Investor and Manager Overconfidence Bias and Firm Value: Micro-level Evidence from the Pakistan Equity Market

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ABSTRACT

This study examines the effect of investor and manager overconfidence bias on firm value of dynamic panel of 432 firms listed at Pakistan Stock exchange. To the best of our knowledge, this is the first effort that contemplates the micro-level dataset in context of an emerging economy spanning from 2013 to 2017. The empirical findings reveal that overconfident investors in Pakistan stock market positively and significantly drive the firm value. However, overconfident manager bias lacks the precise direction in explaining the firm value. These findings are consistent with literature that firms with overconfident investors and managers are characterized by high profitability, cash flows and prefer to use debt financing. Although the findings of the study are robust at the firm level, yet it is difficult to generalize the outcome of the single study, therefore much more to be explored in this context.

Keywords: Investor Overconfidence Bias, Manager Overconfidence Bias, Firm Value
JEL Classifications: G20, G11, G32

1. INTRODUCTION

Overconfidence is embryonic behavioral finance concept having a distinctive position in both financial and psychological theory. Overconfidence bias causes individuals' overestimation in their skills and knowledge which raises sentiment that they possess best potential to control events and problems relative to counterparts (Nofsinger, 2001). Existing literature on overconfidence bias addresses the effect of investors' behavior on macro level, i.e., security trading volume, volatility, momentum, portfolio performance and speculative bubbles. However, there is no such an authentic study who can test the impact of this behavioral bias on the firm level except study of (Nikolic and Yan, 2014). In our study, we examine the impact of investor and manager overconfidence biases on the firm value considering the firm-level dataset. Investor and manager biases are the subject of much research in the recent financial literature. Still, there is very little analysis of overconfidence bias on firm value. The lack of research in this area is astonishing. Because firm value is the essential and fundamental concepts in finance due to its implications for market efficiency, capital allocation, and investments.

Intuitively, overconfidence bias among investors tends to overestimate the precision of their information and underestimate risk associated with assets, which irrationally stimulates their demand for risky securities. This increased demand misprices the security in the absence of offsetting arbitrage position (Nikolic and Yan, 2014). In their study, Nikolic and Yan (2014) find the significant positive relation between investor overconfidence and firm value among both high information uncertainty firms and low information uncertainty firms. They choose U.S. equity mutual fund managers as an investor and use six proxies based on the managers' characteristics (manager's gender, management structure, portfolio turnover, portfolio concentration, prior performance, and idiosyncratic portfolio risk) for the construction of overconfidence index.

So, our study is unique from the study of (Nikolic and Yan, 2014) in four distinct ways. First, our data is from the developing country like Pakistan. Second, we include all the investors of the market for the year of 2013–2017 for 432 listed firms of Pakistan Stock exchange (PSX). Third, we extend the sample of our study, by

adding the managers' behavior of all traded firms during the stated time frame. In last we examine, how overconfidence bias, investors and managers, effect the firm value. To fill this literature gap, we divide our study into four parts. Frist part of the study hypothesis the presence of overconfidence bias in the equity market, second part hypothesis the impact of investor overconfidence bias on the firm value, third part hypothesis the managers' overconfidence bias and its effect on firm value and last part hypothesis the impact of both investors and managers' overconfidence bias on the firm value. Results of our study incorporate the presence of investors and managers' overconfidence bias in Pakistan equity market. Additionally, the results of our study are consistent with the findings of (Nikolic and Yan, 2014) and (Liu and Taffler, 2008), which shows investor overconfidence bias positively and significantly affect the firm value and manger's overconfidence bias has and negative and insignificant impact on the firm value.

2. BRIEF LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Literature on overconfidence bias with particular focus on macro-level shows that investors' overconfidence bias generates high trading volume in financial markets. Overconfident investors tend to overestimate the quality of their knowledge and skill (Odean, 1998). This induces them to trade excessively, judge differently than other market participants, underestimate the risk and invest in highly risky assets (Daniel et al., 1998; De Bondt and Thaler (1995); Glaser and Weber, 2007). They rely on private information than the public information and give credit themselves for past success and claims outside factors for their failure (Gervais and Odean, 2001). Moreover, the degree of investor overconfidence bias is different in different gender and experience. Male and inexperienced investors suffer more than the female and inexperienced participants (Barber and Odean, 2001; McKenzie et al., 2008). The study of Statman et al. (2006) exhibit that positive relation between trading activity (turnover) and the market lagged returns shows the presence of overconfidence bias in the security market. High market returns leads to high trading activity which make investors more confident about the precision of their private information. Following with (Gervais and Odean, 2001; Odean, 1998; Statman et al., 2006), we predict a positive and significant lead-lag relationship between market returns and trading activity as a proxy for presence of overconfidence bias. Therefore, we postulate following hypothesis;

H_1: Trading activity is positively related to market lagged return

Investor considers the firm value while making the investment decision. Market value of security reacts on the frequency of investor trade. Therefore, high trading activity of overconfident investor in a specific stock positively affects the firm value. As with Nikolic and Yan (2014), we examine a positive and significant impact of overconfidence bias on the firm value. We formulate following hypothesis to test this relationship.

H_2: Investors overconfidence bias is positively related to firm value.

