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A Revisit of Pecking Order Theory versus Trade-off Theory: Evidence from Pakistan

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Abstract

The objective of this study is to investigate which of the two competing theoretic frameworks; pecking order theory (POT) or trade-off theory (TOT); better explains the corporate leverage behaviour in Pakistan. For this purpose, we use fixed effects model on a large unbalanced panel data comprising of 13,026 firm-year observations of non-financial firms listed on Karachi Stock Exchange Pakistan during 1972-2010 Our results indicate that leverage has two pervasive and significant relationships. First, leverage is negatively related to current and past profitability. Second, leverage is positively related to past dividends. In addition, empirical results present a reasonable support to POT regarding growth. However, POT gets nominal empirical support in Pakistan regarding firm size. The results of this study will help the corporate managers to better formulate the leverage policy.

Keywords: leverage; pecking order theory; trade-off theory; Pakistan

1. Introduction

The complexity surrounding capital structure decision due to its intertwining relationships with many other decision variables distant in time and space has made it the most researched topic in corporate finance literature. Theoretical frameworks were evolved to explain the corporate leverage behaviour of which POT and TOT are the two most prominent theoretical frameworks. Grounding on its core concept of information asymmetry, the POT sequentially ranks the financing sources internal equity being the first preference where the firms avoid market attention, external debt as the second preference due to lower information costs associated with debt, and external equity being the last resort (Myers, 1984). On the other hand, TOT argues that corporate leverage behaviour is shaped by a well-defined target capital structure along with trade-off between costs and benefits of additional debt. The two competing frameworks have entirely distinct set of arguments and predict different corporate leverage behaviour of the firms, but it is difficult to

adequately distinguish between the two (Fama & French, 2002). Some suggests that both are not mutually exclusive (Serrasqueiro & Caetano, 2015), while others find the corporate capital structure behavior in line with the connotations of POT (Serrasqueiro et al., 2011) or TOT (Singh & Kumar, 2012). Nevertheless, the two theoretical frameworks have opposing prophecies about relationship of only some of the independent variables with corporate leverage. As such some suggest model based approach as a better empirical alternative (Allen, 1993; Tong & Green, 2005; Qureshi, 2009) to identify which of the two theories, POT and TOT better explain the corporate leverage behaviour. For this purpose, they identified the current and past profitability, firm size, growth rate, and past dividend rate as the determinants of corporate leverage for which POT and TOT give opposing predictions. Using different proxies for these independent variables and leverage, these studies developed different models to study the relationship of leverage with these determinants. Motivation for the current study emanates from identification of three problems with the earlier approaches that we address in this study. First, they used ordinary least squares (OLS) method which has its own limitations and to overcome this problem we propose to use fixed effects method of panel data that offers unique advantages over OLS (Baum, 2006). Second, they used previous periods' return on assets (e.g. ROA_{t-1}) as a proxy of past profitability. We argue that this introduces bias in favour of current profitability. In our opinion, past profitability is better represented by retained earnings over total assets that we use as a proxy of past profitability in our estimations. Third, these studies have ignored liquidity but we argue that profitable firms are also observed to be liquid and consequently the conflicting predictions about profitability leads to conflicting predictions about liquidity as well. Therefore, we include liquidity in our model. Fourth, the study in Pakistani context (Qureshi, 2009; Sheikh & Wang, 2011) identifies short-term liabilities as a major source of finance but chooses to ignore it as a leverage proxy. We propose to include short-term debt as a proxy for corporate leverage. We expect that findings of this study not only unveil the reasons to use debt in capital structure but also lend-a-hand to corporate managers to choose a balanced capital structure. This study addresses the problems identified with earlier study (Qureshi, 2009) on the same topic. As such, the literature review of that study is relevant for this study too.

Rest of the paper is organized as follows: Section 2 specifies the model and describes the relationship of different variables under POT and TOT. Section 3 describes the data. Section 4 presents empirical results and discussion. Finally, Section 5 concludes the study.

