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The Co-determinants of Capital Structure and Stock Returns: Evidence from the Karachi Stock Exchange

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Abstract

This study uses a structural model to analyze the co-determinants of capital structure and stock returns. Applying a generalized method of moments (GMM) model to a panel dataset for 100 nonfinancial firms for the period 2006–10, our results indicate that both leverage and stock returns affect each other but that the former has a dominant effect on the latter. The results illustrate that profitability, growth, and liquidity are significant determinants of leverage and stock returns. Profitability negatively affects leverage and positively affects stock returns. Growth has a positive effect, while liquidity has a negative effect on leverage and stock returns. Firm size does not have any significant effect on either capital structure or stock returns.

Keywords: Capital structure, stock returns, GMM, Pakistan.

JEL classification: C33, C36, G30.

1. Introduction

Capital structure is an amalgam of a firm's liabilities and equity. Capital structure and composition is a crucial aspect of business, and plays a vital role in firms' survival, performance, and growth (Voulgaris, Asteriou, & Agiomirgianakis, 2004). Firms choose different levels of financial leverage in their attempt to achieve an optimal capital structure, and capital structure policy involves a tradeoff between risk and return. An increase in debt intensifies the risk of a firm's earnings, which leads to a higher rate of return to investors. High risk tends to lower the stock's price, while a high rate of return increases it, so the firm's capital structure policy determines its returns.

Capital structure, stock returns, and their determinants have garnered considerable attention among researchers in financial

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management. Although many studies have examined the determinants of either capital structure or stock returns, few have investigated both. Some show that stock returns determines capital structure (Baker & Wurgler, 2002; Welch, 2004), while others argue the opposite: that capital structure determines stock returns (Bhandari, 1988). Some studies show that capital structure and stock returns affect each other simultaneously (Yang, Lee, Gu, & Lee, 2010). However, no such study has been conducted in the context of Pakistan that shows the simultaneous interaction between capital structure and stock returns. We start with the premise that capital structure and stock returns are interrelated, and are primary determinants of one another since they play an important role in optimal business decision-making.

There is a dearth of literature on this subject in the context of Pakistan. Although studies on Pakistan have identified different determinants of capital structure—including tangibility, firm size, growth, earning volatility, profitability, nondebt tax shield, and income variation (Hijazi & Tariq, 2006; Rafiq, Iqbal, & Atiq, 2008; Shah & Hijazi, 2004; Shah & Khan, 2007; Sheikh & Wang, 2011)—none incorporate stock returns as a determinant. Furthermore, no empirical work has been conducted on Pakistan that explains the effect of capital structure on stock returns. Previous studies identify only dividends and earnings per share as firm-specific variables that can affect stock returns (Azam, 2011). No study shows the simultaneous interplay between capital structure and stock returns. This study tries to fill that gap.

The rest of the paper is organized as follows. Section 2 provides a theoretical framework. Section 3 presents an overview of the data used, and estimates and interprets the model. Section 4 concludes the paper.

2. The Model

This section derives a theoretical model that will be empirically estimated in the following section. In line with the previous research on this topic (see, for instance, Chen & Chen, 2011; Yang et al., 2010), our proposed econometric model is as follows:

$$Lev_t = \beta_0 + \beta_1 SR_t + \beta_2 SZ_t + \beta_3 PF_t + \beta_4 GW_t + \beta_5 LQ_t + \mu_t \quad (1)$$

$$SR_t = \alpha_0 + \alpha_1 Lev_t + \alpha_2 SZ_t + \alpha_3 PF_t + \alpha_4 GW_t + \alpha_5 LQ_t + \nu_t \quad (2)$$

where the following variables are defined as given:

Lev_t = leverage

SR_t = stock returns

SZ_t = size of firm

PF_t = profitability

GW_t = growth of firm

LQ_t = liquidity ratio

μ_t , ν_t = white noise error terms

Each of the included variables and the relevant theory that justifies their inclusion in the model are explained below.