Overconfidence bias is not limited to the investors only. It is also attributable to the manager's behavior during their investment decision. Heaton (2002) and Malmendier and Tate (2008) find managerial overconfidence bias is the cause of investment deviations, investment sensitivity, and overestimation of projects' returns. Ahmed and Duellman (2013) show that overconfident managers intended to delay in loss recognition and generally not follow conservative accounting and use more debt based capital structure (Hersh, 2001), which turns to affects the firms' value negatively (Liu and Taffler, 2008). Hence, we construct the following hypothesis;

H_3: Manager's overconfidence bias is negatively related to firm value.

Firm value is most important and fundamental concept in finance due to its wide implications for market efficiency, capital allocation, and investments. Investor considers the firm value while investing and trading the security. It is good indicator for investor and mangers to know about the business accounting value of at market price. Nikolic and Yan (2014) find positive and significance association of firm value with investor overconfidence. Morck et al. (1988) and DeAngelo et al. (2010) find the market to book ratio (M/B) or Tobin Q as a good proxy to measure the firm performance. Managerial overconfidence bias causes investment deviations, investment sensitivity, and overestimation of projects' returns which negatively affects the firms' value.

To examine the combine effect of investor and manager overconfidence bias on the firm value, we test the following hypothesis;

H_4: Investor and Managers' overconfidence bias significantly explain the firm value.

3. METHODOLOGICAL APPROACH

To examine the effect of investors and managers' overconfidence bias on firm value, the theoretical association between these variables can functionally express as;

$$FV_t = f(IOB_t, MOB_t, CF_t, FL_t, FS_t, ROA_t) \qquad (1)$$

Equation (1) can be transformed into mathematical expression;

$$FV_t = \beta_0 + \beta_1 IOB_t + \beta_2 CF_t + \beta_3 ROA + \beta_4 FL_t + \beta_5 FS_t + \gamma + \epsilon \qquad (2)$$

$$FV_t = \beta_0 + \beta_1 IOB_t + \beta_2 CF_t + \beta_3 ROA + \beta_4 FL_t + \beta_5 FS_t + \gamma + \epsilon \qquad (3)$$

$$FV_t = \beta_0 + \beta_1 IOB_t + \beta_2 MOB_t + \beta_3 CF_t + \beta_4 ROA_t + \beta_5 FL_t + \beta_6 FS_t + \gamma + \epsilon \qquad (4)$$

3.1. Description of Variables
3.1.1. Dependent variable
Firm vlaue is the depenent varible of this reseacrh, for the measruement of firm value we use three different method of market to book value (MB) or Tobin's Q as a proxy of firm value. For Tobin's Q1 and Tobin's Q2, we follow the methodology of Chung and Pruitt (1994) and Malmendier and Tate (2005).

Table 1: Explanation of variables

Variables	Name	Proxy	Explanation
Dependent variable	Firm value $FV_{(MB)\,t}$	Market to book ratio	Market value of equity divided by book value of equity
	$FV_{(Tobin's\,Q1)\,t}$	Tobin's Q1	Number of outstanding common shares multiplied by the share price at the end of the fiscal year plus liquidating value of preferred stock plus debt[1] divided by total assets
	$FV_{(Tobin's\,Q2)\,t}$	Tobin's Q2	Value of total assets plus total equity minus the book value of total equity[2] divided by total assets
Independent variable	Investor overconfidence	VAR model	Bias exist if positive and significant relation of trading activity with lead lag market returns occurs otherwise not
	IOC	Aggregate investor overconfidence Index	Firm level bias exits if St[3] is greater than Wt[4] of value wieghted stock otherwise not
	MOC	Overinvestment in assets model	Bias exist if residual of regression of assest growth on sales grwoth is positive otherwise not
Control Variable	Cash flow to assets (CF)$_t$	Cash flow at time t	Cash flow to Assets ratio
	Firm leverage (FL)$_t$	FL at time t	Total debt to equity ratio
	Firm size (FS)$_t$	FS at time t	Natural log of total assets
	Return on assets (ROA)$_t$	RA at time t	Net income to average total assets

MOC: Managers overconfidence, VAR: Vector autoregressive

3.1.2. Independent varibles
Investors and managers bias are two independent variable of this study. We adopt two methods, Vector autoregressive (VAR) modle and aggregate investor overconfidence, of Statman et al. (2006) and Meier (2018) for presence on overconfidence bias in the equity market and individual firm level bias of investors overconfidence respectivley. For the measuremnet of managers overconfidence bias, we follow overinvestment in assest model of Ben-David et al. (2010).

3.1.3. Control variables
We use following control variable as suggested by the Chen and Lin (2013) such as cash flow (CF) to assets, firm leverage (FL), firm size (FS) and return on assets (RA).

Table 1 shows the complete list of variables, proxy and explantion of proxy.

3.2. Sample Selection, Study Period and Data Structure
Until 31st December 2017, there were a total 560 number of firms listed in PSX. Out of which 432 qualified to our criteria, which is described below;
1. The firms whose annual reports are publicly available over the study period.
2. The firms maintain same fiscal year during the study period.
3. The firms actively traded during the reported period.

