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16 August 2010

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Abstract

This paper is a first attempt to look into the issue of the effect of leverage and adjustment costs on various measures of corporate performance for 374 non-financial firms listed on Karachi Stock Exchange of Pakistan. The Arellano and Bond dynamic panel data estimation technique (a variant of GMM) is used to capture the role of adjustment costs and the dynamic behavior of corporate performance. A panel data set spanning 1988 to 2008 is used for the purpose. The results, thus obtained, are essentially mixed. The coefficients of the adjustment variable (lagged corporate performance) are positive for ROCE (Return on capital employed) and EPS (Earnings per Share) but ironically negative for ROE (Return on Equity).

Similarly the effect of leverage on ROCE is negative but insignificant and positive significant when EPS is used as a measure of corporate performance. Whereas the relationship between leverage and ROE (another measure used in the paper for corporate performance) is negative and significant which implies that high leverage force the managers to perform optimally due to higher interest burden and agency cost. The positive effect of the size of firm on performance is confirmed for all the three measures of corporate performance. Furthermore, the positive and statistically significant impact of short term liabilities implies that high short term liabilities exert pressure on corporate managers to perform efficiently in the competitive market.

Keywords: Corporate Performance, leverage, adjustment costs, panel data, Pakistan

JEL Codes: G34, G32, C23

1. Introduction

In corporate finance literature one of the much debated issues is the relationship between leverage and corporate performance. This debate started with the celebrated irrelevance theorem of Miller and Modigliani (1958) which brought about a revolution in corporate finance. According to this theorem in a perfect capital market, where there are no transaction costs and where perfect rationality and certainty prevails, the capital structure choice is of no relevance. However after a series of modifications made by Jensen and Meckling (1976), it was revealed that the level of debt in a firm financing does have impact on a firm's behavior and its performance.

On the other side, as leverage increases it increase the agency costs because the interests of shareholders and debt holders are different resulting in an increase in the total cost of the company. Therefore leverage may be negatively correlated with performance (Jensen and Meckling, 1976; and Mayers, 1977). The extant literature varies over the conclusion if leverage is positively or negatively related to corporate performance. The reasons behind these diverging views can be many; different performance measures and/or different estimation techniques. The contribution of the present paper is twofold; first three different performance measures are used in order to check the divergence in the results due to different measures, second Generalized Method of Moments (GMM) is used to capture the dynamics of the model. The use of GMM has also enabled to unfold the role of adjustment costs in the determination of corporate performance.

Rest of the paper is organized as follows: section 2 presents a brief overview of extant literature, section 3 contains model specification and data description, section 4 has the discussion of results while section 5 concludes with policy implications.

2. Literature Review

There are very limited studies in the extant literature to have had analyzed the relationship between leverage and corporate performance. To the author knowledge there is no such study conducted for Pakistan to date. However studies carried out for other countries generally differ in choosing a proxy for corporate performance. Broadly categorizing, the literature can be divided into two different strands on the basis of measures used for performance. The first strand uses total factor productivity (Pushner 1995; Nickell et al. 1997; Nickell and Nicolitsas, 1999). The second strand of literature uses basic accounting measures of performance (Majumdar and chibber 1999; Kinsmen and Newman, 1999). All of these studies have different results due to either the measure used for performance or due to the econometric technique employed. Weill (2008) asserts that the link between performance and leverage differs across different countries. He,

moreover, maintains that it's the legal system of the country that primarily determines corporate performance.

3. Data description and Model Specification

The data set consists of the financial accounts of the publically listed firms in Pakistan. A total of 374 firms which are listed on Karachi Stock Exchange for the period spanning 1988 to 2008 are considered. The data is collected from "Balance Sheet Analysis of Joint Stock Companies", listed on the Karachi Stock Exchange, State Bank of Pakistan and annual reports of Karachi Stock Exchange.