- *Stock returns:* A higher stock return increases the market value of assets and, hence, the debt ratio decreases (Yang et al., 2010). This implies that stock returns negatively affects leverage $(\beta_1 < 0)$.
- *Leverage:* Theoretically, if a firm is highly leveraged, then the investor will demand a higher return on its stock due to the high risk of bankruptcy (Bhandari, 1988; Yang et al., 2010). Therefore, one would expect leverage to have a positive effect on stock returns $(\alpha_1 > 0)$.
- *Size of firm:* According to the tradeoff theory, larger firms, which are more diversified, have lower bankruptcy costs, and easier access to capital markets, obtain more debt. The pecking order theory, however, suggests that larger firms rely on internal sources of finance and, hence, do not choose debt or equity as their first option for financing. Empirically, studies have found that larger firms borrow more in order to take maximum advantage of tax shields. Thus, firm size is expected to have a positive effect on leverage $(\beta_2 > 0)$. Since smaller firms may suffer from earnings depression and information asymmetry, it involves more risk than larger firms, and investors demand more return on their stock (Gallizo & Salvador, 2006). Hence, firm size is expected to have a negative effect on stock returns $(\alpha_2 < 0)$.
- *Profitability:* The pecking order theory of capital structure implies that profitable firms will not opt for debt or equity financing because they have sufficient funds to finance their assets. However, the tradeoff theory proposes a positive relationship between profitability and

leverage. Intuitively, this suggests that higher-profit firms can, on the strength of their reputation, easily acquire debt and take maximum advantage of tax shields. Hovakimian, Opler, and Titman (2001) argue that there is no association between profitability and leverage because unprofitable firms also issue equity to offset the effect of excessive leverage. Empirically, a negative relationship emerges between firm profitability and leverage (Chen & Chen, 2011; Yang et al., 2010). Thus, we expect profitability to have a negative effect on leverage $(\beta_3 < 0)$. Since higher-profit firms provide more return on their stocks, profitability should have a positive effect on stock returns $(\alpha_3 > 0)$.

- *Growth:* According to the pecking order theory, if a firm's internal sources are not enough to fund new projects, it will opt for debt financing. This shows that high-growth firms are highly leveraged because they can acquire more debt due to their need for greater financing. The trade-off theory hypothesizes that growth opportunities cannot be collateralized to acquire debt and that growing firms have enough resources to finance new activities. So, there is a negative relationship between growth and leverage. Empirical studies have also found that growth has positive and negative effects on leverage. Thus, the sign of β_4 cannot be determined a priori. Chen and Chen (2011) explain that a firm's growth causes variation in its value, and greater variation is associated with greater risk. This implies that growth positively affects stock returns $(\alpha_4 > 0)$.

- *Liquidity:* The pecking order theory explains that retained earnings increase liquid assets; excess liquid assets are negatively associated with firm leverage. The trade-off theory suggests that firms with a high ratio of liquid assets should borrow more because they have the ability to meet their contractual obligations on time. This theory predicts a positive relationship between liquidity and leverage. Based on the empirical studies carried out, firms with high levels of liquid assets are likely to acquire less debt and rely on internally generated funds. Thus, liquidity should negatively affect leverage $(\beta_5 < 0)$. While analyzing the effect of liquidity on stock returns, many empirical studies have found a negative relationship between liquidity and stock returns. Most theoretical and empirical studies have demonstrated that liquidity has a negative effect on stock returns since liquid stock involves less risk, so the return on liquid stock is low (Chen & Chen, 2011; Yang et al., 2010). Thus, there is a negative relationship between liquidity and stock returns $(\alpha_5 < 0)$.