The selection of study period is always a challenge and subject to some constraints. The subprime crisis of the United States spillovers to all those economies, which were either trading partner or receiving debt. Pakistan was amongst the list of debt receivers and this crisis encompassed Pakistan economy instantly, resulting

a sharp decline of economic growth to just 3.6% from 49.9%[5]. The stock market crash by the end of 2008 put the economy under further depression. The stock market crash shacked the whole economy, and there was a desperate need to introduce reforms to regulate and tighten the stock market operations to revive the effect of 2008. In this scenario, 2009 was the worst point in time when economic activities condensed to the historical lowest level. The policy actions enable the economy to revive that took around 2–3 years gradually, and 2012 was considered a bit reasonable time when investors gained back the confidence. This year was important in the history of PSX by two reasons; firstly, parliament passed the PSX act (2012) to win the investors' confidence for tightening and improving the measures of corporate governance and reforms to prevent such a reoccurrence of 2008 crises. Secondly, 2012 is also considered best year for economic growth after 2008 economy shock.

In 2012, Pakistan stock market particularly KSE (Karachi Stock Exchange) outer-performed to touch 48% of the market gain. However, a shock caused this gain to decline by 1.7% in 2013. Again in 2014 the growth rate increased a little bit and reached at 40. 5% of GDP. Whereas 2015 and 2016 were the continuous growth period for the economy with growth sustained at 40.4% and 40.71% of GDP respectively. In January 2016, another

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1 Total current assets minus total current liabilities plus total inventories plus total long-term debt
2 Total assets minus total liabilities minus liquidating value of preferred stock deferred tax and investment tax credits
3 Strength of stock is measured by value weighted means of strength impulse at time t.
4 Cross sectional standard deviation of strength impulse with average of strength impulse at time t.
5 Information collected form BBC news; http://www.bbc.com/news/business-40081530.

significant reform was approved by Security and Exchange Commission of Pakistan to merge all the trading floors of stock market such as Karachi stock exchange, Lahore stock exchange, and Islamabad stock exchange into one stock market, the Pakistani stock exchange. In June 2017 PSX enter the Morgan Stanley Capital International Emerging Markets Index (MSCI) which consists of 23rd high growth economies. This study selected to examine the investor and manager overconfidence bias during 2013–2017 keeping in view the relatively smooth performance of PSX.

Over the study period, we utilize daily stock return data for 432 firms spread across 35 different sectors from PSX and firm value indicators from the statistical division of the State Bank of Pakistan (annual reports) to compute these biases and further estimation.

3.3. Measurements of Overconfidence Bias
3.3.1. Investor overconfidence bias
We measure investor overconfidence in two ways; firstly using Statman et al. (2006) VAR model to test the presence of overconfidence behavior in the stock market. Secondly, we use Meier (2018) index for firm-level measurement of investor behavior at different time intervals. Statman et al. (2006) unrestricted VAR model predict the overconfidence bias among investor if the market volume has a lagged relation with market returns. Whereas, Meier (2018) uses strength and weight of evidence based on the current investor performance with the long-term performance. The presence of overconfidence occurs when the strength of a value-weighted stock is higher than the weight of the stock. This method is much reliable to find out the investor confidence level even at the firm level at the different period as compared to Statman et al. (2006), VAR method. Because if we use VAR to find out the relation of past return on the current trading volume of each firm, it would be voluminous in results which would not be appropriate to find out overconfidence bias at the firm level. Although, this two method can also measure the overconfidence bias (overall and firm level) our purpose to use both models are to refine the results within the limited period deeply. The secondary aim of taking these two methods is for robustness.

3.3.2. VAR model
In VAR model we use two endogenous variables, i.e., market return (RET) and turnover (TURN) and two exogenous variables such as market volatility (Mvol) and dispersion (Disp) as employed by (Statman et al., 2006).

For endogenous variable; market return (RET) and turnover (TURN) we use the following measures[6].

$$RET_t = \ln\left(\frac{P_t}{P_{t-1}}\right) \quad (5)$$

$$TURN_t = \left(\frac{ST_t}{No_t}\right) \quad (6)$$

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6   Table 2 for symbols explanations.

For exogenous variables; market volatility (Mvol) and dispersion (Disp) we follow the measurements of French et al. (1987), mentioned below

$$Mvol_t = \sum_{t=1}^{T} r_t^2 + 2\sum_{t=1}^{T} r_t r_{t-1} \quad (7)$$

$$Disp_t = \sqrt{\sum_{t=1}^{T}\left[\frac{(x-\mu)^2}{N_t}\right]} \quad (8)$$

To run the VAR model, we use unit root; Augmented Dickey Fuller test (ADF) and Phillips Perron test (PP) for stationary data. Results of unit roots report that data has stationary at level. After the stationary test, we use VAR model to get the results of the presence of overconfidence. VAR model has the basic equation

$$Y_t = \alpha + \sum_{k=1}^{K} A_k Y_{t-k} + \sum_{l=0}^{L} B_l X_{t-1} + \varepsilon_t \quad (9)$$

To determine suitable lag length, we use Akaike Information Criterion model, which reports as k =3 and l = 2.

