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## IMPACTS OF LEVERAGE ON INVESTMENT: A BRIEF VIEW OF PAKISTANI LISTED FIRMS

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### ABSTRACT

The association between financial leverage and corporate investment strategy is considered a significant concern in corporate finance; Therefore, we proceed with this line of research to elaborate further the impact of leverage on investment decisions using panel regression and Two-Stage Least Squares (2SLS) regression. Our sample covers all non-financial Pakistani firms listed in Pakistan Stock Exchange (PSX) from the year 2008 to 2017. The results indicate that there is an inverse relationship between leverage and investment in the Pakistani context. However, this inverse association is unique to higher and lower growth firms. We further documented that leverage has a negative and significant impact on the lower growth firms than the higher growth ones. Our results are aligned with the agency theory of corporate leverage, focusing mainly on the theory that financial leverage has a unique and disciplining position in low growth organizations.

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## 1. INTRODUCTION

Financial leverage and investment are the central and debatable issues in corporate finance for the last two decades. The history of the present broad topic of the research subject has raised interesting questions about the firm value and capital structure during this period. The firm performance is not fully driven by the capital structure in the entire market. However, looking into the real world; the concept of the imperfect market that includes tax factor, bankruptcy cost, transaction cost, and information cost is not ignorable that may influence the firms' capital structure in general and firm' value. For example, debt is a system that encourages tax benefits (tax shield), which increases the firm's value. Therefore, the firm incorporates an optimal capital structure (equity & debt) to improve the profitability and wealth of an organization (Modigliani, 1958). In the meantime, information regarding asymmetric cost has become a core factor in the financial market, but all the information does not necessarily reflect the current market prices. The information is transfer through the

managers, also known as a signal in the stock market term, and such signals may have a powerful impact on the capital structure. Under the underlying assumptions of signaling theory, the inside managers of the firm possess profound and reliable information than those outside the boundary of the firm. Firms utilize less expensive funds internally or externally and generate a positive information signal in the market, which increases the shareholder's wealth and the relative value. How much the mixture debt & equity should be utilized is still an interesting issue related to the emerging market. Consequently, the seminal work (Myers, 1977) has mentioned that higher growth and productive firms neglect the favorable Net Present Value (NPV) of the projects, which leads to an increase in the relative debt. The projects with higher NPV are considered more valuable for bondholders than shareholders.

On the other hand, the underinvestment theory helps to suggest that overhang debt creates a liquidity issue, and therefore, it has a direct influence on the firm's values. (Aivazian et al., 2005; Kang et al., 2000; Stiglitz & Wess, 1981) have discussed that in the imperfect market, the financing alternatives have a significant contribution to the financial decision process. The over-investment issue has a strong link with leverage. The overinvestment theory explains the divergent of interest between manager and shareholders arise due to the firm's manager's pay more attention to enhance the productivity of the firm by decreasing the shareholders' wealth and increasing the relative debt. Taking into account (Stulz, 1990; Michael C. Jensen, 1986) has argued that an inverse association between leverage and investment, which also decreases the firm's growth. As (Ahn et al., 2006; Alonso et al., 2005; Dang, 2011; Lang et al., 1996; Aivazian et al., 2005) have examined the less firm growth opportunities firms have a negative and significant relationship between investment and leverage. Another study, performed on five euro countries (Gebauer et al., 2018), have also indicated that debt levels are increased after 2008, and firms faced difficulties with generating investment opportunities. It is vital to understand the conditions and flow of emerging markets that exhibit higher difference than the developed markets.

The applied studies have been carried out in emerging countries (Umutlu, 2010; Firth et al., 2008), documented an inverse association between leverage and investment. However, the impact on lower and higher growth firm's opportunities have found dissimilarities in the result of three countries. In China, a weak connection between leverage and investment is captured. By taking evidence from the Turkish market, a negative relation is captured with those firms having lower growth opportunities. However, then a negative relationship can be controlled when the two-way error component approach is proposed.