3. Data, Estimation, and Interpretation of Results

3.1. Data Overview

Following the standard practice, leverage is calculated as the ratio of total liabilities to total assets. Total liabilities (assets) include short-term and long-term debt (assets). Stock returns are measured as the ratio of the market value to book value of equity. The market value of equity is calculated as the product of price per share and common shares outstanding, while the book value of equity is calculated as total assets minus total liabilities and preferred stocks. The log of the firm's total sales is used as a proxy for firm size. Profitability is calculated as the ratio of net profit before taxes to total assets of the firm. Firm growth is measured by the percentage change in total assets. Liquidity is measured as the ratio of current assets to current liabilities.

Data was collected for 100 nonfinancial companies listed on the Karachi Stock Exchange (KSE) for the period 2006–10, and taken from the State Bank of Pakistan, the KSE, the *Business Recorder*, and companies' annual reports.

Table 1 provides summary statistics for the variables used in this study, which helps interpret the coefficient estimates by providing the scale of the relevant variables.

Table 1: Summary statistics for variables used

Variable	Mean	Median	Std. dev.	Minimum	Maximum	Count
Leverage	0.65	0.66	0.25	0.02	1.67	500
Stock returns	1.15	0.65	5.65	-65.30	56.25	500
Size	14.69	14.55	1.74	7.35	18.87	500
Profitability	0.05	0.02	0.14	-0.38	0.74	500
Growth	0.11	0.07	0.22	-0.61	1.20	500
Liquidity	1.31	0.99	1.20	0.00	9.66	500

Source: Authors' calculations.

Table 2 presents the correlation matrix for the variables. Column (1) of Table 2 correlates leverage with all the independent variables. The value of the correlation coefficient of stock returns is -0.234, which indicates that leverage and stock returns are inversely correlated with each other. This result is also supported by Figure 1, which illustrates the trend analysis

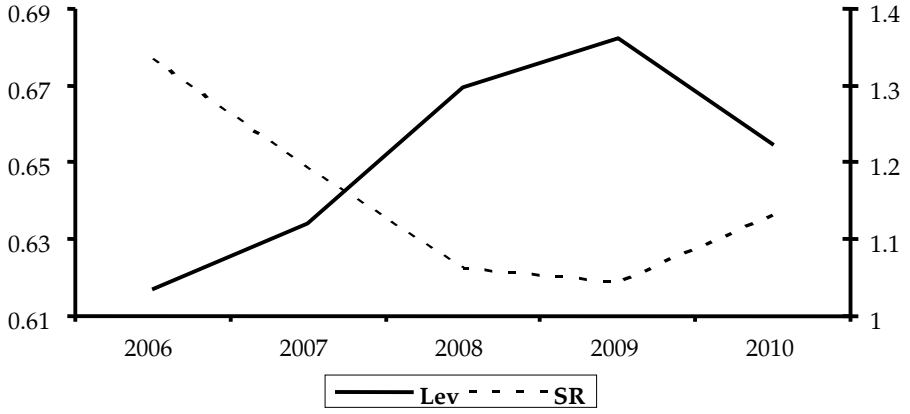
between leverage and stock returns.[1] It is evident from the figure that both variables are inversely related with one another. This statistical analysis remains, however, simplistic, and calls for a more rigorous framework, which is done in the next section.

Table 2: Correlation matrix of variables

Variable	Leverage	Stock returns	Size	Profitability	Growth	Liquidity
Leverage	1.000					
Stock returns	-0.234	1.000				
Size	-0.106	0.076	1.000			
Profitability	-0.540	0.161	0.340	1.000		
Growth	-0.121	0.066	0.234	0.221	1.000	
Liquidity	-0.643	0.081	-0.025	0.519	0.085	1.000

Source: Authors' calculations.

Figure 1: Trend analysis between leverage (Lev) and stock returns (SR)



Source: Authors' calculations.

3.2. Estimation and Interpretation of Results

We cannot use least squares to estimate our structural model because the potential endogeneity of the variables might render the least-square estimators biased and inconsistent. Therefore, we use the generalized method of moments (GMM) (see Arellano & Bond, 1991; Arellano, 1993; Arellano & Bover, 1995) to estimate our panel model. GMM

[1] Period average values are taken for the companies.

estimators control for the potential endogeneity of the lagged dependent variable, and for that of other explanatory variables in the model (Judson & Owen, 1999). The lagged values of the variables are used as instruments.

