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Do the Investment Distortions Affect the Performance of Non-financial Firms of Pakistan?

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Abstract *The investment decisions are very important for investors as it directly affects the firm's future profitability and shareholder's wealth. Firm managers are involved in making inefficient investment decisions in imperfect capital markets. This study aims to examine how the inefficient investment decisions influence the firm performance after controlling for the financial factors. The two steps System Generalized method of moments is used to examine the impact of investment distortion on firm performance. The empirical analysis is based on unbalanced annual panel data set of a sample of 324 non-financial firms listed on the Pakistan Stock Exchange for the period 2015 to 2017. The results show that investment distortion is negatively affecting the performance of non-financial firms in Pakistan; irrespective of the proxy used to measure the firm performance. These results support the information asymmetry theory and agency theory, which explains why managers are involved in making sub-optimal investment decisions at the cost of shareholders' wealth and why their inefficient investment decisions can damage the value of the firm.*

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Introduction

Firms enhance their value through investing in good capital projects, and rational managers pursue value-maximizing investment opportunities as much as available. However, there is a limit to the possibility of indefinite investments due to the scarcity of available investment funds to firms. Efficiently allocated funds endue corporate investment efficiency, which brings future growth and sustainable profitability to the firms. It is expected that investment funds will be utilized in the best possible manner and with minimal wastage as the future of firms rely upon their investment efficiency. Firm managers have discretionary powers to allocate funds among different investment projects. Therefore, the duty of firm managers is to critically evaluate all possible investment projects and select only those that increase firm value. However, previous researches indicate that managers do not always allocate funds efficiently and involve in making sub-optimal investment decisions by exploiting their control over the allocation of investment funds (Jensen & Meckling, 1976; Jensen, 1986; Stulz, 1990; Myers, 1977; Stiglitz & Weiss, 1981; Myers & Majluf, 1984). Managers have the tendency to squander funds either by making overinvestment in non-valuable projects or foregoing valuable investments despite the presence of profitable investment opportunities i.e. underinvestment. This over- and under-investment is categorized as investment distortions that adversely affect investment (Hubbard 1998). The financial literature accentuates the role of these problems in a firm's investment decisions (Love 2003; Love & Zicchino, 2006; Guariglia & Yang, 2016; Guariglia & Liu, 2014). Thus, in the real world, firms deviate from their optimal investment level either by over or under-investment. The empirical evidence explains agency problems and asymmetric information are two possible reasons for such deviations in a firm's investment

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decisions. Guariglia and Yang (2016) provide empirical evidence from China that financial constraints lead to underinvestment. However, overinvestment is due to excessive free cash flows. Both problems are originated from agency problems and decreasing the firm profitability. Therefore, it is likely that overinvestment may deteriorate firm performance (Gu 2013; Jensen 1986; Shima 2010). A wide range of empirical studies highlighted the negative relationship between overinvestment and profitability. Farooq et al. (2014) suggest three levels of investment (i.e. just-investment, overinvestment, and underinvestment). They explain that only just-investment is an effective for a firm, and the others significantly reduce the efficiency of the firm. Eventually, only optimal investment is effective for firm performance, and over and underinvestment are damaging firm performance. (Liu & Bredin, 2010; Shima, 2010; Titman *el al*, 2004; and Yang, 2005). Kadioglu and Yilmaz (2017) highlighted that researchers do not analyze the impact of investment distortions on firm performance as most of the prior research focuses on only overinvestment and firm performance relationship.

Moreover, extensive literature on investment distortions is accumulated from developed countries (e.g., USA, UK, Netherlands, Spain, and Turkey) over the time and limited research is available from developing countries (e.g., China). The structure of financial markets in developing country is considerably different than the one in developed countries. It is well established that financial markets in developing countries may experience relatively more agency problems and information asymmetry as compared to developed markets. These problems are mainly because of weak corporate governance practices and poor capital market regulations. Additionally, financial intermediaries and corporate firms are not well linked to each other. Therefore, funds from external sources are expensive to firms in less financially developed countries. as they experience more difficulty to raise funds from external sources (Arslan et al., 2006). In this context, it would be informative and worthwhile to examine the impact of investment distortions on firm performance in developing countries separately. Although there is growing interest in examining the investment decisions on firm performance, there is very limited research for developing countries. Therefore, the primary aim of this study is to specifically investigate the impact of investment distortions on firms' performance for non-financial firms in Pakistan. This study contributes to the literature in several important dimensions. First, it contributes to the general literature of finance and is particularly related to investment distortions. Second, this study contributes specifically from the developing country perspective about whether corporate managers are involved in making sub-optimal investment decisions and how their sub-optimal investment decisions affect the corporate performance in developing countries like Pakistan. Lastly, pertaining to empirical methodology, a dynamic panel data model is employed, which controls for heterogeneity in individual countries and firms. Generalized Method of Moments (GMM) is applied for estimation to address the problem of endogeneity and heterogeneity through differencing and use of natural instruments as a system of equations both in levels and at first difference with orthogonality conditions. According to the authors' knowledge, there is no prior research that uses a dynamic model to estimate the impact of investment distortion and firm performance considering specifically the case of Pakistan.