Moreover, Ali et al., (2014) documented no effect of leverage on stock returns. While looking into Vietnam markets, results have a significant impact on higher growth firms rather than lower growth firms. However, in the developed market (Aivazian et al. (2005) find different results like lower growth firms have significantly negative impacts by investment than higher growth firms.

The core objective of contemporary research is to investigate the association between leverage and investment related to Pakistan's listed non-financial firms. The economy of Pakistan remains under pressure since the last decade because of law and order conditions. Therefore, the current research contributes to the following ways: First, this paper sheds light on the issue of leverage & investment in Pakistani format. Second, to the best of our knowledge, this is the first study that

improves the existing line of research in emerging markets.

Our remaining study is organized as follows. In Section 2, we highlight the methodological framework. While section 3 deliberate the results and discussion. Section 4 provides concluding remarks.

## 2. METHODOLOGY

### 2.1 DATA COLLOCATION

To contemplate the association between investment and leverage, we have selected a sample of Pakistani firms listed in the Pakistan Stock Exchange (PSX). We extract our data from profit & loss statements and balance sheets. Investment-related entries are selected from the balance sheet, i.e., total assets, total liabilities, depreciation, and shareholder equity, while other items are extracted from the profit and loss statements of the firms, i.e., net sales and cash flow. In the current study, we have incorporated annual data covering the period from 2008 to 2017, and 21% of firms from the total sample have been excluded from the empirical analysis due to financial listed stock and missing observation.

For measuring our dependent variable, we used the Net investment to Total assets formula ( $N.I/T.A$ ). While the loan is treated as an independent variable in our empirical model, which is used subsequently: First, the ratio of the book-value of long term loan to total assets (BLTA) is used as an independent variable as proposed by (Lang et al., 1996b). Second, the book-values of total liabilities to total assets ( $BTL/TA$ ) is taken as an independent variable in the empirical model. The set of control variables are,  $Q$  (total assets of market value/ total assets of book value) included as a proxy for growth opportunities. The value of  $Q$  is in between 1 or 0. If  $Q$  value is  $>$  than '1', would be considered as higher growth opportunities for firms and '0'; otherwise, net sales to total assets ( $NSTA$ ) and earnings before extraordinary items to deprecation ( $ERED$ ), respectively.

### 2.2 EMPIRICAL MODEL

The panel regression model has been used to test the statistics to identify the leverage and investment association, as proposed by the prior studies (Lang et al., 1996b; Aivazian et al., 2005) and the following model is used for further analysis :

$$\text{Investment } i_{it} = \gamma + \alpha_t + \theta \text{Leverage}_{i,t-1} + \beta \text{Tobin's } Q_{i,t-1} + \sigma \text{Cashflow}_{i,t-1} + \tau \text{Sale}_{i,t-1} + \mu_i + \varepsilon_{i,t} \quad (1),$$

where Investment  $i_{it}$  is a dependent variable indicating the firm's net investment measured as a net investment (tangible fixed assets with depreciation) of the firm 'i' to total assets.  $\gamma$ ,  $\alpha_t$  and  $\mu_i$  represents the constant, firm' fixed effect, and time fixed effects accordingly. Consequently,  $\text{Leverage}_{i,t-1}$  is the lagged of total liabilities to total assets and  $\text{Tobin's } Q_{i,t-1}$  is the lagged of Tobin's  $Q$  of the firm  $i$  at the time  $t$ . Moreover,  $\text{Cashflow}_{i,t-1}$  and  $\text{Sale}_{i,t-1}$  is the one period lagged of Cash flow (CF) and sale, respectively. However, we use two different methods to measure leverage, long term debt to total assets, and total liability to total assets as proposed by (Aivazian et al., 2005). Prior studies have also provided evidence that there is a significant association exists between investment & leverage in advanced and emerging countries (Lang et al., 1996a; Vo, 2019; Aivazian et

al., 2005). However, the effect of leverage on investment with higher and lower firms' growth opportunities may differ from country to country. To check the role of leverage on higher and lower firm' growth opportunities, we have identified the subsequent regression analysis.