2. Methodology and Model Specification

Ours is an unbalanced dataset for which we use fixed effects model of panel data analysis that offers unique advantages over ordinary least squares (OLS) method which has its own limitations (Baum, 2006). The corporate leverage is our dependent variable whereas current profitability, past profitability, liquidity, firm size, growth rate, and past dividend rate are our explanatory variables. As such, we develop the following model (Eq.1) to estimate the effects of explanatory variables on corporate leverage.

$$Lev_{it} = \beta_{0i} + \beta_1(Prof_{it}) + \beta_2(P\_Prof_{it}) + \beta_3(Liq_{it}) + \beta_4(Size_{it}) + \beta_5(Growth_{it}) + \beta_6(Div_{it-1}) + \mu_{it} \ldots\ldots\ldots \text{(Eq. 1)}$$

where *i* indicates cross-section dimension and *t* denotes the time dimension. We use three proxies of leverage: $LTDR_{it}$: long-term leverage (long-term liabilities / total assets); $STDR_{it}$: short-term leverage (short-term liabilities / total assets); and TDR_{it}: total leverage (total liabilities / total assets). In Table 1 we present predicted relationship of leverage with six determinants under POT and TOT as synthesized from selected literature.

Table 1: Determinants of Leverage

Determinant	Proxy	Definition	Expected	
			POT	TOT
Profitability	$Prof_{it}$	Net profit before taxes / Total	-	+
Past	P_Prof_{it}	Retained earnings / Total assets	-	+
Liquidity	Liq_{it}	Current assets / Current	-	+
Firm size	$Size_{it}$	Natural logarithm of sales	-	+
Growth	$Growth_{it}$	(Total assets$_t$ - Total assets$_{t-1}$) / Total assets$_{t-1}$	+	-
Past dividend	Div_{it-1}	Dividend$_{t-1}$ / Total equity$_{t-1}$	+	-

3. Data

To investigate which of the two theories better explain corporate leverage behaviour in Pakistan we use the firm-specific unbalanced panel data extracted from financial statements of all non-financial firms listed on Karachi Stock Exchange (KSE) Pakistan during 1972-2010. While selecting the time period we faced a trade-off, having an extended number of observations or including the most recent years. The reason for this is that the changes in financial data reporting necessitated a number of new items included in the most recent data that were not required earlier. To avoid any mismatch, we chose to ignore the most recent years in favor of having an extended and balanced dataset. Table 2 presents the financing composition of firms belonging to 13 different sectors.

Table 2: Composition of Different Financing Sources

Sector	*External Equity*	*Internal Equity*	*Long-term Liabilities*	*Short-term Liabilities**
Cement	0.2460	0.1260	0.2310	0.3970
Chemical	0.2400	0.1370	0.1160	0.5070
Engineering	0.2370	-0.0030	0.1430	0.6230
Fuel & Energy	0.1770	0.2080	0.1780	0.4370
Jute	0.2290	0.0820	0.1300	0.5590
Miscellaneous	0.3120	-0.1330	0.1470	0.6740
Paper & Board	0.2950	-0.0080	0.2210	0.4920
Sugar	0.1860	0.0110	0.2820	0.5210
Textile	0.2320	-0.1000	0.2550	0.6130
Textile ancillary	0.3540	-0.4610	0.3090	0.7980
Tobacco	0.2570	-0.3670	0.1630	0.9470
Transport & Communications	0.3380	0.0090	0.1990	0.4540
Vanaspati	0.2110	-0.4520	0.2130	1.0280

*Accounts payable are quite nominal

On the average, seven out of thirteen sectors have negative internal equity due to poor corporate profitability. With a lesser or negative supply of internal equity, the firms then tend to seek external financing sources where they have a possibility to raise external equity, or long-term, or short-term debt. Table 2 depicts short-term debt as a major financing source in Pakistan. In Table 3 we present the descriptive statistics of the three proxies of leverage and its six determinants.