Section 1 of the research paper presents an introduction of the study. Section 2 reviews previously available literature, while section 3 describes data description and methodology. Section 4 reports the results and discussion, and section 5 concludes the study along with the policy implications and directions for future research.

Literature Review

The capital investment decision is one of the discretionary decisions taken by firms' managers. It has been observed that self-interested managers are less likely to always take decisions in the best interest of shareholders. Therefore, they may involve in making sub-optimal investment decisions (i.e. overinvestment and underinvestment). Previous theoretical literature relates agency problems (i.e. principal-principal and principal-agent problems) and information asymmetry problems and with the firm over and underinvestment (Bushman & Smith, 2001; Stein, 2003; Biddle, Hilary, & Verdi, 2009; Chen et al., 2006, 2017; Jiang et al., 2011; He & Kyaw, 2018).

The principal-agent agency problem indicates that managers exploit their

discretionary power and corporate resources by making investment decisions that maximize their personal benefits at the cost of shareholders' wealth and thus decreases the total value of the firm (Jensen & Meckling, 1976). Jensen (1986) proposed the overinvestment hypothesis which suggests that agency problem arises due to the separation of ownership and control. The overutilization of managerial discretion may lead to overinvestment that increases the private benefits of managers such as perquisites, empire building (Jensen, 1986; Stulz, 1990), and entrenchment (Shleifer & Vishny, 1989). Therefore, managers are inclined to invest abundant free cash flows in non-valuable projects to increase the firm's size but not the firm's value.

However, the information asymmetry between shareholders and bondholders as well as the current and prospective shareholders, may lead to an underinvestment problem (Myers, 1984; Myers & Majluf, 1984) by asset substitution effect, moral hazard, and adverse selection. For example, in the presence of excessive debt, bondholders either increase the interest rates or impose the restrictions on shareholders to invest in valuable projects through financing constraints and lead to an underinvestment problem (*asset substitution effect)* (Jensen & Meckling, 1976). Moreover, the presence of risky debt motivates managers, acting in the shareholders' interest, to reject valuable investment projects and thus reduces the firm value in the long run (*moral hazard*) (Myers, 1977). Additionally, bondholders demand a higher premium on riskier debt, as they do not have sufficient information to discern the quality of different investment projects of the firm. Therefore, instead of issuing new risky debt, firms might forego the valuable investments when the amount of investment required to finance all positive NPV projects exceeds the available internal funds, and ultimately shareholders have borne this cost (adverse selection) (Stiglitz and Weiss, 1981).

In summary, the extant literature suggests that agency problems and information asymmetries between main stakeholders can lead to investment distortions. Consequently, both the decrease in firm performance and firm value are the results of over and under-investment (Liu & Bredin, 2010; Fu 2010; Yang, 2005; Titman et al. 2004). Moreover, empirical researches indicated that investment impacts firm performance (Fama and French (2006a) and, in particular, that firms that invest too much have lower stock returns (Titman, Wei, and Xie, 2004). Thus, investment decisions are important to investors as it directly affects future profitability and firm value. The capital expenditure and R&D investment decisions by a large number of firms are inefficient and negatively affecting firm performance (Jensen, 1993).

Few studies examined the relationship between overinvestment and firm performance. Liu and Bredin (2010) examined whether institutional investors improve corporate performance and gain benefits through mitigating the overinvestment problem in emerging countries like China. First, they tested the impact of institutional ownership on the overinvestment, based on the theoretically supported argument that institutional shareholdings is a powerful mechanism for monitoring the managerial investment decisions, and then analyze the impact of overinvestment on firm performance. They found a significant negative relationship between over-investment and firms' performance regardless of the proxy used to measure firms' performance. From 2005 to 2011, Shima (2010) highlighted the negative effect of overinvestment on the profitability for 360 listed firms in Singapore.

Fu (2010) linked the operating performance deterioration of seasoned equity offering (hereafter SEO) firms to the overinvestment in the USA. He suggested that the overinvestment problem is more severe in SEO firms than in non-issuing firms of the same industry with sufficient financial slack and similar investment opportunities. Furthermore, he found that post-issue investment is negatively correlated to the operating performance, and overinvestment leads to reduce the productivity of assets and is more severe for firms with fewer investment opportunities.

Yang (2005) also presented empirical evidence that both overinvestment and underinvestment have catastrophic effects on firm performance and that negative effect on firm performance persists for the next five years. His findings are consistent with suboptimal value creation followed by sub-optimal investment.

Similarly, Farooq, Ahmed, and Saleem (2015) found that both overinvestment and underinvestment problem have a severe negative impact on firm performance, while proper investment has a positive impact on firm

performance in Singapore. They further found that underinvestment has a stronger negative impact on firm performance than overinvestment.