The results of the structural model are reported in Table 3. Column (1) gives the results of the leverage equation. The t-statistic for the stock returns coefficient (-2.9929) indicates that there is a statistically significant negative relationship between stock returns and leverage. The coefficient for stock returns is -0.0011, which means that a one-standard deviation increase in stock returns (5.65) leads to a -0.0062 decrease in leverage. Although, statistically, this result is significant, economically it is very weak. The result is consistent with the market timing theory of capital structure, which states that, when the return on a stock is high, a firm's managers will focus on equity financing rather than debt financing, thereby decreasing the firm's leverage. This negative relationship between stock returns and leverage shows that Pakistani firms do consider stock returns an important factor when determining an optimal capital structure.

The results for the other variables are also in line with theoretical predictions. Firm size affects leverage negatively. This result is consistent with the pecking order theory, which suggests that larger firms have internal sources of financing, and therefore do not opt for debt or equity as their first option. However, this result is statistically insignificant, implying that size is not an appropriate explanatory variable of debt ratio. The result reflects the findings of empirical studies on Pakistani firms that have also demonstrated that firm size does not have a significant relationship with leverage (Hijazi & Tariq, 2006; Shah & Khan, 2007).

Profitability has a significant negative effect on leverage, which implies that, in Pakistan, profitable firms do not prefer debt or equity financing because they have sufficient funds with which to finance their assets. Firm growth significantly and positively affects leverage. This result is in accordance with the pecking order theory that firms acquire more debts to fund new projects. The coefficient of growth indicates that a one-unit increase in growth will tend to increase leverage by 0.0319 units. Liquidity has a significant negative effect on leverage. This result also complies with the pecking order theory that firms with high levels of liquid assets will acquire less debt and rely more on internally generated funds.

Column (2) gives the results for the stock returns equation. The t-statistic for the leverage coefficient (-3.0032) indicates that there is a statistically significant negative relationship between leverage and stock returns. The coefficient of leverage is -4.6199, which means that a one-

standard deviation increase in leverage (0.25) leads to a -1.1550 decrease in stock returns. Unlike the weak effect of stock returns on leverage, however, the effect of leverage on stock returns is statistically strong.

Our results are in line with those of Chen and Chen (2011), who argue that firms with greater leverage face a higher risk of bankruptcy—investors accordingly feel more anxious when investing in the stocks of highly leveraged firms, and such investor behavior causes the value of the stock to fall. Furthermore, lenders impose different kinds of restrictions on firms, which can adversely affect the latter's performance. For example, lenders may restrict companies from using borrowed money in risky projects. Such restrictions can affect firms' performance negatively, making them unable to generate more return on their stock. The coefficient of firm size is insignificant, which means that the variable has no effect on stock returns—a result that goes against the theoretical expectation that firm size affects stock returns. The results also show that profitability has a significant positive effect on stock returns, i.e., high-profitability firms provide a high return on their stock in Pakistan.

As theoretically expected, firm growth significantly and positively affects stock returns. This result is in line with the notion that investors consider the stocks of growing firms more valuable because they expect a high future return and accord more worth to the stock of growing firms. This investor behavior causes an increase in the market value of the stock compared to its book value, which is an indication of high stock returns. It implies that growing Pakistani firms provide more return on their stocks. Finally, liquidity has a significant negative effect on stock returns. This result shows that firms with greater liquid stocks provide low (required) returns on their stock because stocks with high liquidity carry no risk and investors will purchase such stocks even at a low (required) return. As far as the relationship between leverage and stock returns is concerned, our results indicate that both have an opposite effect on each other: An increase in leverage decreases stock returns and an increase in stock returns decreases leverage. However, this negative influence is more dominant in the case of the effect of leverage on stock returns.