3.1. Industries classification

Table 1: Classification of industries

S #	Industry	No. of Firms	As a Percentage of Total
1	Textile	166	44.38
2	Chemicals	26	6.95
3	Engineering	36	9.63
4	Sugar & Allied Industries	35	9.36
5	Paper & Board	10	2.67
6	Cement	16	4.28
7	Fuel & Energy	18	4.81
8	Transport & Communication	5	1.34
9	Tobacco	3	0.80
10	Jute	6	1.60
11	Vanaspati & Allied Industries	7	1.87
12	Miscellaneous	46	12.30
	Total	374	100.00

Table 1 presents a summary of the dependent and explanatory variables and their measurement.

Table 2: Variables description and measurement

S.No	**Acronym**	**Dependent Variable**	**Measurement**
1	ROCE	Return on Capital Employed	Ratio of net operating profit to the net operating assets
2	EPS	Earnings per share	Ratio of net income to the number of shares outstanding
3	ROE	Return on Equity	Ratio of net income to the number of shareholder's equity
S.No.		**Explanatory Variables**	**Measurement**
1	LEVR	Leverage of the firm	Ratio of total debt to total assets
2	TANG	Tangibility of Assets	Ratio of fixed assets to total assets
3	SIZE	Size of the firm	Natural log of total assets
4	STLR	Short term liabilities ratio	Ratio of short term liabilities to total liabilities

3.2. Model Specification

Dynamic panel data usually suffers from endogeneity, omitted variables bias, and heteroscedasticity. In dynamic models, the ordinary least squares (OLS) approach does not account formally for potential simultaneity bias, nor does it control explicitly for Firm fixed effects or the routine use of lagged dependent variables in regressions which results in the inconsistency and upward biasness of the estimators due to serial correlation between the autoregressive ($Y_{i,t-1}$) parameters and error terms (ε_{it}). This inconsistency would persist even when N and T grows larger. (Pesaran and Smith 1995) have suggested that serial correlation can be removed by first differencing; they express their reservations as to the generalization of this approach. In such a situation, a dynamic panel data model with instrumental variables (IV) should provide accurate and consistent results. Accordingly Generalized Method of Moments will be employed in this paper. The general specification of the model can be written as:

$$CP_{i,t} = \beta X_{i,t}$$

Where

$CP_{i,t}$ = Corporate performance of the ith firm in time t

$X_{i,t}$ = Vector of explanatory variables

To be more specific the following models are specified for different measures of corporate performance:

$$ROCE_{i,t} = \alpha + \beta_0 ROCE_{i,t-1} + \beta_1 LEVR_{i,t} + \beta_2 LEVR_{i,t-1} + \beta_3 TANG_{i,t} + \beta_4 TANG_{i,t-1} + \beta_5 SIZE_{i,t} + \beta_6 SIZE_{i,t-1} + \beta_7 STLR_{i,t} + \beta_8 STLR_{i,t-1} + \varepsilon \text{ ----------1}$$

Where

$ROCE_{i,t}$ = Return on Capital Employed by ith firm in current year

$ROCE_{i,t-1}$ = Return on Capital Employed by ith firm in the Previous Year

$LEVR_{i,t}$ = Leverage of the ith firm in current year

$LEVR_{i,t-1}$ = Leverage of the ith in the previous year

$TANG_{i,t}$ = Tangibility of Assets of the ith firm in current year

$TANG_{i,t-1}$ = Lagged tangibility of Assets of the ith firm

$SIZE_{i,t}$ = Size of the ith firm in current year

$SIZE_{i,t-1}$ = Size of the ith firm in the previous year

$STLR_{i,t}$ = Ratio of short term liabilities to total liabilities of the ith firm in current year

$STLR_{i,t-1}$ = Ratio of short term liabilities to total liabilities of the ith firm in the previous year