Few studies examined the impact of capital investment decisions on the stock performance of the firm as well. McConnell and Muscarella (1985) observed the positive (negative) excess returns followed by the announcement of increased (decreased) capital expenditures for US industrial firms. However, Titman, Wei, and Xie (2004) reported a negative impact of increased capital investments and stock returns in the USA. Moreover, they found that this negative relationship becomes stronger for firms with higher cash flows and low debt ratio, and those firms continued to earn low returns for subsequent 5 years, which increased their investment level the most. Their findings support the hypothesis that investors tend to under-react to the empire-building implications of increased investment expenditures. In 2009, they conducted another study and did not observe the negative impact of underinvestment on stock returns.

Thoung et al. (2019) found that overinvestment is negatively related to firm performance, and the government can regulate this relationship through state ownership in Vietnamese non-financial listed companies during 2012 to 2016 by using the fixed-effect model. Nghia et al. (2019) also examined the bad effect of overinvestment on firm performance and reported that the use of debt or payouts of dividend may reduce the harmful effect of overinvestment. Finally, the study develops the hypothesis to shed light on the investment distortion-performance relationship as:

H: There is a Significant Relationship between Investment Distortions and Firm Performance

Empirical Framework

Data and Sample

To empirically examine the impact of investment distortion on firm performance, this study utilizes a sample of non-financial listed firms of Pakistan. The sample does not include the financial firms (i.e., banks, insurance companies, mutual funds, asset management companies etc.) as they have different investing, financing and operating activities and are closely regulated by the central bank. Moreover, the study excludes the firms with negative equity, delisted firms, and the firms with incomplete annual reports and market data for at least three consecutive years. Therefore, the final sample includes 324 non-financial firms listed in the Pakistan Stock Exchange. The data of firm-specific variables were collected from annual reports of firms, while the stock prices were taken from websites of the Pakistan Stock Exchange and Business recorder. The study period covers 14 years, from 2004 to 2017 as the annual financial reports of most of the firms are not available prior to 2004. This study applied an unbalanced panel dataset, and panel data methodology was used to test the hypothesis.

Model Specification

Investment Model

The firm's investment decisions have gained much attention of researchers in the field of economics and finance. In order to examine the investment distortion in Pakistan, the study used Richardson (2006) investment expectation model, an accounting-based framework, and a dynamic panel regression method. His model has been widely used in previous literature. According to his model, the investment expenditure is estimated by the following regression model.

$$I_{it}^{New} = \alpha + \beta_1 Tobin'sQ_{i,t-1} + \beta_2 Lev_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Age_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 StockReturns_{it-1} + \beta_7 I_{it-1}^{New} + f_i + \nu_t + \epsilon_{it} \quad (1)$$

where, I_{it}^{New} is the investment expenditure on new projects. The predicted values from the model are the expected investments in new projects with positive NPV (I_{it}^{*}) and the residual or unexplained value is the estimate of investment distortion (I_{it}^{ε}) (Richardson, 2006). The unexpected (abnormal) part of the investment may be positive or negative. Positive (or negative) values correspond to overinvestment (or underinvestment) in Pakistani firms. Thus the study considered both types of firms with positive and negative values for (I_{it}^{ε}) as of the empirical analysis of the study focuses on both investment distortions. The additional variables which are considered as the determinants of investment decisions in prior research are taken as control variables which include the firm's growth opportunities (measured by Tobin's Q), firm size, age, leverage, level of cash, and initial investments, and prior

stock returns at firm-level (Barro, 1990; Bates, 2005; Hubbard, 1997; Lamont, 2000). Time (v_t) and firm-specific dummies (f_i) are added to capture annual and firm-specific fixed effects respectively as macroeconomic factors, like the business cycles, influence the investments of firms. All of the variables related to investment expenditure are standardized by scaling with the total assets of the firms.

Investment Distortions and Firm Performance Model

To analyze the effect of investment distortion on firm performance, the estimated model is based on Liu and Bredin (2010) study. Jensen (1993) reported that corporate performance has been damaged due to major inefficiencies in the capital expenditure and R&D spending decisions by a large number of firms. To test *Hypothesis 1*, a regression equation (2) has been constructed that link the investment distortions with firm performance after controlling financial factors (i.e. leverage and size) as suggested by Cho (1998).

$$Perf_{it} = \alpha + \beta_1 I^{\varepsilon}_{it-1} + \beta_2 Lev_{it-1} + \beta_3 Size_{it-1} + \beta_4 Perf_{it-1} + f_i + v_t + \epsilon_{it} \quad (2)$$

where, $Perf_{it}$ is a measure of performance for firm *i* at time *t*, I^{ε}_{it-1} is a measure of investment distortions (i.e. residuals of equation (1)), Lev_{it-1} and $Size_{-1}$ denote firm leverage and size respectively. $Perf_{ect-1}$ is a lag term of dependent variable which is included in this model to avoid endogeneity problem. Three proxies are used for firm performance, which includes Tobin's Q, Return on assets (ROA) and Return on equity (ROE).