Table 3: Descriptive Statistics

Variables	Statistic	Cement	Chem	Engg	Fuel	Jute	Other	Paper	Sugar	Tex	Tex(O)	Tobb	Trans	Vanas
$LTDR_{it}$	Mean	.2306	.1161	.1426	.1776	.1302	.1472	.2209	.2820	.2545	.3094	0.1629	.1991	.2128
	SD	.1926	.1675	.1977	.2100	.1290	.3365	.2996	.6843	.2929	.7567	0.4235	.2113	.6609
$STDR_{it}$	Mean	.3971	.5073	.6234	.4368	.5589	.6735	.4916	.5208	.6128	.7984	0.9466	.4543	1.0289
	SD	.2758	.3023	.3563	.2672	.3182	.8592	.3613	.4329	.4803	1.3148	1.1140	.3097	1.3003
TDR_{it}	Mean	.6277	.6233	.7660	.6144	.6891	.8207	.7125	.8028	.8674	1.1392	1.1096	.6534	1.2417
	SD	.3101	.3206	.3929	.2530	.3090	.9741	.4791	.9385	.5393	1.9860	1.2865	.3887	1.3629
$Prof_{it}$	Mean	.0358	.0859	.0313	.0694	.0345	.0338	.0500	.0416	-.0025	-.0045	0.0711	.0120	-0.0757
	SD	.1271	.1472	.1427	.1116	.1376	.2077	.1330	.1428	.1886	.1732	0.2119	.2069	0.4158
P_Prof_{it}	Mean	.1256	.1368	-.0028	0.2077	.0819	-.1330	-.0082	.0115	-.1001	-.4608	-0.3673	.0086	-0.4523
	SD	.3430	.3994	.5633	.2150	.4032	1.1749	.6794	.9759	.8196	2.2167	1.4958	.5494	1.5408
Liq_{it}	Mean	1.1051	1.4331	1.3362	1.9544	1.2034	1.6142	1.6894	1.2445	.8611	1.5263	1.1810	1.4809	1.0883
	SD	.8411	1.0439	1.8531	2.8938	.7732	3.1421	1.6931	1.9789	.6744	2.4776	.5867	3.0764	0.6921
$Size_{it}$	Mean	6.7197	5.8904	5.5113	7.6462	5.0853	4.7048	4.5240	5.9727	5.4058	4.3186	6.0771	7.5660	5.2451
	SD	1.6011	2.0453	2.2639	2.8006	1.5439	2.1995	2.1391	1.5002	1.8419	2.5177	2.5152	2.1312	1.5699
$Growth_{it}$	Mean	.1578	.1375	.1552	.3489	.0985	.2168	.1006	.1137	.2065	.0614	0.1263	.2038	0.0863
	SD	.5437	.3976	.4597	2.5822	.2626	2.9837	.3073	.3068	6.3695	.2158	0.3136	.4747	0.2683
Div_{it-1}	Mean	.0429	.0701	.0414	.0770	.0291	.0582	.0468	.0411	.0207	.0297	0.0686	.0212	0.0589
	SD	.0691	.1209	.0653	.0857	.0508	.1723	.0602	.0748	.1080	.0700	0.0956	.0436	0.3136

On the average 12% to 31% of total assets are financed with long-term debt, while 40% to 103% of the assets are financed with short-term debt. Three sectors show losses while 1.2% to 8.6% return on assets of the remaining ten profitable sectors indicates poor corporate profitability in Pakistan. Consequently, we observe poor levels of retained earnings in many of the sectors. All of the sectors are maintaining a relatively higher level of current assets as depicted by average Liq_{it} (current ratio > 1 for all except for one sector). Intuitively, we expected a poor growth in assets considering the poor profitability. However, we observe a good growth rate in assets ranging between 6% and 35%. On other hand, poor profitability leads to poor dividend yield which ranges between 2% and 7%.

4. Empirical Results and Discussion

Using the three proxies of leverage, we develop three models. We provide the results and their discussions in the following paragraphs.

