M.T.O)}$

Where $M.T.O. = (\text{total number of shares traded over a period} / \text{average outstanding shares at that period}) \text{ ----- } 1$

Happiness variable (H) is divided into Investment Atmosphere Happiness (IAH) and Natural Environment Happiness (NEH)

Whereas

Natural Environment Happiness (NEH) = Cloud coverage, (CC) + Lag cloud Coverage Change, (LagCloud)

or

$(NEH) = CC + \text{LagCloud} \text{ ----- } 2$

Data for both variables have been collected from metrological department of Pakistan from year 2007 Jan to 2016 Sep

While

Investment Atmosphere Happiness (IAH) = Former day returns change $(\Delta R(t-1))$ + Former short term Loan rate $(L(t-1))$ + Former Market turnover $M.T.O(t-1)$ + Former daily Open $(Open(t-1))$.

or

$(IAH) = \Delta R(n-1) + (L(n-1)) + M.T.O(n-1) + (Open(n-1)) \text{ -----}$
 (3) Here $L(t-1) = ((L2-L1)/L1) * 100 \text{ ----- (3a)}$

$L(t-1)$ = short term loan rate in trading day before the current day

$MLR2$ = Margin loan in one trading day before $t - 1$ day.

And $\Delta R(t-1)$, is defined as $(R) = ((R2+R1)/R1) * 100 \text{ ----- (3b)}$

$R1$ = Ending value of Market Returns day before the current day
 $R2$ = Opening value of Market returns day before the current day

Study defines their relationship as below

$OC = \alpha_0 + IAH \alpha_1 + \epsilon \text{ ----- (5)}$

$$OC = \alpha_0 + NEH \alpha_1 + \epsilon \text{-----}(6)$$

$$OC = \alpha_0 + IAH \alpha_1 + NEH \alpha_2 + \epsilon \text{-----}(7)$$

Ten years data of Pakistan stock market from year 2007 to 2016 is used. For weather, daily cloud coverage and average daily temperature in city where the largest stock exchange of country is located. Cloud coverage is measured in OKT having value 0 to 9. 0 is for clear sky while 9 is for sky obstructed from view. Data is collected from Metrological department on daily bases. Stock exchange works 5 days in week from Monday to Friday and also remain close on public holidays while the data of temperature and cloud coverage was on continuous daily basis, 7 days in a week. For this first the required data is filtered than Scattered Plots were created to check the outliers in data. After removing the outliers and public holiday "2268" readings/ data points are used to run the analysis. Two tailed Pearson and Spearman correlation is used to interrogate relationship among the components. Significance of relation is checked on 0.01 and 0.05 Level of Confidence. Regression analysis is used to check the affect of happiness on overconfidence. For autocorrelation Durbin Watson test is used as a diagnostic tool.

Analysis and Results

Figure 01: Daily market Turnover during years 2007-2016

Table 1: Spearman Correlation

Correlations										
Spearman's rho		cloud coverage	Day close	Previous day change	Loan rate	Previous day open	Change of cloud coverage	Previous day temperature change	Previous day short term loan rate	Previous day Turnover
Daily Market turnover	Correlation Coefficient	-.083**	.182**	.081**	-.425**	.179**	.080**	.089**	-.427**	.806**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	0.000
	N	2286	2286	2285	2286	2285	2286	2285	2285	2285

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 1 (a): Pearson Correlation

Correlations									
Daily Market Turnover	cloud coverage	Day close	Previous day change	Loan rate	Previous day open	Change of cloud coverage	Previous day temperature change	Previous day short term loan rate	Previous day Turnover
Pearson Correlation	-.293*	.024	.163**	-.314**	.020	.138**	.129**	-.316**	.825**
Sig. (2-tailed)	.000	.258	.002	.000	.329	.001	.000	.000	0.000
N	2286	2286	2285	2286	2285	2286	2285	2285	2285

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 1 shows the Spearman's correlation among variable. Although the values are not high but these are significantly correlated with each other at .01 level as for all the values P value is less than 0.05.