$$\text{Investment } i_t = \gamma + \alpha_t + \theta \text{Leverage}_{i,t-1} + \delta D_{i,t-1} * \text{Leverage}_{i,t-1} + \beta \text{Tobin's } Q_{i,t-1} + \sigma \text{Cashflow}_{i,t-1} + \tau \text{Sale}_{i,t-1} + \mu_i + \varepsilon_{i,t} \quad (2)$$

Here, value has a 1 for dummy variable "D" if the Tobin's 'q' value is > than 1 and 0 otherwise.

### 3. RESULT AND DISCUSSION

The summary statistics of variables are displayed on the Table1. The standard deviation (SD) of investment to fix assets is more than two times greater than the mean value, which clearly shows a lower investment environment in the Pakistani market. Consequently, the mean of Tobin, 'Q' is less than 1, which also indicates that there were no growth opportunities for Pakistani firms in the entire sample period.

**Table 1: Descriptive Statistics**

Variables	N	Mean	SD	p1	Median	p99
Net investment/Lag Fixed assets	1678	0.116	0.294	-0.546	0.042	1.867
Lag (Long term debt/Total assets)	1671	0.923	0.646	0.176	0.801	4.866
Lag (Total Liabilities/Total assets)	1773	0.142	0.203	0	0.071	1.189
Lag Tobin's Q	2082	0.533	0.89	0.008	0.233	5.76
Cash flow/ Lag total assets	1679	0.181	0.33	-0.69	0.116	1.748
Lag (Sales/Fixed assets)	1917	3.181	4.766	0	1.885	34.362

The average value of total Long-term debt/Total assets (LTD/TA) and Total Liabilities/Total assets (TL/TA) are 0.923 and 0.142, respectively, which suggests that Pakistani firms are more interested to discourage short-term financing and encourage long-term financing. The correlations among the variables are depicted in Table 2 since the association among independent variables is not more than 30%, which shows the multicollinearity problem is absence in the data.

**Table 2: Pairwise Correlation Analysis of independent variables**

Sr.No	Variables	1	2	3	4	5
1	Lag (Long term debt/Total assets)	1.000				
2	Lag (Total Liabilities/Total assets)	0.328	1.000			
3	Lag Tobin's Q	0.091	0.075	1.000		
4	(Cash flow/ Lag total assets)	-0.214	-0.159	0.210	1.000	
5	Lag (Sales/Fixed assets)	-0.224	-0.015	0.172	0.301	1.000

Table 3 identifies the relationship between leverage & investment of listed non-financial firms at the Pakistan Stock Exchange (PSX). We have used two alternative explanatory variables of leverage, book value, and market value, while also try to estimate results using different methods, pool regression (PR), fixed effect (FE), random effect (RE) model for the robustness check. To select the most suitable method, we have imposed two statistical tests: one is Lagrange's Multiplier (LM) test for random effect developed by (Breusch and Pagan, 1980).