The VAR model show one equation for each one dependent variable. Each equation of model has lagged values of all dependent variables. VAR model formulation for this research is as follows

$$\begin{bmatrix} TURN_t \\ RET_t \end{bmatrix} = \begin{bmatrix} \alpha TURN \\ \alpha RET \end{bmatrix} + \sum_{k=1}^{3} A_k \begin{bmatrix} TURN_{t-k} \\ RET_{t-k} \end{bmatrix} + \sum_{l=0}^{2} B_l \begin{bmatrix} Mvol_{t-l} \\ Disp_{t-l} \end{bmatrix} + \begin{bmatrix} \varepsilon TURN_t \\ \varepsilon RET_t \end{bmatrix} \quad (10)$$

Table 2: Explanation of symbols

Model	Variables	Symbols	Explanation
VAR model	Endogenous variable	RET_t	Market return at time t
		P_t	Current day price
		P_{t-1}	Last day price
		$TURN_t$	Turnover
		ST_t	Value shares traded at time t
		No_t	No of outstanding shares
	Exogenous variables	$Mvol_t$	Market volatility at month t
		$r_t = x$	Return of security at day t
		$T = N_t$	Number of days in a month
		$Disp_t$	Dispersion for the month t
	VAR equation	μ	Sample mean at month t
		Y_t, X_t	(n×1) vector of endogenous and exogenous variables
		A_k, B_l	Coefficients vector of endogenous and exogenous variables
		ε_t	n×1 vector of residuals
		k, l	Length lag of endogenous and exogenous variables

VAR: Vector autoregressive

The positive and highly significant association between market turnover and lagged market returns provides the evidence of overconfidence of investors. T-values obtained to explain the significance of the causal relationship (Table 2).

3.3.2.1. Aggregate investor confidence index

Meier (2018) index is conceptually consistent with Griffin and Tversky (1992) to examine the investor confidence level based on the strength and weight of evidence. Strength is measured by an investor's recent performance with his long-term average performance. Therefore, the strength variables can be construed as the extremeness of evidence and are defined as the difference between value-weighted market return in time t and the average return in a baseline period v, which an investor uses as an anchor in a given market state to define the expected return. The baseline period return is computed as the average value-weighted market return over a given number of days, i.e., 120 days (6 months, 5 days a week) in our study. Thus, strength of a stock in an index can be termed as follows:

$$s_{i,t} = r_{i,t} - \overline{r}_{i,v,t} \tag{11}$$

where $s_{i,t}$ is the impulse strength of security i in period t, $r_{i,t}$ is the return of security i in period t and $r_{i,v,t}$ is the simple moving average of stock i in baseline period v, the lookback period used to compute the moving average at time t.

For measurement of weight variable, Meier (2018) uses the standard error of the strength variable. We consider the rationale that if the strength impulses response is high, more investors will outperform. Following this is the computation of weight variable W_t, the reciprocal of cross-sectional standard deviation of strength impulse for each security i in at time t.

$$W_t = \frac{1}{\sqrt{\frac{\sum_i^n (s_{it} - s_t)^2}{n-1}}} \tag{12}$$

St is the value-weighted means of the strong impulse and computed as follow

$$S_t = \sum_i^n \frac{m_{i,t} s_{i,t}}{\sum_i^n m_{i,t}} \tag{13}$$

Meier (2018) documents that overconfidence bias exists among investor if the strength variable is higher than the weight variable, which means if the investor response of the vividness of evidence is higher than its reliability. Which shows clear information of investor overconfidence bias. By this information, we construct our index IOC of each firm from each sector[7] and assign dummy values 1 for overconfidence and 0 no overconfidence.

3.3.3. Manager overconfidence measurement technique

There are many measures for managers overconfidence, i.e., stock option and earning forecast (Malmendier and Tate, 2005), but

we use overinvestment in assets as a proxy to test the managers' overconfidence bias. Because in developing country like Pakistan employee stock option[8] and earning forecast[9] is not available for the entire firm. Therefore, overinvestment in assets proxy is the best measure of this limitation. Based on the stated proxy, we construct the MOC index on the coefficient of residuals from the regression of the assets growth on sales growths. We assign dummy variable 1 if the residuals are positive and 0 otherwise. Assets growth in sales based regression equation is as follow:

$$Ag_{i,t} = \beta_0 + \beta_1 Sg_{i,t} + \varepsilon_{i,t} \tag{14}$$

In this equation;
$Sg_{i,t}$ = Sales growth of company i at time t.
$AG_{i,t}$ = Assets growth of company i at time t.
$\varepsilon_{i,t}$ = Regression residuals of company i at time t. Dummy variable 1 present positive value of residuals other wise 0.

Calculation of assets and sales growth are:

$$Ag_{i,t} = \frac{TA_{i,t} - TA_{i,t-1}}{TA_{i,t-1}} \tag{15}$$

$$Sg_{i,t} = \frac{S_{i,t} - S_{i,t-1}}{S_{i,t-1}} \tag{16}$$

Where, $S_{i,t}$ is the sales amount of company and $TA_{i,t}$ is the amount of total asset i at fiscal year t.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1. Descriptive Statistics, Correlation and Matrix Stationarity Test

Table 3 reports the descriptive statistics and correlation matrix corresponding to all variables. The results show mean, maximum, minimum and standard deviation of the market to book ratio, Tobin Q1, Tobin Q2, CF, FL, firms size and RA. Descriptive of a dummy variable, i.e., investors and managers' overconfidence have no meaning because of binary in nature. The correlations between all variables during research period are reported in second part of Table 1. The correlations matrix shows correlation results for each pair respectively. The MB has a positive correlation among all variable whereas Tobin Q1 and Tobin Q2 have a negative correlation with FL and FS. Furthermore, Tobin Q2 is also negatively correlated to MOC.

