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Impact of Capital Structure on the Stock Price Performance

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This article aims to shed light on the propositions put forward by Modigliani and Miller (1958, 1963) in their seminal work concerning the relationship between firm value and the financing decision. Debt is one of the principle sources of financial risk. Rational, risk-averse investors should demand a leverage premium, indicating an expected positive relationship between a firm's leverage and stock returns.

This paper aims to investigate the impact that the capital structure of a firm has on its stock price performance. Regression analysis is applied at a sample consisting of listed Indian construction companies over the period 2007-2011, both at the full sample level and at four leverage deciles. In doing so, it is tested if leverage is priced as a risk factor by constructing a leverage factor.

Debt is one of the principle sources of financial risk. Rational, risk-averse investors should demand a leverage premium, indicating an expected positive relationship between a firm's leverage and stock returns. The vast majority of studies in the area of capital structure investigate either the determinants of leverage or the existence of an optimal capital structure. Also, there are a few studies that examine the relationship between leverage and stock returns, with contradictory results.

The main contribution of the work is that capital structure studies are diversified by broadening the limited work that has been accomplished on the base of leverage as an explanatory variable of returns. The present paper involves the performance of a step–wise regression analysis of the stock returns of the sample stocks against the returns of five risk factors, i.e., market risk , size , value , momentum ,and leverage . Specifically, the analysis is applied both on a portfolio level and on a whole sample basis, where leverage is used as the criterion to allocate stocks in four portfolios.

The step–wise regression analysis approach is used to observe the change in the explanatory power of the independent variables (i.e., statistical significance and numerical value of the parameters).Specifically, the following models are be tested: a univariate model involving the leverage risk factor; the Capital Asset Pricing Model; the Fama and French model; the Carhart four factor model; the five factor model. The

findings show that the leverage risk factor contains significant information content and that it adds a considerable portion in the explanation of stock returns.

The vast majority of studies in the area of capital structure investigate either the determinants of leverage or the existence of an optimal capital structure. Also, there are a few studies that examine the relationship between leverage and stock returns, with contradictory results. The aim of the present project is to find empirical evidence in the relationship between leverage and stock returns. In doing so, we treat leverage as an independent factor and examine whether leverage is an asset-pricing factor that can explain stock return variability. By using leverage as an independent factor, the results of the present study can be converted to a practical tool, or a successful investment (leverage) strategy.

The data analysis involves the performance of a step–wise regression analysis of the excess (ERim) returns of the sample stocks against the returns of five risk factors, i.e., market risk premium (MRPm), size (SMBm), value (HMLm), momentum (WMLm),and leverage (HLMLLm). Specifically, the analysis will be applied both on a portfolio level and on a whole sample basis, where leverage is used as the criterion to allocate stocks in four portfolios.3 The step–wise regression analysis approach will help us to observe the change in the explanatory power of the independent variables (i.e., statistical significance and numerical value of the parameters).Specifically, the following models will be tested: i) a univariate model involving the leverage risk factor; ii) the Capital Asset Pricing Model; iii) the Fama and French three Factor Model; iv) the Carhart (1997) four factor model; and v) a five factor model involving all risk factors

All stocks at the end of December of each year t from 1998 to 2008 are ranked on leverage and divided into four leverage groups (portfolio L1 consists of the low levered firms, while portfolio L4 consists of the high levered firms). A broad definition of leverage is used (Total debt to Total Assets), in order to capture the substitutability between the various forms of debt. The market risk premium was calculated as the monthly logarithmic return of a market for the period from April 2007 to June 2012.

The market return is proxied by the CNX INFRA index, which is a capitalization-weighted index consisting of the 60 largest companies of the construction industry. In order to calculate the returns of the SMB, HML, HLMLL, and WML risk factors, all stocks at the end of March for each year t from 1999 to 2008 were ranked:

- On size (capitalization) and allocated into two size groups (small and large)
- On their book equity to market equity ratio (BEt−1/MEt−1) and divided into three BE/ME groups (30% of stocks are allocated to the lowest BE/ME portfolio, 40% to the medium BE/ME portfolio, and 30% to the highest BE/ME portfolio)
- On their average monthly return of the previous year, from highest to lowest, and allocated into two momentum portfolios winner portfolio and looser portfolio
- On their leverage ratio of year t−1 and allocated into two leverage portfolios (Low and High).

Need for the study

From the survey it is known that capital structure of a firm significantly impacts its stock price, but the results are not consistent and it varies from industry to industry and economy to economy. This study is mainly to explore the dependence of stock price on the capital structure of the firm in the Indian construction industry by developing a model that determines the influence of debt component in the capital structure on the stock returns.