4.1 Model 1: Long-Term Leverage and Its Determinants

In Model 1 we use $LTDR_{it}$ as a proxy of Lev_{it} in Eq.1. We find a significant negative relationship of current profitability with $LTDR_{it}$ in 7 sectors, while this relationship is significant positive in 4 sectors and is insignificant in remaining 2 sectors. Our results are generally in line with the findings of Qureshi (2009), but are contradictory for three sectors. Using a different proxy for past profitability we find its universal negative relationship, except for one, with $LTDR_{it}$ suggesting conformity of POT and Qureshi (2009). Moreover, eight of the thirteen sectors demonstrate a positive relationship of liquidity with $LTDR_{it}$ in line with the prophecies of TOT while two sectors have negative relationship as advocated by POT and for the remaining three this relationship is insignificant. Using $LTDR_{it}$ as a proxy of leverage, the observed relationship of current and past profitability as well as liquidity with leverage is mixed. We find a universal positive relationship of firm size with $LTDR_{it}$ which in conformity of TOT. Growth is an insignificant determinant of leverage in nine of the thirteen total sectors, but whenever it is significant it demonstrates a positive relationship with $LTDR_{it}$ as predicted by POT. As a determinant of $LTDR_{it}$, past dividend yield is significant only in six sectors and depicts a negative relationship in line with TOT. Overall, around 75% of the observed relationships of TDR_{it} with its determinants are in conformity with POT and 25% are in line with TOT.

Table 4: Model 1 Relationship of Long-Term Leverage with its Determinants

		Const.	$Prof_{it}$	P_Prof_{it}	Liq_{it}	$Size_{it}$	$Growth_{it}$	Div_{it-1}	Firms	Obs.	R-Sq	p-value
Cement	Coef	.2208	-.384	-.076	.030				25	488	.145	.000
	P>|t	.0000	.000	.002	.007							
Chemical	Coef	.1595		-.120	.022	-.010	.0510	-.094	56	100	.100	.000
	P>|t	.0000		.000	.000	.009	.0000	.020				
Engineering	Coef	.1385	-.112	-.163	.010		.0205	-.306	67	125	.125	.000
	P>|t	.0000	.010	.000	.003		.0310	.000				
Fuel & Energy	Coef	.3801	.276	-.240		-.020		-.247	34	576	.129	.000
	P>|t	.0000	.001	.000		.000		.003				
Jute	Coef	.1588	.150		-.029		.0495	-.354	9	209	.047	.000
	P>|t	.0000	.032		.046		.0790	.044				
Miscellaneous	Coef	.2120	-.106	-.065		-.014			89	175	.180	.000
	P>|t	.0000	.002	.000		.005						
Paper & Board	Coef	.1520	-.567	-.102	.057				17	380	.277	.000
	P>|t	.0000	.000	.000	.000		.0365	-.232				
Sugar	Coef	.2558	.113	-.461	.020		.1150	.021	42	106	.814	.000
	P>|t	.0000	.049	.000	.001							
Textile	Coef	.2467	-.051	-.113	.029	-.006		-.077	255	482	.109	.000
	P>|t	.0000	.006	.000	.000	.043		.016				
Textile Anc.	Coef	.0228	.133	-.277	.024	.028			37	700	.614	.000
	P>|t	.7630	.269	.000	.001	.079						
Tobacco	Coef	.4918		-.102		-.060			7	177	.900	.000
	P>|t	.0010		.000		.007						
Trans & Com	Coef	.2193	-.096	-.203	-.011				14	201	.199	.000
	P>|t	0000	.180	.000	.003							
Vanaspati	Coef	-.2385	-.260	-.153	.545	-.044			19	390	.453	.000
	P>|t	.0640	.003	.000	.000	.055						

Note: Blank cells indicate insignificant relationship; grey-highlighted figures indicate results in conformity with POT

4.2 Model 2: Short-Term Leverage and Its Determinants

We use $STDR_{it}$ as a proxy of Lev_{it} in Eq.1 for our Model 2. We find a significant negative relationship of current profitability with $STDR_{it}$ in nine sectors, while this relationship is significant positive in one sector and is insignificant in remaining three sectors. Further, we find universal negative relationship of $STDR_{it}$ with past profitability and liquidity. Our results for current and past profitability and liquidity provide an overwhelming support to POT. On the other hand, we find a significant positive relationship of firm size with $STDR_{it}$ in eleven sectors which is in conformity of TOT, whereas this relationship is insignificant in only two sectors. As observed in Model 1, growth is generally an insignificant determinant of leverage in nine of the thirteen total sectors, but whenever it is significant it demonstrates a positive relationship with $STDR_{it}$ as predicted by POT. Finally, past dividend yield is a significant determinant of $STDR_{it}$ only in three sectors and depicts a positive relationship in line with POT. Overall, around 79% of the observed relationships of $STDR_{it}$ with its determinants are in conformity with POT and 21% are in line with TOT.