Table 4 presents the stationarity results of Levin, Lin and Chu, Im, Pesaran and Shin W-stat, ADF - Fisher Chi-square and PP - Fisher Chi-square test. The null hypothesis assumes presence of unit-root if corresponding P > 0.05, against the alternative which holds that series is free from unit-root. We find no evidence to accept null hypothesis of existence of unit-root for all the variables. This

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7   Pakistan stock market has 35 sector which are heterogeneous characteristically. So, in this study we choose individual sector and find the strength and weight of each security at time t.

8   Only 9 companies are registered in the Security and Exchange Commission of Pakistan (SECP) under the employee stock option scheme among 500 plus companies.

9   SECP makes mandatory for each firm to show earning forecast in the prospectus from the 2015.

Table 3: Descriptive statistics and correlation matrix

	MB	Tobin Q1	Tobin Q2	IOC	MOC	CF	FL	FS	ROA
Mean	2.6717	1.4585	1.1811	0.1630	0.0333	0.0417	1.8384	7.6200	3.7837
Median	1.0050	1.0081	0.7434	0.0000	0.0000	0.0200	0.8100	8.0256	1.9502
Maximum	89.6900	14.7073	14.7026	1.0000	1.0000	0.5600	27.3400	13.9211	82.9781
Minimum	−11.6000	0.0168	−2.4354	0.0000	0.0000	−0.4600	−21.2600	2.2844	−49.9974
SD	7.4722	1.6434	1.7743	0.3694	0.1795	0.1184	4.4498	2.7747	11.5961
Skewness	7.7451	4.5023	3.8540	1.8251	5.1995	0.2872	2.4683	−0.4411	1.35759
Kurtosis	77.4049	29.6383	24.0675	4.3311	28.0345	6.3760	17.7638	2.9136	14.3365
MB	1.0000								
MB1994	0.4388	1.0000							
MB2005	0.3982	0.9181	1.0000						
IOC	0.0360	0.0641	0.0169	1.0000					
MOC	0.0154	0.0001	−0.0035	0.0019	1.0000				
CF	0.1905	0.1994	0.2284	−0.0488	−0.0514	1.0000			
FG	0.0097	0.0069	−0.0114	−0.0069	0.0759	0.0120			
FL	0.3092	−0.0455	−0.0940	−0.0043	0.0181	0.0221	1.0000		
FS	0.0342	−0.0233	−0.0537	−0.0266	0.0555	0.1574	0.2232	1.0000	
ROA	0.1654	0.3222	0.4203	−0.1530	0.0582	0.3498	−0.0881	0.1151	1.0000

Table 4: Panel unit root test

	Levin, Lin and Chu t*	Im, Pesaran and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
IOC	-	-	-	-
MOC	-	-	-	-
MB	−133.64(0.0000)	−27.88(0.0000)	1232.28(0.0000)	1548.49(0.0000)
MB1994	−219.98(0.0000)	−35.56(0.0000)	1436.22(0.0000)	1689.43(0.0000)
MB2005	-304.76(0.0000)	-40.39(0.0000)	1300.30(0.0000)	1528.07(0.0000)
FG	−21.87(0.0000)	−10.54(0.0000)	1135.07(0.0000)	1320.53(0.0000)
FL	−58.14(0.0000)	−12.34(0.0000)	1050.41(0.0000)	1215.34(0.0000)
FS	−72.85(0.0000)	−9.74(0.0000)	938.24(0.0016)	1153.26(0.0000)
CF	−58.84(0.0000)	−18.27(0.0000)	1349.83(0.0000)	1583.38(0.0000)
ROA	−32.05(0.0000)	−26.93(0.0000)	1130.57(0.0000)	1393.38(0.0000)

*, **, *** denote test statistics significant at 1%, 5%, and 10% respectively, while P value in parenthesis. Null: Unit root (assumes common unit root process)

implies that the variables under study are stationary at level and further estimation is appropriate.

4.2. Overconfidence Bias in Equity Market

Table 5, set A exhibits significantly and positively relation between turnover and lagged turnover. In particular, recent turnover has very strong relation on the first lag TURN (−1) at t-value (3.6644) that is significant with 99% level of confidence interval. Second lag and third lag, TURN (−2) and TURN (−3) also has a significant positive relation at 99% confidence interval at t-value (2.5965) and (2.3188) respectively. Current return (RET), also has positive significant relation with TURN (−1), TURN (−2) and TURN (−3) at 5%, 10% and 5% respectively. Lee and Swaminathan (2000) argue that future returns can be predicted by past volume. Therefore, our results endorse similar findings market data instead of individual security. Set B contains three lagged value of returns RET (−1), RET (−2) and RET (−3), and shows turnover (TURN) has a positively significantly related to the all three lagged of return at 5%, 10% and 1% respectively. Set C shows market volatility (Mvol) and its two lagged value relation with turnover and return. Market volatility (Mvol) has positive and significant relation with turnover and negative relation with return at 10% and 10% respectively. This relation of volatility implies that if volatility increases the turnover increases and return of the market decreases. First and second lag of market volatility Mvol (−1) and Mvol (−2) also generate the similar results. These are consistent with Karpoff (1987) and French et al. (1987) the

volume-volatility relationship. Set D reports the relation of lagged value of Dispersion (Disp) with turnover (TURN) and return (RET). Dispersion lagged value have negative significant and insignificant relation with turnover and market return. If dispersion increases in returns, the market turnover decreases and vice versa. Results are consistent with the first hypothesis; that the equity market participant has overconfidence bias during the study period.