Table 1. Description and Abbreviation of Variables

Variables	Abbreviation	Description
Investment Model		
Dependent Variable		
New Investment	$\frac{ew}{vi}$	$I^{New}_{it} = I^{Total}_{it} - I^{Maintenance}_{it}$ where, $I^{Total}_{it} = NF_t - NF_{t-1} + Dep_t$
Independent variables		
Growth opportunities	$Tobin'sQ_{it}$	$Tobin's\ Q_{it} = (MV\ of\ equity_{it} + BV\ of\ assets - BV\ of\ equity_{it}) / BV\ of\ assets_{it}$
Leverage	Lev_{it}	Total debt divided by the total book value of assets
Cash	Cas_t	The balance of cash and short term investments divided by total assets
Maturity	Age_{nt}	The log of the number of years the firm has been listed on PSE.
Firm size	$Size$	The log of total assets
Stock Returns	$Stock\ Returns$	Natural log of the market price of the share at the end of the current year divided by market price of the share at the end of the previous year. $Stock\ Return_{it} = \ln\left(\frac{P_{it}}{P_{it-1}}\right)$
Lagged New Investment	I^{New}_{it-1}	Investment expenditure on a new project of the previous year

Investment Distortion and Firm Performance Model		
Dependent Variables		
Firm performance	$Perf_{ect}$	Three proxies will be used.
Tobin's Q	$Tobin'sQ_{it}$	$Tobin's\ Q_{it} = (MV\ of\ equity_{it} + BV\ of\ assets - BV\ of\ equity_{it}) / BV\ of\ assets_{it}$
Return on assets	ROA_{it}	$ROA_{it} = Operating\ Income_{it} / Total\ Assets$
Return on equity	R_{ohit}	$ROE_{it} = Net\ Income_{it} / Total\ Equity$
Independent variables		
Lagged Investment Distortion	I^{ε}_{t-1}	Residuals of the previous year

Investment Distortion and Firm Performance Model		
Dependent Variables		
Lagged Leverage	Lev_{it-1}	Debt ratio of the previous year
Lagged Size	$Size$	The log of total assets of the previous year
Lagged Performance	$Perf_{ect-1}$	Lagged values of all three proxies. (i.e. $Tobin's\ Q_{it-1}$, ROA_{it-1} , and ROE_{it-1})

Estimation Method

The prior empirical studies suggest that the Generalised Method of Moment (GMM) is a more suitable method for dynamic panel data estimation, as it gives more consistent and unbiased estimation compared to using the ordinary least square method (OLS). GMM estimator is planned for situations when a) small periods and many individuals are there, b) a linear functional relationship exists, and c) useful when independent variables are not strictly exogenous. The two-step system-GMM estimator, proposed by Arellano and Bover (1995) and afterward fully developed by Blundell and Bond (1998), is used as there are variables in the specified model, which are dynamic in nature (i.e. investment and firm performance). System GMM helps to control endogeneity problem by using instruments, therefore lagged value of dependent variables is included as instruments in models. In order to ensure the validity of instruments, Hansen's (1982) J test is used to test the null hypothesis of the instruments if they are orthogonal to the residuals. Moreover, the Arellano and Bond (1991) test for AR (2) is applied for testing the existence of serial correlation in the residuals.

Empirical Results and Discussion

Descriptive Statistics

The first prime aspect of collected data is to analyze the statistical behavior of variables that quantitatively illustrates or summarizes features of the data which includes the value of the mean, median, minimum, maximum values and standard deviation of all variables of the study. The findings of the descriptive statistics of the variables of all models explained previously for the sample firms are presented in Table 2.

Table 2. Descriptive Statistics

Variable	Mean	Std Dev	Median	Minimum	Maximum
$\mathbf{I^{Total}}$	0.0823	0.2033	0.0530	-4.7498	4.9258
$\mathbf{I^{Maintenance}}$	0.0322	0.0188	0.0302	0.0000	0.2095
$\mathbf{I^{New}}$	0.0498	0.2041	0.0192	-4.7760	4.9092
Tobin′sQ	1.3224	1.2896	1.0022	-1.0994	25.4246
Leverage	0.5283	0.2332	0.5501	0.0000	5.6461
Cash	0.0775	0.1219	0.0234	0.0000	0.9037
Age	33.921	18.7370	30.000	1.0000	150
Size	22.255	1.6836	22.1811	14.9174	27.1647
Stock Returns	0.1016	0.5366	0.0785	-2.4079	2.9970
$\mathbf{I^{*}}$	0.0355	0.0976	0.0355	-1.8701	0.3104
$\mathbf{I^{\varepsilon}}$	0.0000	0.1392	-0.0114	-2.1465	1.0959
ROA	0.09795	0.1215	0.0870	-1.4404	0.9998
ROE	0.0551	1.1391	0.1249	-38.54725	14.0695

The investment expenditure of an average firm in the sample is equal to 8.23% of its total asset base, which is lower than the United States (i.e. 13.1%) (Richardson, 2006) and China (i.e. 10%) (Chen, Sun, & Xu, 2016) however higher than Singapore (i.e. 5.6%) (Farooq, Ahmed & Saleeem, 2015). Descriptive stats show that 39.32% of total investment expenditure is used up to maintain existing assets in place and the residual 60.68% is spent on new investments. Both mean (i.e. 1.3224) and median (i.e. 1.0022) values of Tobin's Q are greater than 1, which indicates that nonfinancial firms in Pakistan have many projects with positive net present value (NPV) for investment and more future growth opportunities. The mean value of leverage is

52.83% indicating that on average, sample firms are heavily relying on debt. An average firm in the sample holds 7.75% of its total assets in the form of cash. While a firm total assets ranges from 0% to 90.37% of their assets indicate that some firms have abundantly available cash for investment. The mean value of age represents that the average firm in the sample is 33.9 years old. The mean (median) value of the firm size (that is a logarithmic transformation of total assets) is 22.2547 (22.1811). Stats indicate that nonfinancial listed firms in Pakistan are earning 10.16% average stock returns annually.