The main objective of the study is

- To study the impact the capital structure of a firm has on its stock price performance.
- To study the role of leverage as strategic investment instrument.

The sample used in the empirical tests consists of construction firms listed on the BSE and NSE. Totally there are 65 firms operating in Civil engineering and construction segment. Out of these 65 firms listed 35 firms data is collected from the period 2007 to 2012.This resulted in total 175 observations.

Companies that have changed name under the selected period are identified and treated as a single unit. Moreover, companies that either merged or are acquired over the study period are treated as a new unit following the event. By adopting simple random sampling method a selection bias toward historically successful firms is limited to a great extent. Moreover, firms with no available financial information for book, market equity, or leverage for at least 12 months are not included in the sample either.

One Factor Model

The empirical results of the one factor model involving the leverage risk factor and stock returns, shown in the table below revealed a positive relationship between stock returns and leverage, both on the portfolio and whole sample basis. In most cases, both the regression coefficient and the leverage coefficients are significant, indicating that statistically significant positive relationship exists between the dependent and independent variables. Finally, the very low regression coefficient and negative intercept value indicates that leverage cannot explain by itself the cross-section of stock returns and there are also other factors which negatively influences the stock returns.

Table no 1: One factor model

Portfolio Coefficient	Constant	Leverage	R Square	F statistic	Significance
ALL	0.02	1.885	0.289	14.449	0.000
1	-0.098	1.204	0.555	10.24	0.004
2	1.176	1.171	0.589	17.004	0.000
3	0.075	0.956	0.573	10.662	0.003
4	-0.193	0.765	0.489	91.778	0.000

The leverage coefficient increases as we move from low (L1) to medium-levered firms (L3) and then declines for high levered firms (L4).This shows that leverage impacts the market value of shares by affecting the share holders return and risk, the capital structure decision is a significant financial decision. The debt-equity mix has implications for the share holders earnings and risk, which in turn will affect the cost of capital and the market value of the firm.

Table no 2:Correlation between leverage and returns

		Leverage	Rate
Leverage	Pearson Correlation	1	.438**
	Sig. (2 – tailed)		.000
	N	175	175
Rate	Pearson Correlation	.438*.*	1
	Sig. (2 – tailed)	.000	
	N	175	175

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

Capital asset pricing model

The results of the model are shown in the table below. The beta coefficients are calculated by regression the returns of sample stocks against market return of the portfolio. The CNX infra index value is used as proxy for market return. The market risk factor turned out, as expected, to be positive and significant, both in the full sample and on the portfolio level (Table 2). The beta coefficient increases as we move from low (L1) to medium-levered firms (L3) and then declines for high levered firms (L4), indicating that investors require a larger return for holding companies with higher leverage ratios.

Table no 3: Capital asset pricing model

Portfolio Coefficient	Constant	Leverage	R Square	F statistic	Significance
ALL	-11.551	1.485	0.606	91.897	0.000
1	-0.118	0.090	0.432	5.280	0.031
2	0.139	0.049	0.486	9.897	0.004
3	0.022	0.044	0.616	13.455	0.001
4	-2.007	0.038	0.553	27.720	0.000

Table no 4 - Correlation between market return and stock return

		Leverage	Rate
Rate	Pearson Correlation	1	.604**
	Sig. (2 – tailed)		.000
	N	175	175
Index	Pearson Correlation	.604*	1
	Sig. (2 – tailed)	.000	
	N	175	175

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

The results of the above analysis indicate that there exists a significant positive relationship between the market risk and stock returns. This behavior of the shareholders towards highly levered firms can be attributed to the fact that high leverage in the capital structure exposes the shareholders returns to market risk by increasing the variability of earnings per share with respect to the change in earnings before interest and depreciation. Hence share holders wish to compensate this by discounting their expected returns with market risk premium factor. Higher value of regression coefficient indicates that market risk factor can better explain the variability of stock returns compared to leverage factor.

Fama and French three factor model

Fama and French (1992) find that the main prediction of the CAPM, a linear cross-sectional relationship between mean excess returns and exposures to the market factor violates exposures to two other factors, a size based factor and a book-to-market-based factor, often called a "value" factor, these factors explain a significant part of the cross-sectional dispersion in mean returns. If stocks are priced rationally, then systematic differences in average returns should be due to differences in risk. Thus, given rational pricing, the market, size and value exposures must proxy for sensitivity to pervasive risk factors in returns. We analyze whether the market, size and value factors are pervasive in the cross-section of random stock returns. We investigate whether there are market, size and value factors in corporate earnings similar to those in returns, and whether the common risk factors in earnings translate into common risk factors in returns. The results of the above analysis is shown in the table