4.3. Overconfidence Bias and Firm Value

Impact of Investor and manager's overconfidence bias on firm value can be analyzed through regression results. Following are regression results based on hypothesis 2–4.

4.3.1. Regression results

In Tables 6-9, we use market to book ratio (MB), Tobin Q1 and Tobin Q2 as proxies of firm value. For regressing the results on the data, we use random effect in regression analysis as guided by the Hausman Test that assumes rejection of fixed effect hypothesis under significant p-value. Hence, we failed to reject the null hypothesis "the random effect is appropriate."

4.3.1.1. Investor overconfidence and firm value

Table 6 shows positive and 1% significant relation of investor overconfidence on firm value by all three proxies at t-statistics 3.2990, 4.9680 and 3.3062 respectively by controlling the other factors. Control variable show different result with different

Table 5: Vector auto regressive estimation

	Set A			Set B			Set C			Set D					
	TURN lagged value			RET lagged value			Mvol lagged value			Disp lagged value			C	R²	F
	TURN (−1)	TURN (−2)	TURN (−3)	RET (−1)	RET (−2)	RET (−3)	Mvol	Mvol (−1)	Mvol (−2)	Disp	Disp (−1)	Disp (−2)			
TURN															
Coefficient	0.0239	0.0169	0.0151	0.0417	0.0958	0.1456	0.0318	−0.4754	0.301	−2.4389	−1.3183	−3.666	0.1429	0.5	2.1356*
S.E.	(0.0065)	(0.0065)	(0.0065)	(0.0183)	(0.0489)	−(0.0492)	−(0.0110)	−(0.1157)	(0.4250)	−(1.2439)	−(1.2439)	−(1.2438)	−(0.0066)		
t-stat	(3.6644)***	(2.5965)***	(2.3188)**	(2.2855)**	(1.9596)*	(2.9620)***	(2.8909)***	(4.1091)***	−0.7082	−(1.9606)***	−1.0598	−(2.9474)***	(11.718)***		
RET															
Coefficient	0.001	0.0009	0.0144	−0.032	−0.0309	0.0167	−0.0775	−0.004	−0.0025	−0.0199	−0.004	−0.0025	0.0016	0.5	3.7942*
S.E.	−0.0005	−0.0005	−0.0065	−0.0066	−0.0066	−0.0066	−0.0309	−0.0316	−0.0319	−0.0309	−0.0316	−0.0319	−0.0005		
t-stat	(2.0030)**	(1.8516)*	(2.2085)**	(4.8781)***	(4.6788)***	(2.5211)***	(2.5093)***	(0.1277)	(0.0784)	(0.5093)	(0.1277)	(0.0784)	(3.3677)***		

measures of firm value. MB shows that CF, FL and ROA has the direct positive and 1% significant relation expect FS. Whereas, Tobin's Q finding shows FL also has negative impact which means increase in debt financing will decrease the firm value of investor overconfidence biased firms. Findings of investor overconfidence bias on firm value is consistent with our second hypothesis that investors overconfidence bias is positively and significantly related to firm value. Whereas, negative relation with FS and FL show that firm is investing in short term projects

Table 6: Investor overconfidence and firm value

Random effects test results			
Dependent variable	MB	Tobin Q (1)	Tobin Q (2)
IOC	1.4386***	0.4821***	0.3313***
	(3.2990)	(4.9680)	(3.3062)
CF	8.6217***	1.5984***	1.7008***
	(6.3737)	(5.3101)	(5.4714)
FL	0.5676***	−0.0017	−0.0149*
	(16.5250)	(−0.2250)	(−1.8819)
FS	−0.2126**	−0.0439***	−0.0714***
	(−3.7670)	(−3.4991)	(−5.5060)
ROA	0.1069***	0.0439***	0.0618***
	(7.7086)	(14.2236)	(19.3993)
Constant	2.2496***	1.4852***	1.3938***
	(4.9777)	(14.7680)	(13.4201)
R-squared	0.1612	0.1413	0.2144
F-statistic	45.9197***	39.2944***	65.1915***
Hausman test	3.7360	2.0127	1.9146
Fixed effect	No	No	No
Random effect	Yes	Yes	Yes
N	2160	2160	2160

*, **, *** denote significant at 10%, 5%, and 1% respectively, while t-statistics is shown in parenthesis

Table 7: Manager's overconfidence bias and firm value

Random effects test results			
Dependent variable	MB	Tobin Q (1)	Tobin Q (2)
MOC	0.5498	−0.0857	−0.1583
	(0.6627)	(−0.4628)	(−0.8300)
CF	8.5993***	1.5548***	1.6575***
	(6.3221)	(5.1200)	(5.3029)
FL	0.5654***	−0.0023	−0.0152
	(16.4226)	(−0.2963)	(−1.9182)
FS	−0.2269***	−0.0478***	−0.0737***
	(−4.0133)	(−3.7846)	(−5.6720)
ROA	0.1003***	0.0420***	0.0607***
	(7.2550)	(13.6188)	(19.0945)
Constant	2.6041***	1.6055***	1.4770***
	(5.9208)	(16.3508)	(14.6137)
R-squared	0.1572	0.1315	0.2106
F-statistic	44.5431***	36.1647***	63.7503***
Hausman test	4.7119	2.9397	2.7858
Fixed effect	No	No	No
Random effect	Yes	Yes	Yes
N	2160	2160	2160

*, **, *** denote significant at 10%, 5%, and 1% respectively, while t-statistics is shown in parenthesis

at the cost of long term project and use debt financing for investment this result is consistent with the finding of Nikolic and Yan (2014) and (Hersh, 2001) and accepting the second hypothesis that investor overconfidence bias is positively related to firm value.