The mean value of ROA implies that an average firm generates 9.79% operating profits relative to its total assets with a standard deviation of 12.15%. However, the mean value of ROE is 5.5%.

Correlation Results

In prior studies, Pearson's correlation is used to investigate the problem of multicollinearity among variables in empirical models. Therefore, it is necessary to check the multicollinearity among variables before proceeding to panel regression.

Tables 3 represent the correlation results for the model estimated to analyze the impact of investment distortion on firm performance. The correlation coefficients among the dependent variable and independent variables are reported with p-value shown below in brackets.

Tobin's Q is highly correlated to an abnormal investment of the firm as compared to other proxies (i.e. ROA and ROE) of the firm performance. Return on assets has a positive correlation with firm size. Moreover, return on equity is negatively correlated with leverage as a higher leverage result is an increased interest expense which reduces the income available to shareholders of the firm. There is also a high correlation between abnormal investment and leverage. An important consideration relating to correlations among independent variables is that they are not highly correlated. Thus, we can assume the possibility of multicollinearity among independent variables to be non-existent. Moreover, the correlations among independent variables are not much high to cause a potential multicollinearity problem.

Table 3. Correlation Matrix for Investment Distortion and Firm Performance

Variables	$Tobin'sQ$	ROA	ROE	I^{ε}	$Leverage$	$Size$
$Tobin'sQ$	1.00					
ROA	0.310***	1.00				
	(0.000)					
ROE	0.081***	0.259***	1.00			
	(0.000)	(0.000)				
I^{ε}	0.201***	0.060***	0.01	1.00		
	(0.000)	(0.004)	(0.600)			
$Leverage$	0.073***	-0.166***	-0.079***	0.222***	1.00	
	(0.000)	(0.000)	(0.000)	(0.000)		
$Size$	0.035**	0.218***	0.062***	-0.186***	0.079***	1.00
	(0.049)	(0.000)	(0.001)	(0.000)	(0.000)	

*** p<0.01, ** p<0.05, * p<0.1

GMM Estimation Results: Investment Distortion and Firm Performance

This section reports the empirical findings for analyzing the relationship between investment distortions and firm performance using firm-specific variables specified in equation (2). Three regression equations have been estimated as there are three proxies are used to quantify the firm performance.

In the first regression, $Tobin'sQ$ is used as a firm performance measure to examine the effects of investment distortion on firm performance. The significant *p*-value of BPLM test indicates that we reject the null hypothesis and support to the random-effect model. Further, *a p*-value of the Hausman test is also significant, so we reject the null hypothesis and use the fixed-effect model. We obtain the significant *p*-value for Modified Wald test so reject the null hypothesis that the series is homoskedastic and conclude the presence of group-wise heteroskedasticity.

Finally, the *p*-value of Wooldridge test shows that we reject the null that no first-order autocorrelation and conclude that there is a first-order serial correlation. All these findings are reported in Appendix A. Thus, the System GMM method is most appropriate in the case of endogeneity and autocorrelation in the data. The lag value of $Tobin's Q$ is included in the model to control the endogeneity problem. In this case, we use the first leg of both the controlling variables and only the second lag of investment distortion as instruments.

Model I of Table 4 presents the regression estimates of the two-step system GMM. The dependent variable is $Tobin's Q$. The coefficient of investment distortion is negative and statistically significant indicates that the abnormal investment is affecting the performance of Pakistani non-financial firms. These results are consistent with prior studies (Titman, Wei and Xie, 2004; Yang, 2005). The negative relationship between firm performance and leverage implies that due to bankruptcy risks and financial distress, leverage restricts the performance of the firm. However, the firm size coefficient is positive and also statistically significant, which indicates that large firms perform better than small firms. Our findings are consistent with prior literature.

ROA is used as a dependent variable to measure firm performance in the second regression. The *p*-value of the BPLM test is significant, indicating that the random effect model is appropriate as we reject the null hypothesis. Further, the significant *p*-value of the Hausman test allows us to reject the null hypothesis and support to use the fixed effect model. Moreover, we also reject the null hypothesis of the Modified Wald test as the *p*-value of the test is significant so and conclude the presence of group-wise heteroskedasticity. Lastly, we get the significant *p*-value of the Wooldridge test, thus we reject the null and conclude the presence of the first-order autocorrelation. These results are reported in Annexure A. In the literature it is found that System GMM is the most appropriate method to estimate coefficients of the dynamic panel model. The lag value of ROA is also included in the model to overcome the endogeneity problem. Here as instruments, we use the first leg of both the controlling variables (i.e. leverage and size) while investment distortion and ROA lagged twice and more. Model II of Table 4 presents empirical findings of the relationship between investment distortions and firm performance in which ROA is used as a proxy for the performance of the firm. We again obtain the significant coefficient of investment distortion which implies that abnormal investment is negatively affecting the performance of the firm. The negative and positive coefficients of both controlling variables that are leverage and firm size are also highly significant and also in accordance to the theory.