Table 5: Model 2 Relationship of Short-Term Leverage with its Determinants

		Consta	$Prof_{it}$	P_Prof	Liq_{it}	$Size_{it}$	Growt	Div_{it-1}	No.	No.	R-Sq	p-
Cement	Coef.	.4325	.2329	-.6232	-.066	.0161			25	488	.4913	.000
	P>|t|	.0000	.0030	.0000	.000	.0100						
Chemical	Coef.	.4301	-.1263	-.5627	-.043	.0367	.0416	.1143	56	1004	.5244	.000
	P>|t|	.0000	.0100	.0000	.000	.0000	.0100	.0160				
Engineering	Coef.	.4888	-.1001	-.5548	-.033	.0325	.0324		67	1257	.4975	.000
	P>|t|	.0000	.0580	.0000	.000	.000	.0070	.1257				
Fuel & Energy	Coef.	.3297	-.4411	-.4700	-.016	.0342		.1170	34	576	.4118	.000
	P>|t|	.0000	.0000	.0000	.000	.0000						
Jute	Coef.	.4246	-.1689	-.7198	-.025	.0451			9	209	.7529	.000
	P>|t|	.0000	.0260	.0000	.064	.0000						
Miscellaneous	Coef.	.3320		-.6742	-.017	.0595			89	1755	.7697	.000
	P>|t|	.0000		.0000	.000	.0000						
Paper & Board	Coef.	.6350		-.3863	-.0858		.0586		17	380	.7016	.000
	P>|t|	.0000		.0000	.000		.0570					
Sugar	Coef.	.3417	-.2221	-.4947	-.020	.0365		.2012	42	1067	.5748	.000
	P>|t|	.0000	.0000	.0000	.000	.0000		.0450				
Textile	Coef.	.5804	-.1618	-.3918	-.142	.0213			255	4822	.5833	.000
	P>|t|	.0000	.0000	.0000	.000	.0000						
Textile Anc.	Coef.	.4651	-.6961	-.5487	-.040	.0369			37	700	.8980	.000
	P>|t|	.0000	.0000	.0000	.000	.0070						
Tobacco	Coef.	.4831		-.7089	-.1430	.0612			7	177	.9012	.000
	P>|t|	.0020		.0000	.014	.0030						
Trans & Com	Coef.	.5070	-.1272	-.4177	-.0321				14	201	.4978	.000
	P>|t|	.0000	.0970	.0000	.000							
Vanaspati	Coef.	.6375	-0.1670	-.6485	-.5109	.1191	.1763		19	390	.8479	.000
	P>|t|	.00	.0830	.0000	.0000	.0000	.0560					

Note: Blank cells indicate insignificant relationship; grey-highlighted figures indicate results in conformity with POT

4.3 Model 3: Total Leverage And Its Determinants

In Table 6 we present our results of Model 3 that uses TDR_{it} as a proxy of Lev_{it} in Eq.1. We find universality of the negative relationship of current and past profitability with TDR_{it}.

Except for one, liquidity also demonstrates a negative relationship with TDR_{it}. We can state that the observed relationship of profitability and liquidity with TDR_{it} is in line with POT. We find a universal positive relationship of firm size with TDR_{it} which in conformity of TOT. Growth is an insignificant determinant of leverage in five of the thirteen total sectors, but whenever it is significant it demonstrates a positive relationship with TDR_{it} as predicted by POT. As a determinant of TDR_{it}, past dividend yield is significant only in four sectors of which three depicts a negative relationship in line with TOT while one has a positive relationship as advocated by POT. Overall, around 75% of the observed relationships of TDR_{it} with its determinants are in conformity with POT and 25% are in line with TOT.