Columns (3) and (4) give seemingly unrelated (SUR) regression estimates. The SUR estimator, while inconsistent (no instruments are used), is characterized by greater efficiency and may prove some indication of the model's robustness. The SUR estimates provide almost the same results as the GMM estimates, but the significance levels of the variables have decreased greatly, and some variables have also become insignificant.

We have applied an autoregressive (AR) process to remove the problem of autocorrelation from the models. High values of R^2 and adjusted R^2 in the leverage equation indicate that the model fits the data fairly well. However, low values of R^2 in the stock returns model indicate that other variables—that have not been included in the model—also affect stock returns. The Durbin Watson (DW) values are close to the desired value of 2, which indicates the absence of an autocorrelation problem in the model. The high p-value of the J-statistic indicates that the instruments are valid.

Table 3: Estimated results of model

	GMM estimates		**SUR estimates**	
	Leverage	**Stock returns**	**Leverage**	**Stock returns**
Variable	**(1)**	**(2)**	**(3)**	**(4)**
Intercept	0.9286	7.3139	0.7777	11.5345
	(5.2460)*	(2.3452)*	(5.2720)*	(2.1528)*
Stock returns	-0.0011		-0.0027	
	(-2.9929)*		(-3.4116)*	
Leverage		-4.6199		-10.4364
		(-3.0032)*		(-4.3464)*
Size	-0.0078	-0.1630	0.0032	-0.1806
	(-0.7315)	(-0.9244)	(0.3687)	(-0.5615)
Profitability	-0.2727	5.2585	-0.3089	3.4174
	(-4.0313)*	(2.6621)*	(-6.3007)*	(1.0634)
Growth	0.0319	1.1462	0.0377	2.4075
	(1.6542)**	(2.0412)*	(2.2110)*	(2.0013)*
Liquidity	-0.0653	-0.5186	-0.0458	-0.7997
	(-6.9983)*	(-2.2713)*	(-6.4625)*	(-1.8082)**
AR (1)	0.9215	0.5695	0.9236	0.5853
	(45.2242)*	(5.0648)*	(40.5632)*	(11.6663)*
R^2	0.8759	0.2951	0.8775	0.2922
Adjusted R^2	0.8740	0.2843	0.8756	0.2814
DW	2.1675	1.9067	2.1366	1.9514
J-statistic	0.0501			
p-value (J-statistic)	0.9999			

Note: Values in parentheses are underlying student-*t* values. The *t* statistics significant at 5% and 10% levels of significance are indicated by * and **, respectively.
Source: Authors' calculations.

4. Conclusion

This study has used a structural model to find the co-determinants of capital structure and stock returns, employing a panel dataset for 100 nonfinancial firms listed on the KSE for the period 2006–10. The GMM was used to estimate the model and overcome the potential endogeneity problem. The results show that stock returns and leverage affect one another but that the effect of leverage on stock returns is greater than the effect of stock returns on leverage. The results also indicate that profitability, growth, and liquidity are significant determinants of both leverage and stock returns. Profitability affects leverage negatively and affects stock returns positively. Growth has a positive effect and liquidity has a negative effect on leverage and stock returns. Firm size, however, does not have any significant effect on either capital structure or stock returns.

Our results show that the pecking order theory of capital structure best explains the financing behavior of Pakistani firms. This suggests that they do not have a specific debt ratio; rather, they follow a hierarchy in their methods of financing. The results also indicate that Pakistani nonfinancial sector firms prefer to use internal sources of financing over external sources. As far as stock returns is concerned, the results support the market timing theory in best explaining the financing decisions of Pakistani firms: Firms will issue equity when the return on a stock increases.

Future research could extend the scope of the study to include a large number of nonfinancial companies and financial companies over a longer period. Adding other determinants such as asset structure, tax shield, business risk, and earning volatility to the variables used in this study may provide additional insights.

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