In last, to measure firm performance, we use a third proxy i.e. ROE as a dependent variable. The *p*-value of BPLM test is insignificant, suggesting that the pooled regression model is an appropriate method as we fail to reject the null hypothesis. However, the significant *p*-value of Hausman test allows us to reject the null hypothesis and support to use the fixed effect model. The significant *p*-value of the Modified Wald test implies to reject the null hypothesis and provides support to the existence of group-wise heteroskedasticity. Finally, we obtain the insignificant *p*-value of the Wooldridge test, so we fail to reject the null and conclude that no first-order serial correlation is there. These findings are presented in Annexure A. Therefore, System GMM is the most suitable statistical method to estimate the coefficients of the dynamic panel model. The lag value of ROE is also included in the model as we did earlier. In this model, as instruments, we use the first lag of investment distortion and firm size whereas leverage and ROE lagged twice or more.

Model III of Table 4 reports the empirical results to support the relationship among investment distortions and the performance of firms measured by ROE. The negative coefficient of investment distortion provides more support to the expected significant relationship between investment distortion and the performance of the firm. The results indicate that leverage is also negatively affecting firm performance. However, the sign of size coefficient is positive as expected but becomes insignificant when ROE is used as a performance measure.

In a nutshell, the results obtained from equation (2), the relationship of all independent variables specified in the model to the performance of the firm remains the same as theoretically predicted irrespective of the proxy used to measure the firm performance. Thus, all

the above findings substantiate the *hypothesis* that there is a significant negative impact of investment distortion on the performance of the firm. Our findings are aligned with the findings of a previous study by Liu and Berdin (2010) for Chinese firms as well as Yang (2005) and Farooq, Ahmed and Saleem (2015) studies for Singaporean firms. The result is consistent with theory, which suggests that inefficient capital expenditure by a large number of firms is negatively affecting the performance of the firm (Jensen, 1993). Results show that the magnitude of this negative impact of investment distortion on the performance of the firm is highest when $Tobin's\ Q$ used as a dependent variable. Similarly, leverage is also negatively affecting the firm performance as our findings provide evidence of the significant relationship between leverage and firm performance in all three models. However, size has a positive relation to the firm performance, which becomes insignificant when we use ROE to quantify the firm performance. The coefficients of all lagged dependent variables are also significant. The number of instruments is less than the number of groups. The insignificant p-value of $AR(2)$ is indicating that error terms in level regressions are not correlated. Furthermore, the insignificant p-value of the Hansen test is indicating that the instruments are valid. Thus we may conclude that the GMM model is specified appropriately and there are no identification issues.

Table 4. Regression Results for Investment Distortion and Firm Performance

Variable	Predicted Sign	Model		
		I	II	III
I_{it}^{ε}	+ve	-0.5014**	-0.0588**	-0.3575*
		(0.2584)	(0.0291)	(0.2125)
$Leverage$	-ve	-1.2548***	-0.0766**	-0.3180***
		(0.1547)	(0.0351)	(0.1161)
$Size$	+ve	0.9296**	0.0128***	0.0299
		(0.0392)	(0.0031)	(0.0294)
$Tobin'sQ_{i,t-1}$	+ve	0.7394***		
		(0.0489)		
$Return\ on\ Assets_{i,t-1}$	+ve		0.5851***	
			(0.0996)	
$Return\ on\ Equity_{i,t-1}$	+ve			0.3429**
				(0.1516)
Intercept		-1.0553	-0.2102***	-0.4858
		(0.8428)	(0.0605)	(0.6542)
Observations		2019	2019	2015
No of Groups		304	304	302
No of Instruments		91	207	207
AR (1)		-3.01	-5.34	-1.36
[p-value]		(0.003)	(0.000)	(0.175)
AR (2)		0.42	0.06	1.04
[p-value]		(0.675)	(0.956)	(0.300)
Hansen test		100.54	209.23	224.32
[p-value]		(0.135)	(0.349)	(0.135)
F-statistics		58.81	24.07	5.28
F-Significance		0.000	0.000	0.000

*Note: The estimated results are the output of the Two-steps Generalized Method of Moments (System GMM) with robustS.E reported under the coefficients in parenthesis. Significant AR (1) indicates the existence of autocorrelation among residual terms. In level regression, insignificant AR (2) indicates the non-existence of autocorrelation among residual terms. The insignificant value of Hansen statistic validates the instruments of the model.Significance Codes: '***' = 0.01 '**' = 0.05 '*' = 0.1*

Conclusion

Inefficient investment decisions adversely affect firms' value, future profitability, and stock returns. Thus, the study analyzes the impact of investment distortion on firm performance. The empirical results suggest that investment distortion is negatively affecting the performance of non-financial firms in Pakistan irrespective of the proxy used to measure the firm performance.