**Table 3: Panel Regression with Leverage and Investment**

Variables	Leverage <sub>t-1</sub> =LTD/TA				Leverage <sub>t-1</sub> =TL/TA			
	Pool	FE	RE	FE with AR (1)	Pool	FE	RE	FE with AR (1)
LEV	-0.102** (0.043)	-0.195*** (0.071)	-0.110** (0.047)	-0.362*** (0.093)	-0.024* (0.014)	-0.062** (0.027)	-0.033** (0.016)	-0.088*** (0.031)
Q <sub>(t-1)</sub>	0.005 (0.011)	0.048*** (0.018)	0.020* (0.012)	0.052** (0.022)	0.007 (0.011)	0.047*** (0.018)	0.021* (0.012)	0.052** (0.022)
CF/TA <sub>(t-1)</sub>	0.078** (0.034)	0.101** (0.045)	0.063* (0.035)	0.083* (0.055)	0.072** (0.034)	0.103** (0.045)	0.058* (0.035)	0.103* (0.055)
Sale/TA <sub>(t-1)</sub>	0.006*** (0.002)	0.022*** (0.006)	0.007*** (0.002)	0.026*** (0.007)	0.008*** (0.002)	0.022*** (0.006)	0.008*** (0.002)	0.026*** (0.007)
Constant	0.065 (0.041)	0.037 (0.025)	0.095*** (0.014)	0.041 (0.029)	0.071 (0.043)	0.063* (0.034)	0.106*** (0.018)	0.068* (0.038)
LM test	Chi <sup>2</sup> (1) = 1.69*				Chi <sup>2</sup> (1) = 1.64*			
H test	Chi <sup>2</sup> (4) = 17.32***				Chi <sup>2</sup> (4) = 15.89***			
Observations	1,187	1,187	1,187	960	1,187	1,187	1,187	960
Firms		227	227	202		227	227	202
R-squared	0.066	0.042	0.038		0.064	0.040	0.036	

Table 3 shows the LM test and chi-square values are 1.69 and 1.64, respectively, due to different methods of leverage measurement, which confirms that the pool regression is not suitable. Further, the Hausman test derived by (Hausman, 1978) is the best method to select the fixed or random effect, and Hausman test explains that independent variables are not correlated with individual effects., if it is not, then FEM and REM should be statistically same. Table2 reports that the Hausman test chi<sup>2</sup> values are 17.32 and 15.89, respectively, for the two (measure of Leverage) different models, which suggests that the FEM is much compatible with an estimation of investment & leverage. While Table 3 reports that both measures of alternative leverage have a significantly negative link with investment. The coefficients are -0.195 and -0.062, respectively, which advocates that a 0.01 unit increase in both measures of leverage will decrease the investment by 0.0195 and 0.0062 units

**Table 4: Panel Regression Analysis with High and Low Growth Firms**

Variables	Leverage <sub>t-1</sub> =LTD/TA				Leverage <sub>t-1</sub> =TL/TA			
	Pool	FE	RE	FE with AR-1	Pool	FE	RE	with AR -1
LEV	-0.105** (0.043)	-0.195*** (0.071)	-0.113** (0.047)	-0.365*** (0.094)	-0.026* (0.014)	-0.067** (0.027)	-0.035** (0.016)	-0.092*** (0.031)
D*LEV	0.092 (0.233)	0.020** (0.008)	0.093 (0.238)	0.004* (0.002)	0.045 (0.044)	0.109* (0.059)	0.050 (0.046)	0.118* (0.069)
Q <sub>(t-1)</sub>	0.003 (0.012)	0.048** (0.019)	0.019 (0.013)	0.051** (0.022)	-0.003 (0.015)	0.029 (0.021)	0.011 (0.016)	0.034 (0.024)
CF/TA <sub>(t-1)</sub>	0.080** (0.034)	0.101** (0.045)	0.065* (0.035)	0.084 (0.055)	0.070** (0.034)	0.107** (0.045)	0.057 (0.035)	0.106* (0.055)
Sale/TA <sub>(t-1)</sub>	0.006*** (0.002)	0.022*** (0.006)	0.007*** (0.002)	0.026*** (0.007)	0.007*** (0.002)	0.022*** (0.006)	0.008*** (0.002)	0.026*** (0.007)
Constant	0.066 (0.041)	0.037 (0.025)	0.095*** (0.015)	0.041 (0.029)	0.074* (0.043)	0.065* (0.034)	0.109*** (0.019)	0.068* (0.038)
H. test	Chi <sup>2</sup> (5) = 17.31***				Chi <sup>2</sup> (5) = 17.88***			
Observations	1,186	1,186	1,186	960	1,187	1,187	1,187	960
R-squared	0.066	0.042	0.040		0.064	0.043	0.041	
Firms		226	226	202		227	227	202
R-squared	0.066	0.042	0.040		0.064	0.043	0.041	

