Empirical Analysis Of The Borrowing Behavior Of Indian Firms On The Backdrop Of The Pecking Order Model

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SECTION I

INTRODUCTION

The determination of an optimal capital structure has been one of the most debatable issues in the finance literature since the introduction of the groundbreaking work by Modigliani and Miller on the capital structure irrelevance in 1958. Following the work of Modigliani and Miller (1958), two conflicting theories of capital structure came to the limelight, namely the static trade-off theory, and the pecking order theory. The paper starts with a very succinct description of these two theories followed by rigorous analysis of different facets of the latter one.

The static trade-off theory of capital structure states that optimal capital structure is obtained where the tax advantage of debt financing balances leverage-related costs such as financial distress and bankruptcy. According to this theory, issuing equity means a diversion from the optimum position and should , therefore, be treated by the external stakeholders as bad news. The theory also states that firms attempt to set a target debt to equity ratio by trading off the tax advantage of debt with the cost of financial distress, which maximizes the firm value by keeping the WACC at the minimum. Once the target structure has been set, all the strategic and financial decisions are aligned toward achieving the same. On the practical ground, such setting of the optimal capital structure is difficult as the parameter- cost of financial distress is hard to define.

On the other hand, Pecking order theory proposed by Myers states that firms prefer to finance new investment, first internally with retained earnings, then with debt, and finally with an issue of new equity. Myers argues that an optimal capital structure is difficult to define, as equity appears at the top and the bottom of the pecking order. Internal funds incur no flotation cost, asymmetric information costs, and no cost of financial disclosure and thereby, they are given the highest priority for financing deficit. On the other hand, when the managers go for equity issue, the investors, who normally have less information about the firm's value relative to the managers, anticipate that the shares are overpriced. This results in the fall in share price post such announcements. This asymmetric information cost of equity issue is high enough to motivate the management to keep the equity issue only as a last option. Thus, it can be generalized that firms issue securities that carry the smallest adverse selection cost, i.e. that are least likely to be mispriced by inaccurately informed outside investors. This intuition reduces to the pecking order, i.e. firms prefer to issue debt, only when the adverse selection cost of debt is negligible. Halov and Heider (2004) argued that the standard pecking order is only a special case of the adverse selection argument of external financing and that, as soon as the outside investors are imperfectly informed about the risk, debt can be mispriced, and firms may prefer to issue equity. Asymmetric information cost of debt arises because the outside investors are not aware of the risk of the projects where they are investing. As there is a tendency of the management to siphon borrowed funds into high risk projects, the providers of the debt are concerned about not knowing the risk of the projects, and they normally set a premium on the debt price. This results in the mispricing of debt. The adverse selection of cost of debt is higher if the past asset volatility of the firm is high. The reason being that, high asset volatility hints toward high riskiness of the firm, which compels the risk caring investors to set a premium. This paper empirically studied these observations in the Indian context.

The main objectives of this paper are :

1. To test empirically, the Pecking order theory using the original model, propounded by Myers' (1984) and Frank and Goyal (2003), and its degenerate form, in the Indian context.

2. To compare the borrowing behaviors of a specific sample of consistently growing firms during their growth phase against the borrowing behaviors of a wider sample of firms in general.

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3. To study empirically, whether Myers' (1984) pecking order hypothesis is a special case that applies when there is no asymmetric information about risk, so that there is no adverse selection cost of debt.

The rest of the paper is organized as follows. Section II presents a review of the relevant literature on capital structure. The data and research methodology is described in section III. Empirical testing of hypothesis and the relevant findings are presented and discussed in section IV. Section V concludes the paper.