Table no 5 - Fama and French three factor model

Portfolio	Constant	SML	Market Risk	HML	R square Statistic	F	Significance
All	-4.599	0.472	0.604	0.01	0.590	86.1	0.000
1	0.139	0.372	0.5	0.1	0.406	4.068	0.002
2	0.154	0.287	0.38	0.48	0.494	3.225	0.0036
3	0.122	0.243	0.33	0.28	0.397	1.867	0.001
4	-1.964	0.238	0.267	0.13	0.556	9.101	0.000

Table no 6 - Correlation between various factors involved in three factor model

		Rate	Index	Value	Size
Rate	Pearson Correlation	1	0.604**	0.325**	0.717**
	Sig. (2 – tailed)		.000	.000	.000
	N	175	175	175	175
Index	Pearson Correlation	.604.*	1	.465**	.610**
	Sig. (2 – tailed)	.000		.000	.000
	N	175	175	175	175

	Pearson Correlation	.325**	.465**	1	.511**
Value					
	Sig. (2 – tailed)	.000	.000		.000
	N	175	175	175	175
	Pearson Correlation	.717**	.610**	.511**	1
SIze					
	Sig. (2 – tailed)	.000	.000	.000	
	N	175	175	175	175

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

The coefficient of the market risk premium once again showed the same increasing pattern, confirming the results from the CAPM model. The size factor coefficient exhibited an increase monotonically as we moved from low- to high-levered portfolios, indicating that investors require a size premium. Small sized stocks always outperform large sized companies. To attract shareholders large sized firms should provide a premium.

The HML factor showed a non monotonic relationship with the leverage, as we move from low levered portfolio to medium levered portfolio the HMLL factor initially increased and then it declined from medium to high levered which validated the findings of traditional theory of capital structure, according to which the weighted average cost of capital initially reduces and adds to the value of the firm due to the tax shield provided by the inclusion of debt and after reaching a certain point called indifference point the value of firm reduces with the inclusion of further debt as the tax shield advantage disappears due to increase in the cost of equity, which increases the weighted average cost of capital.

This model evidenced an even higher coefficient of determination, which means that the explanatory power of the model increased as we included both risk factors (SMB and HML)

Carhart Four Factor Model

The Carhart multifactor asset pricing model (1997) extends the Fama-French model by adding a fourth factor which takes into consideration, the momentum anomaly. The resulting model is consistent with a market equilibrium model, with four risk factors which are: the Fama French risk factors, i.e., the value-weighted market proxy CNX infra Index, the size risk SMB (Small Minus Big), and the book-to-market factor HML in addition of the momentum anomaly proxied by WML which is short for (Winner Minus Loser).

The empirical results showed that the coefficients of the market risk premium, the size factor, and the value factor remained quite stable both in sign and magnitude as with the previous models. The momentum risk factor (WML) exhibited a positive and statistically significant coefficient both in the full sample and in each leverage decile. However, the magnitude of the momentum coefficients is small, indicating that it adds only a small portion to the total variability of the stock returns. Furthermore, the constant remains negative and statistically significant,

thus additional risk factors are missing. Finally, the higher adjusted R square as compared to the one from the Fama & French model revealed that the inclusion of the momentum factor improved the explanatory power of the model.

Table no 7 - Carhart four factor model

Portfolio	Constant	SML	Market Risk	HML	WML	R square Statistic	F	Significance
All	-4.086	0.47	0.538	0.12		0.024	0.616	66.9
1	0.542	0.32	0.45	0.063	0.021	0.525	17.0	0.002
2	0.139	0.10	0.341	0.081	0.024	0.236	19.8	0.004
3	0.253	0.09	0.284	0.045	0.213	0.209	18.4	0.007
4	-1.795	0.06	0.276	0.037	0.058	0.393	24.5	0.000

Table 8 - Correlation between various factors involved in Carhart four factor model

	Rate	Index	Value	Size	Momentum
Pearson Correlation	1	.604**	.325**	.717**	.529**
Rate					
Sig. (2 – tailed)		.000	.000	.000	.000
N	175	175	175	175	175
Pearson Correlation	.604**	1	.465**	.610**	.497**
Index					
Sig. (2 – tailed)	.000		.000	.000	.000
N	175	175	175	175	175
Pearson Correlation	.325**	.465**	1	.511**	.424**
Value					
Sig. (2 – tailed)	.000	.000		.000	.000
N	175	175	175	175	175
Pearson Correlation	.717**	.610**	.511**	1	.556**
SIze					
Sig. (2 – tailed)	.000	.000	.000		.000
N	175	175	175	175	175
Pearson Correlation	.529**	.497**	.424**	.556**	1
Momentum					
Sig. (2 – tailed)	.000	.000	.000	.000	
N	175	175	175	175	175