ε = Error term in the model

$$EPS_{i,t} = \alpha + \beta_0 EPS_{i,t-1} + \beta_1 LEVR_{i,t} + \beta_2 LEVR_{i,t-1} + \beta_3 TANG_{i,t} + \beta_4 TANG_{i,t-1} + \beta_5 SIZE_{i,t} + \beta_6 SIZE_{i,t-1} + \beta_7 STLR_{i,t} + \beta_8 STLR_{i,t-1} + \varepsilon \text{ ----------2}$$

Where

$EPS_{i,t}$ = Earnings per share of the ith firm in the current year

$EPS_{i,t-1}$ = Earnings per share of the ith firm in the previous year

And rest of the variables is the same as those in model 1

$$ROE_{i,t} = \alpha + \beta oROE_{i,t-1} + \beta_1 LEVR_{i,t} + \beta_2 LEVR_{i,t-1} + \beta_3 TANG_{i,t} + \beta_4 TANG_{i,t-1} + \beta_5 SIZE_{i,t} + \beta_6 SIZE_{i,t-1} + \beta_7 STLR_{i,t} + \beta_8 STLR_{i,t-1} + \varepsilon \text{ ----------} 3$$

Where

$ROE_{i,t}$ = Return on Equity of the ith firm in current year

$ROE_{i,t-1}$ = Return on Equity of the ith firm in previous year

And rest of the variables is the same as in model 1 and 2

4. Discussion of Results

Table 3 Arellano-Bond dynamic panel-data estimation results

Variable	ROCE		EPS		ROE	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
ΔROCE	.1099605	0.000	.720277	0.000	-.0109482	0.000
ΔLEVRt-1	.0000345	0.000	.0066048	0.000	-.0000551	0.000
ΔLEVR	-.000189	0.153	.0021585	0.000	-.0920797	0.000
ΔTANGt-1	-.0004122	0.000	-.0034612	0.000	-.0003635	0.000
ΔTANG	.0013073	0.000	.0058389	0.000	-.0002843	0.000
ΔSIZEt-1	-.7975204	0.000	-12.59335	0.000	-.9760587	0.000
ΔSIZE	.7865054	0.000	7.717186	0.000	1.269869	0.000
ΔSTLRt-1	.0355179	0.000	-16.3255	0.000	1.119906	0.000
ΔSTLR	.0230453	0.007	15.46664	0.000	.9380895	0.000
Constant	-.0012807	0.000	.1937677	0.000	-.0504003	0.000
	Sargan test of over-identifying restrictions: $Chi^2(189) = 27.43$ Prob > $Chi^2 = 0.2130$		Sargan test of over-identifying restrictions: $Chi^2(189) = 27.51$ Prob > $Chi^2 = 0.1621$		Sargan test of over-identifying restrictions: $Chi^2(189) = 28.81$ Prob > $Chi^2 = 0.0983$	
	Arellano-Bond test that average autocovariance in residuals of order 1 is 0: H0: No Autocorrelation z= -1.05 Prob > z = .2930		Arellano-Bond test that average autocovariance in residuals of order 1 is 0: H0: No Autocorrelation z= -3.95 Prob > z = 0.0001		Arellano-Bond test that average autocovariance in residuals of order 1 is 0: H0: No Autocorrelation z= -1.85 Prob > z = .0642	

The estimates are obtained using Stata version 9.2

The results in table 3 reveal the following findings:

The coefficients of the adjustment variable (lagged corporate performance) are positive for ROCE and EPS but ironically negative for ROE. The adjustment speed for ROCE is 89 percent (1-.1099605), 27.97 percent for EPS and 101.095 percent for ROE. These findings suggest that the performance of all these firms are sub-optimal thus desiring to reach to the optimal level at a quite high speed.

The relationship of leverage with corporate performance is negative but insignificant in case of ROCE as a measure of performance, whereas it is positive and significant when EPS is used as a measure of performance. The positive relationship of EPS and performance indicates that leverage doesn't hinder corporate performance but simultaneously this result can be attributed to the presence of serial correlation present in the model while regressing CP on EPS as can be seen from table 2. Where the Arellano-Bond test that average autocovariance in residuals of order 1 is 0 rejects the null hypothesis of no autocorrelation. The coefficient of leverage in case of ROE as performance measure is negative and significant. Thus the results here give mix effects of leverage on different measures of corporate performance.