Table 8: Investors and managers' overconfidence and firm value

Random effects test results			
Dependent variable	MB	Tobin Q (1)	Tobin Q (2)
IOC	1.4361*	0.4825***	0.3321***
	(3.2927)	(4.9715)	(3.3137)
MOC	0.5251	−0.0940	−0.1640
	(0.6343)	(−0.5104)	(−0.8620)
CF	8.6918***	1.5859***	1.6789***
	(6.4033)	(5.2499)	(5.3826)
FL	0.5673***	−0.0017	−0.0148*
	(16.5113)	(−0.2173)	(−1.8687)
FS	−0.2145***	−0.0436***	−0.0708***
	(−3.7947)	(−3.4666)	(−5.4523)
ROA	0.1058***	0.0440***	0.0628***
	(7.5595)	(14.2167)	(19.5579)
Constant	2.2472***	1.4856***	1.3945***
	(4.9717)	(14.7691)	(13.4258)
R-squared	0.1614	0.1414	0.2147
F-statistic	41.3565***	32.2206***	58.7396***
Hausman Test	3.7393	2.0190	1.9219
Fixed effect	No	No	No
Random effect	Yes	Yes	Yes
N	2160	2160	2160

*, **, *** denote significant at 10%, 5%, and 1% respectively, while t-statistics is shown in parenthesis

4.3.1.2. Managers' overconfidence and firm value

Table 7 shows non-monotonic result of managers' overconfidence bias on the firm value. MB shows the positive impact on overconfidence bias on the firm value whereas results from Tobin's Q exhibits the negative impact. The reason behind the difference in result is that MB is based on the simple calculation on the market to book value of equity and do not give the clear direction of manager's overconfidence bias on firm value. Firm value from manager's aspect also need to add the debt value and total assets to get the more accurate picture of firm performance. So, Tobin's Q is better proxy for firm value. Firm value by MB has 1% positive significance on CF, FL and ROA except FL which has 1% negatively significant on the firm value which means any change in control variable will change the firm value in same direction except FL.

Results of Firm value on control variables by Tobin's Q are different from MB, it shows that firm value decrease with an increase in size and FL. Which means those firms whose values are negatively affected by manger's overconfidence are investing in short term project at the cost of long term projects. These firms prefer to do investment outside instead of installing the new project in company. High cost and low efficiency of capital assets will adversely affect the firm value in the way of depreciation and amortization. On other hand debt financing also increase the financial cost and increase insolvency risk, if the financial cost of debt is more than the benefit of tax shield. Moreover, negative relation may also be reason of agency problem. However, negative impact of manager's overconfidence bias on the firm value is consistent with the meaning of third hypothesis that manager's overconfidence bias is negatively related to firm value.

Table 9: Investors and managers' overconfidence bias and firm value with respect to various time intervals

	Dependent variable								
	2013–14			2015–16			2017		
	MB	Tobin Q1	Tobin Q2	MB	Tobin Q1	Tobin Q2	MB	Tobin Q1	Tobin Q2
IOC	2.1008**	0.5881***	0.5071***	1.0349**	0.4641***	0.2744**	−0.1018−0.1192)	0.0337	0.002
	(2.3613)	(3.6232)	(3.0156)	(1.998)	(3.7908)	(2.1893)		(0.1196)	(0.0067)
MOC	0.8358	−0.5597*	−0.6645**	−0.0345	0.0858	−0.0004	1.1153	0.3056	0.3622
	(0.509)	(−1.8682)	(−2.1406)	(−0.0282)	(0.2964)	(−0.0012)	(0.9098)	(0.7562)	(0.8588)
CF	10.3299***	1.9644***	2.2710***	6.4003***	1.1315**	1.0197**	10.0482***	1.6105**	1.5779*
	(4.3175)	(4.5006)	(5.0216)	(3.1131)	(2.3287)	(2.0501)	(4.1953)	(2.0399)	(1.9147)
FL	0.5215***	−0.0064	−0.0186	0.6268***	−0.0105	−0.0243*	0.5441***	0.0100	−0.0042
	(8.322)	(−0.5582)	(−1.5705)	(11.9054)	(−0.8471)	(−1.9064)	(9.7678)	(0.5434)	(−0.2204)
FS	−0.2169**	0.0036	−0.03	−0.2458**	−0.027	−0.0501**	−0.1787**	−0.1227***	−0.1411***
	(−2.0908)	(0.1899)	(−1.5314)	(−2.5556)	(−1.1882)	(−2.1519)	(−2.1408)	(−4.4584)	(−4.9114)
ROA	0.1306***	0.0371***	0.0575***	0.0911***	0.0468***	0.0654***	0.1009***	0.0445***	0.0614***
	(4.7327)	(7.3692)	(11.0247)	(4.3695)	(9.4912)	(12.956)	(4.7333)	(6.3377)	(8.3751)
C	2.5013***	1.0196***	0.9583***	2.5212***	1.4567***	1.3837***	1.5584**	2.1075***	1.9068***
	(3.1607)	(7.0619)	(6.4062)	(3.0905)	(7.5549)	(7.0107)	(2.4877)	(10.2059)	(8.8464)
Fixed effect	No	No	No	No	No	No	No	No	No
Random Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.1232	0.1261	0.2018	0.1682	0.147	0.2211	0.2945	0.1906	0.26
F-statistic	15.0122	15.4188	27.0252	21.61751	18.4206	30.33	25.288	14.2622	21.2844
N	864	864	864	864	864	864	432	432	432