Table 1(a) is about Pearson Correlation. As Pearson correlation is more restricted measure to check correlation so after applying the test it is examined that although Spearman Correlation is showing a significant low correlation between day close, Pearson correlation measure rejects the relationship as P value is also high i.e. > .05. so we dropped the variables Day close and Previous day open from our Model. However other variables are showing significant relation with our overconfidence proxy i.e. Daily market turnover though the relation is not so strong. When daily loan rate increases investor does not feel comfortable in investing so Daily market activity decreases as shown by the value -.314 which is significant at confidence interval .05 and .01.

Regression Analysis for Daily Volume Turnover, Lag of Temperature Change, Cloud Coverage and Change of Cloud Coverage

Table 2 Regression: Market Turnover as dependent variableVariables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Previous day temperature change, cloud coverage, Change of cloud coverage ^b	.	Enter

a. Dependent Variable: Daily Market turnover

b. All requested variables entered.

Table 2(b): ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	468150095284387650	3	156050031761462560.	120.564	.000 ^b
	Residual	17309161685683874000	2281	7588409331733395.		
	Total	17777311780968262000	2284			

a. Dependent Variable: Daily Market Turnover

b. Predictors: (Constant), Previous day temperature change, cloud coverage, Change of cloud coverage

Table 2(c): Regression Model volume vs Natural Environment Happiness

Model Summary

Model	R	R Square	Adjusted Square	Std. Error of the Estimate
1	.262 ^a	.126	.0185	87111476.47

a. Predictors: (Constant), Previous day temperature change, cloud coverage, Change of cloud coverage

Table 2(d): Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant) cloud coverage	120859727.538	6575235.620		98.381	.000
	Change of cloud coverage	-3183226.271	804604.719	-.082	-3.956	.000
	Previous day temperature change	1845996.518	579493.073	.091	3.186	.001
		1059450.962	566995.249	.053	1.869	.062

a. Dependent Variable: Daily Market turnover

Table 2 ,2(a), 2(b) and 2(d) are generated to check the relationship of Proxy for Happiness: Natural Environment happiness. Table 2(c) includes variable cloud coverage on that day, change of cloud coverage and previous day temperature change based upon the correlation calculated through Pearson correlation measure. However after applying the regression it is concluded that previous day temperature change has no significant effect on Market turnover, in other words, on overconfidence of investor. However Cloud coverage has weak negative but significant relation with Market turnover while change has positively weak but significant relation with daily turnover activities of investor.

Regression: Volume Vs Investment Atmosphere Happiness
Table 3: Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Previous day Turnover, Previous day change, Previous day open, Previous day short term loan rate ^b	.	Enter

a. Dependent Variable: Daily Market turnover

b. All requested variables entered.

Table 3(a): Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.832 ^a	.692	.691	49012756.32960	2.280

a. Predictors: (Constant), Previous day Turnover, Previous day change, Previous day open, Previous day short term loan rate

b. Dependent Variable: Daily Market turnover

Model 3(b): ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1	123001811356713	4	307504528391783	1280.069	.000 ^b
	Regression		3700.000		
	547713064529692		240225028302496		
	Residual		7700.000		
1	177773117809682	2280	8.500		
	Total				
	64000.000	2284			

a. Dependent Variable: Daily Market turnover

b. Predictors: (Constant), Previous day Turnover, Previous day change, Previous day open, Previous day short term loan rate

Model 3 (c): Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	T value	Sig.
	B	Std. Error	Beta		
1	(Constant)	134832531.967 3663853.501	13190195.604 943208.238	10.222 3.884	.000 .000
	Previous day change	-1269.725	.045	-6.761	.000
	Previous day open	-7566934.180	-.138	-8.475	.000
	Previous day short term loan rate	.754	-.182	57.971	.000
	Previous day Turnover		.769		

a. Dependent Variable: Daily Market turnover

Table 3,3(a),3(b) and 3(c) describes the results calculated for Regression analysis of daily turnover volume and Investment Atmosphere Happiness. It includes variables Previous day change, Previous day open, previous day short term loan rate and previous day market turnover. In order to check the autocorrelation Durbin Watson test is applies which is showing value

It shows that data has almost no autocorrelation. Durbin Watson value ranges from 0-4 and value 2 shows no autocorrelation in observed values. All factors are showing P values less than .05 that tells that they have significant effect on model. The Model R value is .832 and adjusted R² value as .692 which means the model is good to explain the relationship as in general R value is between 0 to 1.