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

5.2.5 Five factor model

The coefficients of the market risk premium, SMB, HML, and WML are statistically significant in most of the cases and remain stable in terms of sign and magnitude as in the previous regression models. Thus, these three risk factors have additional information content and should not be omitted in most of the cases. The coefficient estimator with the biggest magnitude is the HMLL factor, revealing that investors do take the size effect in discriminating between companies. The results of the analysis show that there exists statistically significant positive relationship between leverage and stock returns. A higher value of coefficient of determination compared to four factor model indicates that the inclusion of leverage improved the explanatory power of model

Table no 9 - Five factor model

Portfolio	Constant	HMLL	SML	HML	WML	Market Risk	R square Statistic	F	Significance
All	-4.97	0.230	0.10	0.09	0.141	0.210	0.634	136.12	0.00
1	0.54	1.223	0.32	0.016	0.021	0.15	0.425	17.022	0.00
2	-1.71	1.212	0.21	0.113	0.014	0.123	0.347	17.004	0.00
3	0.25	0.273	0.09	0.045	0.213	0.10	0.209	8.457	0.00
4	-1.70	0.207	0.04	0.03	0.175	0.0240	0.636	55.14	0.00

The leverage coefficient increases as we move from low (L1) to medium-levered firms (L3) and then declines for high levered firms (L4).This shows that leverage impacts the market value of shares by affecting the share holders return and risk, the capital structure decision is a significant financial decision. The debt-equity mix has implications for the share holders earnings and risk, which in turn will affect the cost of capital and the market value of the firm.

Table no 10 - Correlation between various factors involved in five factor model

		Rate	Index	Value	Size	Momentum	Leverage
Rate	Pearson Correlation	1	.604**	.325**	.717**	.529**	.338**
	Sig. (2 – tailed)		.000	.000	.000	.000	.000
	N	175	175	175	175	175	175
Index	Pearson Correlation	.604**	1	.465**	.610**	.497**	.014
	Sig. (2 – tailed)	.000		.000	.000	.000	.000
	N	175	175	175	175	175	175
	Pearson Correlation	.325**	.465**	1	.511**	.424**	.168**

Value						
Sig. (2 – tailed)	.000	.000		.000	.000	.000
N	175	175	175	175	175	175
Pearson Correlation	.717**	.610**	.511**	1	.556**	0.80
SIze						
Sig. (2 – tailed)	.000	.000	.000		.000	.314
N	175	175	175	175	175	175
Pearson Correlation	.529**	.497**	.424**	.556**	1	.074
Momentum						
Sig. (2 – tailed)	.000	.000	.000	.000		0.355
N	175	175	175	175	175	175
Pearson Correlation	.338**	.014	.168**	.080	0.74	1
Momentum						
Sig. (2 – tailed)	.000	.864	.033	.314	.355	
N	160	160	160	160	160	160

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

The Findings of the study are:

- Investment and Financing decisions of a firm are interrelated. There is a strong positive correlation between order book size of a firm and the debt component in its capital structure.

Table no 11 - Correlation between leverage and order book size

		Leverage	Order Book
Leverage	Pearson Correlation	1	.897**
	Sig. (2 – tailed)		.000
	N	175	175
Order Book	Pearson Correlation	.897*	1
	Sig. (2 – tailed)	.000	
	N	175	175

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

- Leverage can be used as strategic investment instrument. From the results of five factor model, it is clear that leverage has significant informational content that causes stock price variability
- Size of a firm and its price earnings ratio are positively correlated. The average price earnings ratio of large sized companies is 23.4 which is higher than the industry average, for small sized firms it is 12.3.

Table no - 12 Correlation between size and price earnings ratio

		Size	PE
Size	Pearson Correlation	1	.567**
	Sig. (2 – tailed)		.000
	N	175	175
PE	Pearson Correlation	.567*	1
	Sig. (2 – tailed)	.000	
	N	175	175

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

- The average value of market to book value of a share is high for levered companies. One of the popular stock market statistics the market value to book value is defined as Market value per share/Book value per share. This ratio which reflects the contribution of wealth to society is higher than 2 for high levered companies (leverage>0.6), this is 1 in case of low levered companies (leverage<0.3).

Recommendations of the study is

- During debt equity restructuring companies should take into account the positive relationship existing between leverage and stock returns. Leverage risk factor contains significant information content and that it adds a considerable portion in the explanation of stock returns.
- Investment and financing strategies must be examined jointly. In the presence of financial market imperfections, leverage and investment are generally correlated so that highly levered firms are also mature firms with relatively safer book assets and less risky growth opportunities.

There exists a statistically significant positive relationship between leverage and stock returns. Leverage risk factor contains significant information content and it can also be used as a strategic investment