*, **, *** indicates level of significance at 10%, 5% and 1% respectively. Numbers in parenthesis are t-statistics

4.3.1.3. Investor and managers' overconfidence and firm value

For examining the combine effect of investor and manger's overconfidence bias on the firm value, following equations help to make the regression analysis; Table 8 shows the combine results or investor and managers overconfidence bias on the firm value. findings report that if the firm value positively related to investor and manager's overconfidence bias they are also positively and significantly affected by CF, FL, ROA except FS. On other hand, if the firm value non-monotonically effected by investor and manager's overconfidence bias, these firm are negatively and significantly affected by FL. This situation explains mangers believe that investor can get information of company external project easily than the internal project. For winning the confidence of investor managers do investment outside based on their skills and used debt finance which increase financial cost and risk of solvency. Which ultimately lead to negative affect on firm value. Our forth hypothesis is also accepted on the light of above findings that investor and mangers both overconfidence bias are non-monotonically related to firm value.

4.3.2. Robustness

For robust test we divide the whole period into three intervals to investigate the impact of investors and manager's overconfidence bias on the firm value at different time span. First and second interval consist of 2 years whereas third interval based on single year such as 2013–15, 2015–2016 and 2017. These yearly time intervals contain results from different measures of firm value, MB, Tobin Q1, Tobin Q2. Table 9, shows that investors' overconfidence has a 1% positive and significant effect on the firm value at from all proxies during an all-time period except 2017. It has been seen that the overconfidence bias does not affect the firm value significantly in the extreme periods (boom and slum) in the history of (PSX). So, there may be other factor, which may affect the trading activity of stock market in year 2017 such as herding bias, dispositional bias, media effect etc. First interval, 2013 to 2014 shows negative significant effect of managers' overconfidence has mixed on the firm value and rest or interval show non-monotonic effects on the firm value. Control variables, CF and RA both have positive and significant effect in all the time intervals including the year 2017. However, FS and FL have different direction in all the time periods.

5. CONCLUSION

The objective of the study was to find the impact behavioral overconfidence bias of both investors and managers on the firm value. Using the micro level data of 432 listed firm of Pakistani stock exchange (PSX) over the period of 2013–2017. Following Statman et al. (2006), applied the VAR model to examine the presence of investors overconfidence bias in stock market as a whole, and followed by Meier (2018) aggregate confidence index approach on individual firm to construct overconfidence bias index. In line with study objective, we first construct the manager overconfidence bias index using the overinvestment in assets mechanism introduced by Ben-David et al. (2010). After that, we conduct preliminary testing of panel unit root for stationarity purpose with Levin, Lin and Chu, Im, Pesaran and Shin, ADF and PP tests and find all variables stationary at level. Hausman test suggested applying random effect model to investigate the

effect of; (1) investors' overconfidence bias on firm value, (2) managers' overconfidence bias on the firm value, (3) investors and managers' overconfidence bias on the firm value respectively for three measures of firm value individually.

Results of this study are derived firstly for full timeframe and secondly for three-time intervals on bi-annually and annually bases. Overall findings report that investor overconfidence bias derives firm value positively and significantly over study period except 2017 where investor overconfidence is not significant. Whereas, managers' overconfidence bias lacks the clear direction with insignificant mixed results. We find the firms with high investors' overconfidence bias tend to more focus towards the profitability. These firms use debt financing and prefer short-term external investment in the cost of the long-term project, which affects the assets size negatively. Also, managers' overconfidence bias positively related to those firms that much focus on profitability and CF to the asset as compared to other firms having a negative effect of bias on the firm value. These firm raise finance through debt and invest in a short-term external project they focus on short-term profitability and ignore the long-term projects. Inefficient and ineffective use of high cost of capital asset turned to increase the expenditure in term of wear and tear or obsolescence, which resulted in a decrease in firms' size. Moreover, combine positive effect of investor and managers' overconfidence bias on the firm value improve the CF of firms, decrease negative effect of FL and improve FS by focusing on long-term projects.

In robustness, it has been seen that the overconfidence bias has not significantly affected the firm value in 2017, the period referred as uncertain boom and slum period in the history of PSX. There may be other factors, which may affect stock market in 2017. These factors may include herding bias, dispositional bias, or media effect.

Pakistani stock market is a volatile market, and most of the investor trade for short-term based on their private source of information. Above mentioned results suggested that overconfidence bias of investor effect the firm value positive in regular trading days but when the volatility will be higher the effect of overconfidence will be vanished or negatively affect the firm value. Managers overconfidence bias exhibits the preference of short term external project, debt financing, low productivity and low growth of firm. This negative effect can be removed through proper corporate governance and tight regulations. Result of the study corporate that mangers should focus on long term projects and should limit the debt financing in the capital structure. In this way, the FS, growth and prosperity can be achieved. Furthermore, tighten the regulation can unpaved the ways of market crash like 2017.

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