The control variables of both models: Tobin's (Q), sale, and Cash (CF) have a significantly favourable effect on investment. Further evidence regarding the fixed-effect model, we have checked



the econometric properties of the model. The high association among explanatory variables may affect the estimation results; an increase in correlation may improve the coefficient of the standard error, which may change the significant results into insignificant results. However, in the study Table 2, correlation matrices show that there is not a high relationship among the independent variables, so it does not affect the regression model. Additionally, using the AR (1) process, it is confirmed that the model has no first-order autocorrelation between error terms. Finally, we apply white's test to check the heteroscedasticity problem in the model and to get consistent-statistics. Table4 displays the linkage between investment & leverage, keeping low versus improved growth firms in the model. The values of Q in both alternative measures of leverage are positive under different (pooled, Fixed and Radom effect) models.

**Table 5: 2SLS Instrument Regression with Leverage and Investment**

Variables	Leverage <sub>t-1</sub> =Long term debt/Total assets		
	Pool	FE	RE
(IV) LEV	-0.910** (0.411)	-7.302*** (1.456)	-1.073** (0.458)
D*(IV)LEV	0.590** (0.267)	4.377*** (0.870)	0.687** (0.292)
Q <sub>(t-1)</sub>	0.047** (0.019)	0.318*** (0.058)	0.056*** (0.021)
CF/TA <sub>(t-1)</sub>	0.090*** (0.034)	0.260*** (0.057)	0.090** (0.036)
Sale/TA <sub>(t-1)</sub>	0.013*** (0.003)	0.074*** (0.010)	0.015*** (0.004)
Constant	-0.141 (0.091)	-1.491*** (0.299)	-0.174* (0.100)
Hausman test	Chi <sup>2</sup> (4) = 26.33***		
Observations	1,220	1,220	1,220
R-squared	0.070	0.096	0.082
Firms		229	229

The 'Q' coefficient values of range are from 0.02 - 0.109 indicate leverage has a significantly negative effect on corporate investment for lower growth than higher growth firms, which confirm that leverage plays a vital role in corporate investment. If we compare the test statistics of the model (1) and model (2), the coefficient value of control variables (sale, cash flow, and Tobin 'Q',) does not change and remains persistent. Thus, the results are persistent to the previous study conducted by (Aivazian et al., 2005; Alonso et al., 2005; Dang, 2011; Lang et al., 1996; Ahn et al., 2006;) which also have studied the inverse effect of leverage on the corporate investment. Consequently, we have deployed fixed assets as an instrument variable and further examined the relationship between coefficients of interest. The two-stage least square (2SLS) Table 5 displays the findings of our regression, which remains persistent with improvement. Therefore the results are persistent to the previous literature of (Firth et al., 2008; Aivazian et al., 2005; Dang, 2011) where they have examined overall leverage negatively effects on corporate investment. Moreover, they have also scrutinized opposite (positive) association between investment & leverage with a high growth firm and vice versa.

## 4. CONCLUSION

The central and debatable issues in corporate finance are Investment and financial leverage for the last two decades. We have analyzed the link between leverage & investment decision with the help of a panel regression model in the context of Pakistani capital market. It is scrutinizing that financial capital is a measure of leverage having an inverse influence on corporate investment. Our findings are consistent with the prior studies (Dang, 2011; Firth et al., 2008; Aivazian et al., 2005), identifying a negative and significant influence of leverage on investment decisions in firms having lower growth than that higher growth opportunities firms. This paper provides credibility to agency theories of leverage and summaries that corporate leverage provides a unique disciplining position by restricting managerial decisions over the investment decision with lower growth opportunities.

## 5. DATA AND MATERIAL AVAILABILITY

Relevant information regarding this study is available by request to the corresponding author.

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