Table 6: Model 3 Relationship of Total Leverage and its Determinants

Sector	Statisti	Constan	$Prof_{it}$	P_Prof_i	Liq_{it}	$Size_{it}$	$Growth_i$	Div_{it-1}	No. of	No. of	R-Sq	p-value
Cement	Coef.	.689	-.157	-.6934	-.0370	.010			25	488	.752	.000
	P>|t|	.000	.018	.0000	.0000	.044						
Chem	Coef.	.602	-.166	-.6633	-.0210	.025	.0548		56	1004	.751	.000
	P>|t|	.000	.000	.0000	.0000	.000	.0000					
Engg	Coef.	.651	-.227	-.7128	-.0228	.027	.0527	-.1788	67	1257	.615	.000
	P>|t|	.000	.000	.0000	.0000	.000	.0000	.0260				
Fuel	Coef.	.696	-.145	-.7258	-.0125	.015	.0040	-.1214	34	576	.795	.000
	P>|t|	.000	.006	.0000	.0000	.000	.0090	.0240				
Jute	Coef.	.588	-.157	-.7358		.032			9	209	.905	.000
	P>|t|	.000	.007	.0000		.000						
Other	Coef.	.537	-.167	-.7384	-.0154	.045			89	1755	.868	.000
	P>|t|	.000	.000	.0000	.0000	.000						
Paper	Coef.	.674	-.540	-.5203	-.0307	.023	.0574		17	380	.883	.000
	P>|t|	.000	.000	.0000	.0000	.000	.0010					
Sugar	Coef.	.614	-.118	-.9561		.033	.0659		42	1067	.992	.0001
	P>|t|	.000	.000	.0000		.000	.0000					
Tex	Coef.	.924	-.208	-.4910	-.1182			-.0665	255	4822	0.7818	.000
	P>|t|	.000	.000	.0000	.0000			.0370				
Tex(O)	Coef.	.414	-.339	-.8789	-.0201	.078	.1178		37	700	0.9746	.000
	P>|t|	.000	.000	.0000	.0000	.000	.0060					
Tobb	Coef.	.920	-.185	-.8283	-.0976		.0470	.1390	7	177	0.9947	.000
	P>|t|	.000	.000	.0000	.0000		.0450	.0750				
Trans	Coef.	.576	-.231	-.6175	-.0449	.020			14	201	0.5824	.000
	P>|t|	.000	.004	.0000	.0000	.055						
Vanas	Coef.	.505	-.451	-.7905	.0419	.056	.0832		19	390	0.9876	.000
	P>|t|	.000	.000	.0000	.0000	.000	.0000					

Note: Blank cells indicate insignificant relationship; grey-highlighted figures indicate results in conformity with POT

The above analysis indicates that current profitability and past profitability are negatively related to leverage irrespective of its definition. Moreover, this relationship is more

pronounced with past profitability. The inverse relationship of profitability with leverage confirms the predictions of POT in Pakistan. Regarding liquidity we obtain an overwhelming support of POT for short-term leverage and total leverage. Firm size is positively related to leverage. The positive relationship confirms the predictions of TOT in Pakistan. Finally, growth and past dividends are generally insignificant determinants of leverage in Pakistan. However whenever growth found significant it is in line with the predictions of POT. Finally we observe a mixed support of POT and TOT for past dividends in Pakistan. In sum 72 percent of our results are in conformity of POT and only 28 percent are in line with TOT.

5. Conclusion

What determines corporate leverage behaviour? We use model-based approach (Tong & Green, 2005) to answer this question in Pakistani context. The scarcity of empirical evidence from developing countries and the weaknesses of the existing empirical studies (Allen, 1993; Tong & Green, 2005; Qureshi, 2009) have lead us to carry out this study to overcome the identified weaknesses and provide empirical evidence from a large panel data of non-financial firms in Pakistan using three proxies of leverage. This study suggests that in Pakistan leverage, irrespective of its definition, has three prevalent and significant relationships: one, in line with POT a negative relationship with current and past profitability as well as liquidity; two, in line with TOT a positive relationship with firm size; and three, in line with POT a positive relationship with growth rate. In sum 72% of the results provide support to POT in Pakistan. In addition, the extent to which the two competing theories explain the financing behaviour of firms in Pakistan, findings of this study also highlight the effects of some firm-specific factors on leverage in different industries. Notably, results of this study provide a unique opportunity to the corporate managers and researchers to recognize that similar variables affect leverage differently in different industries. Why same variables affect capital structure choice of firms differently in different industries is a question that needs to be tested empirically and is the task for future research?

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