Tangibility, similarly, gives mixed results. The coefficients of TANG are positive and significant when ROCE and EPS are used as performance measures but it is negative and significant when ROE is used as a measure of performance. The positive impact of tangibility on corporate performance suggests that fixed assets are efficiently used as collateral for borrowing in the debt market.

Size, for all the three measures of corporate performance, has positive and significant coefficients. This can be attributed to the economies of scale as larger firms have better economies to scale. Secondly larger firms can attract the best managers available in the market through lucrative incentives and big salaries. In the same vain larger firms have access to cheaper finance relative to smaller firms.

Similarly, short term liabilities have positive and significant effect on all the three measures of corporate performance.

5. Conclusion and Policy recommendations

This paper attempted to look into the issue of the relationship between leverage and various measures of corporate performance for 374 non-financial firms listed on Karachi Stock Exchange of Pakistan. The Arellano and Bond dynamic panel data estimation technique was used to capture the role of adjustment costs and the dynamic behavior of corporate performance. The results, thus obtained, were essentially mixed. The coefficients of the adjustment variable (lagged corporate performance) were positive for

ROCE (Return on capital employed) and EPS (Earnings per Share) but ironically negative for ROE (Return on Equity).

Similarly the effect of leverage on ROCE was negative but insignificant and positive significant when EPS was used as a measure of corporate performance. Whereas the relationship between leverage and ROE (another measure used in the paper for corporate performance) was negative and significant which implies that high leverage force the managers to perform optimally due to higher interest burden and agency cost (Jitendra Mahakud and A K Misra, 2009). Currently in Pakistan interest rate is rising steadily thus lowering the confidence of investors to invest in high levered firms. Therefore it is suggested that investors should invest in low levered firms. The positive effect of the size of firm on performance is confirmed for all the three measures of corporate performance. The positive and statistically significant impact of short term liabilities implies that high short term liabilities exert pressure on corporate managers to perform efficiently in the competitive market otherwise they would be facing the burden of debt thus decreasing the value of firm. This in turn will make the investors to switch over to other firms for better investment opportunities.

References

Arellano, M and Bond, S. (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", *the Review of Economics Studies*, 58: 277-297

Balance Sheet of Joint Stock Companies Listed on the Karachi Stock Exchange, *Various issues.*

Hsiao, C. (1995). "Benefits and Limitations of Panel Data", *Econometric Review*, 4: 121-174

Jensen, M C (1986): "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers", America, *Economic Review*, 76, May 323-29

Jensen, M C and W Meckling (1976): "Theory of the Firm: Managerial Behavior, Agency Costs and Capital Structure", *Journal of Financial Economics*, 3, 305-60

Majumdar, S, K. (1995): "Public, Joint and Private Sectors in Indian Industry: Evaluating Relative Performance Differences", *Economic and Political Weekly*, 30, 7, M25-M32

Majumdar, S, K. (1997). "Debt, Where Is Thy Sting? Leverage and Corporate Performance", *Economic and Political Weekly*, 32, M21-M24.

Modigliani, F and M H Miller (1958): "The Cost of Capital, Corporation Finance, and the Theory of Investment", *American Economic Review*, 48, June, 261-97

Myers, S. (1977). "Determinants of Corporate Borrowing", *Journal of Financial Economics*, 5: 147-175

Nickell, S. et al. (1997). "What makes firms Perform Well?", *European Economic Review*, 41: 783-796

Pushner, G. (1995). "Equity Ownership Structure, Leverage and Productivity: Empirical Evidence from Japan". *Journal of Pacific-Basin Finance*, 3: 241-255.

Weill, L. (2008). "Leverage and Corporate Performance: Does Institutional Environment matter?", *Small Business Economics*, 30: 251-265.