References

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, *68*(1), 29–51. https://doi.org/10.1016/0304-4076(94)01642-d

Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies*, *58*(2), 277. https://doi.org/10.2307/2297968

Barro, R. J. (1990). The stock market and investment. *The Review of Financial Studies*, *3*(1), 115-131.

Bates, T. W. (2005). Asset Sales, Investment Opportunities, and the Use of Proceeds. *The Journal of Finance*, *60*(1), 105–135. https://doi.org/10.1111/j.1540-6261.2005.00726.x

Biddle, G. C., Hilary, G., & Verdi, R. S. (2009). How does financial reporting quality relate to investment efficiency?. *Journal of Accounting and Economics*, *48*(2), 112-131.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*, 115-144.

Bushman, R. M., & Smith, A. J. (2001). Financial accounting information and corporate governance. *Journal of Accounting and Economics*, *32*(1), 237-333.

Chen, J. J. (2004). Determinants of capital structure of Chinese-listed companies. *Journal of Business Research*, *57*(12), 1341–1351. https://doi.org/10.1016/s0148-2963(03)00070-5

Chen, X., Harford, J., & Li, K. (2007). Monitoring: Which institutions matter?. *Journal of Financial Economics*, *86*(2), 279-305.

Chen, X., Sun, Y., & Xu, X. (2016). Free cash flow, over-investment and corporate governance in China. *Pacific-Basin Finance Journal*, *37*(C), 81-103.

Cho, M. H. (1998). Ownership structure, investment, and the corporate value: an empirical analysis. *Journal of Financial Economics*, *47*(1), 103-121.

Fama, E. F., & French, K. R. (2006a). Profitability, Investment, and Average Returns. *Journal of Financial Economics*, 82**,** 491–518.

Farooq, S., Ahmed, S., & Saleem, K. (2015). Overinvestment, growth opportunities and firm performance: Evidence from Singapore stock market. *Corporate Ownership & Control*, *12*(3), 454-467.

Fu, F. (2010). Overinvestment and the operating performance of SEO firms. *Financial Management*, *39*(1), 249-272.

Gu, L. (2013). Three Essays on Financial Economics. University of Illinois, Urbana-Champaign.

Guariglia, A., & Liu, P. (2014). To what extent do financing constraints affect Chinese firms' innovation activities?. *International Review of Financial Analysis*, *36*, 223-240.

Guariglia, A., & Yang, J. (2016). A balancing act: Managing financial constraints and agency costs to minimize investment inefficiency in the Chinese market. *Journal of Corporate Finance*, *36*, 111-130.

Guariglia, A., & Yang, J. (2016). A balancing act: managing financial constraints and agency costs to minimize investment inefficiency in the Chinese market. *Journal of Corporate Finance*, *36*, 111-130.

He, W., & Kyaw, N. A. (2018). Ownership structure and investment decisions of Chinese SOEs. *Research in International Business and Finance*, *43*, 48-57.

Hubbard, R. G. (1997). *Capital-market imperfections and investment* (No. w5996). National Bureau of Economic Research.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, *76*(2), 323-329.

Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *The Journal of Finance*, *48*(3), 831-880.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305-360.

Kadioglu, E., & Yilmaz, E. A. (2017). Is the free cash flow hypothesis valid in Turkey?. *Borsa Istanbul Review*, *17*(2), 111-116.

Lamont, O. A. (2000). Investment plans and stock returns. *The Journal of Finance*, *55*(6), 2719-2745.

Liu, N., & Bredin, D. (2010). Institutional Investors, Over-investment and Corporate Performance. *University College Dublin*.

Love, I. (2003). Financial development and financing constraints: International evidence from the structural investment model. *The Review of Financial Studies*, *16*(3), 765-791.

Love, I., & Zicchino, L. (2006). Financial development and dynamic investment behavior: Evidence from panel VAR. *The Quarterly Review of Economics and Finance*, *46*(2), 190-210.

McConnell, J. J., & Muscarella, C. J. (1985). Corporate capital expenditure decisions and the market value of the firm. *Journal of Financial Economics*, *14*(3), 399-422

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, *5*(2), 147-175.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*(2), 187-221.

Nghia, N. T., Khang, T. L., & Thanh, N. C. (2019, January). The Moderation Effect of Debt and Dividend on the Overinvestment-Performance Relationship. In *International Econometric Conference of Vietnam*. 1109-1120. Springer, Cham.

Richardson, S. (2006). Over-investment of free cash flow. *Review of Accounting Studies*, *11*(2-3), 159-189.

Shima, K. (2010). Lumpy capital adjustment and technical efficiency. *Economics Bulletin*, *30*(4), 2817-2824.

Shleifer, A., & Vishny, R. W. (1989). Management entrenchment: The case of manager-specific investments. *Journal of Financial Economics*, *25*(1), 123-139.

Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, *71*(3), 393-410.

Stulz, R. (1990). Managerial discretion and optimal financing policies. *Journal of Financial Economics*, *26*(1), 3-27.

Thuong, C. V., Thanh, N. C., & Khang, T. L. (2019, January). The Firm Performance–Overinvestment Relationship Under the Government's Regulation. In *International Econometric Conference of Vietnam* (pp. 1142-1153). Springer, Cham.

Titman, S., Wei, K. J., & Xie, F. (2004). Capital investments and stock returns. *Journal of Financial and Quantitative Analysis*, *39*(4), 677-700.

Yang, W. (2005). Corporate investment and value creation. *Indiana University Bloomington*.

Appendix

Regression Results of Investment Distortion on Firm Performance

Variable	Predicted Sign	Model		
		OLS	RE	FE
$I^{\varepsilon}_{i,t-1}$	-ve	0.2457	0.1116	-0.6835*
		(0.1928)	(0.1943)	(0.3946)
$Leverage$	-ve	-0.9125***	-0.9335***	-0.8779***
		(0.1077)	(0.1115)	(0.1318)
$Size$	+ve	0.1645	0.0172	0.2532*
		(0.0151)	(0.0166)	(0.1423)
$Tobin'sQ_{i,t-1}$	+ve	0.7083***	0.6585***	0.3834***
		(0.3356)	(0.0193)	(0.0684)
Intercept		0.5587*	0.6165*	-4.3245
		(0.3355)	(0.3708)	(3.1445)
BPLM test			14.49	
			(0.0001)	
Hausman				373.90
				(0.000)
Adj R-squared		0.4372	0.4379	0.1397
Modified Wald test				3.9e+05
				(0.000)
Wooldridge test				3.653
				(0.0570)
Observations		2019	2019	2019
No of Groups			304	304
F-Significance		0.000	0.000	0.000

*Note: The regressand is Tobin's Q to measure the performance of the firm. In Column, I show the results of pooled regression. The results obtained from the random effect and fixed-effect models are presented in Column II and III respectively. Significance Codes: '***' = 0.01 '**' = 0.05 '*' = 0.1*

Regression Results of Investment Distortion on Firm Performance

Variable	Predicted Sign	Model		
		OLS	RE	FE
$I^{\varepsilon}_{i,t-1}$	-ve	-0.0433***	-0.0715***	-0.0727***
		(0.0143)	(0.0142)	(0.0208)
$Leverage$	-ve	-0.0358***	-0.0519***	-0.0541
		(0.0083)	(0.0090)	(0.0443)
$Size$	+ve	0.0041***	0.0057**	-0.0147**
		(0.0012)	(0.0023)	(0.0073)
$ROA_{i,t-1}$	+ve	0.7417***	0.5169***	0.4397***
		(0.0158)	(0.0194)	(0.0524)
Intercept		-0.0433***	-0.0611	0.4128**
		(0.0143)	(0.0514)	(0.1732)
BPLM test			8.20	
			(0.0021)	
Hausman				64.62
				(0.000)
Adj R-squared		0.5646	0.5535	0.2253

Variable	Predicted Sign	Model		
		OLS	RE	FE
Modified Wald test				4.2e+06
				(0.000)
Wooldridge test				60.049
				(0.000)
Observations		2019	2019	2019
No of Groups			304	304
F-Significance		0.000	0.000	0.000

*Note: The regressand is ROA to measure the performance of the firm. In Column, I show the results of pooled regression. The results obtained from the random effect and fixed-effect models are presented in Column II and III respectively. Significance Codes: '***' = 0.01 '**' = 0.05 '*' = 0.1*

Regression Results of Investment Distortion on Firm Performance

Variable	Predicted Sign	Model		
		OLS	RE	FE
$I^{\varepsilon}_{i,t-1}$	-ve	-0.2129	-0.3641**	-0.3443
		(0.1466)	(0.1527)	(0.2174)
$Leverage$	-ve	-0.1826**	-0.1952**	-0.1636
		(0.0834)	(0.0954)	(0.1138)
$Size$	+ve	0.0290**	0.0671***	0.1343
		(0.0118)	(0.0246)	(0.1600)
$ROE_{i,t-1}$	+ve	0.4425***	0.2217***	0.1332
		(0.0400)	(0.0429)	(0.1281)
Intercept		-0.5425**	-1.4265***	-2.8833
		(0.2619)	(0.5470)	(3.5363)
BPLM test			0.01	
			(0.4636)	
Hausman				35.07
				(0.000)
Adj R-squared		0.0693	0.0524	0.013
Modified Wald test				2.7e+07
				(0.000)
Wooldridge test				0.885
				(0.3476)
Observations		2015	2015	2015
No of Groups			302	302
F-Significance		0.000	0.000	0.0066

*Note: The regressand is ROE to measure the performance of the firm. In Column, I show the results of pooled regression. The results obtained from the random effect and fixed-effect models are presented in Column II and III respectively. Significance Codes: '***' = 0.01 '**' = 0.05 '*' = 0.1*