SECTION II

LITERATURE REVIEW

The pecking order theory of capital structure is one of the most popular, and at the same time, the most controversial theories of capital structure. According to Myers (1984), due to the presence of adverse selection, firms prefer internal to external finance. When internal funds fall short and external funds are necessary, firms prefer debt to equity because of lower asymmetric information costs associated with debt issues. Equity is rarely issued. These ideas were captured into a testable model by Shyam-Sunder and Myers (1999).They focused on a regression test of the pecking order. In this test, one needs to construct the financing deficit from information in the corporate accounts. The financing deficit is constructed from an aggregation of dividends, real investment, change in working capital and internal cash flows. According to the theory, the financing deficit should follow accurately, the change in corporate borrowings. As a result, if firms follow the pecking order, then in a regression of the change in debt issues on the financing deficit, a slope coefficient of one should be observed. This concept was widely used as a benchmark for testing the theory. Shyam-Sunder and Myers (1999) found strong support for this prediction in a sample of 157 firms that had traded continuously over the period from 1971 to 1989. Their analysis estimated the coefficient of financial deficit to be **0.75** with a $\mathbf{R^2}$ **of 0.68.** Chirinko and Singha (2000) argued against the findings of Shyam-Sunder and Myers. They exemplified that the Shyam-Sunder and Myer's test could hardly differentiate between possible alternative financing hierarchies, and that the relationship between the change in corporate debt and the financing deficit when firms face debt capacity constraints is concave. The survey by Graham and Harvey (2001) finds, on the one hand, that the CFO's inclination toward avoidance of issuing undervalued securities goes in line with the adverse selection logic of the pecking order behavior. However, at the same time, they do not find evidence that the small high growing firms, who normally face high asymmetric information problems, follow the standard pecking order by preferring debt to equity. Fama and French (2002) tested the pecking order and compared it to the main alternative- The static trade-off theory. They find that, on the one hand, that the pecking order model beats the trade-off theory based on the observation that firms that are more profitable have less book leverage. On the other hand, the pecking order could not explain the behavior of the small, less levered non-dividend paying firms. They showed an inclination toward an equity issue despite high asymmetric information problems. Frank and Goyal's (2003) findings also contradicted the conclusions drawn by Shyam-Sunder and Myers (1999). They questioned the validity of the theory over a wider sample of firms, over a longer time period, and for subsamples of firms predicted to have high levels of asymmetric information. For a wider sample of firms, Frank and Goyal showed that the estimation of the coefficient of financial deficit is much smaller than one and is even smaller in the 1990s. Furthermore, they also found that the pecking order performs poorly in a sample of small and high-growth firms, who are anticipated to have the highest degree of asymmetric information and ,therefore, should have the strongest incentives to follow the pecking order. Halov and Heider (2003) presented a simple model arguing that the pecking order theory is an extreme when there is only asymmetric information about the value. They argued that the higher is the asymmetric information of risk relative to the value, the higher is the adverse selection cost of debt and hence, lesser is the propensity among the firms to follow the pecking order. On a similar ground, the higher is the asymmetric information of value relative to the risk, the higher is the propensity of the firms to follow the pecking order. Hence, they exemplified how asymmetric information about both the value and risk transforms the adverse selection logic of the pecking order into a more general theory of capital structure, which explains with greater buoyancy, the rationality behind for both debt and equity issues. Walking on a somewhat different path, Viswanath (1993) showed that the intertemporal variation in the pecking order hierarchy is caused by the time-variation in adverse selection costs. He found two preconditions for equity issue - high-expected level of information asymmetry in the future and smaller cost of dilution of the equity issue relative to the cost of rejecting the project. Thus, equity is issued when the adverse selection costs are low, thereby allowing the manager to save available internal resources to ensure financing of future positive NPV projects.

SECTION III

DATA AND METHODOLOGY

For the purpose of the empirical analysis 147 BSE listed "A group companies" were selected across a time period of 10 years (2000 to 2009). The relevant data was collected from the CMIE-PROWESS database. All the companies within this A-Group category have a significant market capitalization and represent, without any significant bias, different industries of the Indian economy. 198 prominent Indian companies qualify within this "A-GROUP", from which a sample of 147 was selected by filtering out all the banks and financial service sector companies, as their borrowing and financial behaviors are significantly different from the rest of their peers in the group. Companies with missing data across some or the entire 10-year period were also eliminated. From this parent sample, several subsamples were created, depending upon the demand of the analysis. For analyzing the borrowing behaviors of the firms during their high-growth phase, a sample of 70 firms wasselected, which satisfies the condition of a sustainable PAT growth of 20% or more during the time period of 2005-2009. Similarly, when probed whether the standard pecking order is a special case of the adverse selection argument of external financing, two samples of 49 and 98 firms were created from the parent sample of 147 firms. The filtering criterion was the last ten years (2000-2009) asset volatility (measured by the standard deviation of the total asset of the respective firms).

The data are arranged in a balanced panel form as the observations are spread across different companies and are observed over multiple time periods. The sample is balanced as each of the firm was observed over the same time period. Panel data calls for either fixed effect, or random effect model estimation analysis. This paper follows the pooled panel fixed effect model to study the capital structure behaviors. A fixed effects model is an econometric model that represents the observed quantities in terms of explanatory variables that are assumed to be non-random. This is in contrast to random effects models and mixed models, in which either all or some of the explanatory variables are treated as if they arise from the random causes. Often, the same model can be treated as any of the three types, depending on the researcher's viewpoint. In this paper, all the explanatory variables like the dividend payout, real-investment; working capital, cash inflows, etc. are the result the strategic and financial decision of the firms. Hence, they are anything, but random. This supports the selection of the fixed effect model.