Regression (Complete Model)

Overconfidence = Investment Atmosphere Happiness + Natural Environment Happiness

Table 4: Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Previous day Turnover, Previous day open, cloud coverage, Change of cloud coverage, Previous day short term loan rate, Day session average close ^b	.	Enter

a. Dependent Variable: Daily Market turnover

b. All requested variables entered.

Table 4(a) Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.837 ^a	.700	.700	48356329.81245	2.266

a. Predictors: (Constant), Previous day Turnover, Previous day open, cloud coverage, Change of cloud coverage,

Previous day short term loan rate, Day session average close

b. Dependent Variable: Daily Market turnover

Table 4 (b): ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	124505854871520 77000.000	6	2075097581192012800.	887.4 25	.000 ^b
	Residual	532672629381618 4800.000	2278	2338334632930722		
	Total	177773117809682 62000.000	2284			

a. Dependent Variable: Daily Market turnover

b. Predictors: (Constant), Previous day Turnover, Previous day open, cloud coverage, Change of cloud coverage, Previous day short term loan rate, Day session average close

Table 4 (c): Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	144388630.008	13366014.119		10.803	.000
cloud coverage	-2529636.895	449037.207	-.065	-5.633	.000
Day session average close	20220.209	3517.848	2.198	5.748	.000
Previous day open	-21566.596	3522.461	-2.341	-6.123	.000
Change of cloud coverage	573009.969	235912.103	.028	2.429	.015
Previous day short term loan rate	-7771796.187	881338.624	-.187	-8.818	.000
Previous day Turnover	.745	.013	.761	57.546	.000

a. Dependent Variable: Daily Market turnover

4 (d): Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	5359620.5000	470409824.0000	138053851.8630	73832374.77762	2285
Residual	-244307040.0000 0	226207632.0000 0	.00000	48292772.72499	2285
Std. Predicted Value	-1.797	4.501	.000	1.000	2285
Std. Residual	-5.052	4.678	.000	.999	2285

a. Dependent Variable: Daily Market turnover

Finally the tables 4, 4(a), 4(b), 4(c) and 4(d) show the Model statistics and analysis values. According to the table 4(a) the R value of Model is .837 and the adjusted R value is .7 which show a significant good fit at .01 and .05 level of confidence interval. Durbin Watson Value of Model is also acceptable i.e. 2.266.

Conclusion

The study assumed that investors are more confident when there is good weather (Model 1) and an optimistic investment atmosphere stimulates stock trading (Model 2). The results show that when the sky is not too cloudy (negative value of coefficient) the activity of investor is high as suggested by Kumar & Nish, (2008) that investment atmosphere affects mood and mood affects stock trading. When there is a happy investment atmosphere, investors are more optimistic, able to bear higher risk, and likely to act in a way that causes overconfidence. Frequent trading causes investors to assets at higher prices. However the short term loan rates and previous day loan rates also affect the investment mood of investors, they tend to be less active and decrease trading on days having high rates. However, the significant values although showing low correlation suggest that nontechnical factors like weather, temperature or cloud coverage change are not strongly effecting investor's overconfidence in all sectors but they might have strong influence on few sectors where season has effect on business activities.

Limitations and Future Scope

The study is based on single country data. Moreover the study is limited to secondary quantitative data, qualitative measures like survey, questioners and primary data cross sectional data can increase the parsimony of research under discussion. Sector wise division of shares traded could also help to get a better understanding of results. Other irrational investor behaviors, such as overreaction and disposition effect rarely involved with investor sentiment in past studies can be subjects for further research. In addition, fear and regret could be included in future studies.

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