SECTION IV

EMPIRICAL FINDINGS

The researcher started with the model developed by Shyam-Sunder and Myers (1999), Frank, and Goyal (2003) and others for testing the standard pecking order, using a pooled panel regression of the change in net long-term debt issues ΔD_{it} on the financing deficit DEF_{it}

$$\Delta D_{it} = a + bDEF_{it} + \varepsilon_{it} \qquad (1)$$

The deficit DEF_{it} is an aggregation of a firm *i*th uses of funds at time *t* minus its cash flow at the same period. It is modeled as follows:

$$DEF_{it} = DIV_{it} + \Delta RI_{it} + \Delta WC_{it} - C_{it} \qquad (2)$$

Where, ΔD_{it} = Change in the long-term borrowing of ith company at time t.

ΔRI_{it} = Change in real investment of the ith company at time t.

ΔWC_{it} = Change in Working capital of the ith company at time t.

DEF_{it} = Financial deficit of the ith company at time t.

C_{it} = Internal cash flow of the ith company at time t.

Equation (1) and (2) captures the basic idea of the standard pecking order that a firm issues debt if its internal cash flow C_{it} is insufficient to cover its uses of funds: real investment ΔRI_{it}, dividends DIV_{it} and changes in working capital ΔWC_{it}. According to the standard pecking order, equity is only issued as a last resort. The deficit is financed first with retained earnings, then with debt and finally, with equity. If the standard pecking order was the only true determinant of capital structure, then one expects a=0 and b=1.

Shyam-Sunder and Myers estimate b to be **0.75** with a **R^2 of 0.68**. Halov and Heider (2003) estimated the coefficient to be **0.375** with a **R^2 of 0.36** by considering a large sample of firms. Analysis with 147 BSE listed non**-** financial A group companies of India returned a **b-coefficient of 0.320799 with a R^2 of 0.69** (see equation 3 and Table 1) .Hence, the

result buttresses Halov and Heider's findings only with a better R^2. The model also ascertained statistically at 99% confidence level that the constant term is zero, as predicted by the pecking order theory, but fails to prove statistically that b= 1. The reason for the same can be traced to the hypothesis that asymmetric information about risk creates an adverse selection cost of debt, thereby decreasing the propensity of the firms to finance deficits only through the debt issue. This is tested later in the paper.

Table 1: Fixed-effects, using 1323 observations
Included 147 cross-sectional units
Time-series length = 9
Dependent variable: d_Borrowings

	Coefficient	Std. Error	t-ratio	p-value	
const	-45.8285	26.4739	-1.7311	0.08370	*
DEF	0.320799	0.00801639	40.0178	<0.00001	***

Mean dependent var	307.7152	S.D. dependent var	1538.343
Sum squared resid	9.68e+08	S.E. of regression	907.7356
R-squared	0.690530	Adjusted R-squared	0.651813
F(147, 1175)	17.83546	P-value(F)	1.1e-213
Log-likelihood	-10809.67	Akaike criterion	21915.34
Schwarz criterion	22683.11	Hannan-Quinn	22203.16
rho	0.012410	Durbin-Watson	1.670043

Source: author's calculation

$$\Delta D_{it} = -45.8285 + 0.320799 DEF_{it} + \varepsilon_{it} \quad (3)$$

On a similar ground, the researcher tested the dependence of the equity issue on the financial deficit.

$$\Delta E_{it} = a + bDEF_{it} + \varepsilon_{it} \quad (4)$$

Where, ΔE_{it} = Change in equity issue of the ith company at time t.

The panel regression results are stated as follows :

$$\Delta E_{it} = 12.4305 + 0.00210147\, DEF_{it} + \varepsilon_{it} \quad (5)$$

A low value of the coefficient of financial deficit (0.00210147) in equation (5) , as compared to the corresponding value of 0.320799 in equation (3) reveals that debt issue follows more closely financial deficit than do equity issues. A

Table 2: Fixed-effects, using 1323 observations
Included 147 cross-sectional units
Time-series length = 9
Dependent variable: d_Issued_equity

	Coefficient	Std. Error	t-ratio	p-value	
const	12.4305	2.55483	4.8655	<0.00001	***
DEF	0.00210147	0.000773612	2.7164	0.00670	***

Mean dependent var	14.74643	S.D. dependent var	90.18652
Sum squared resid	9016657	S.E. of regression	87.59994
R-squared	0.161446	Adjusted R-squared	0.056538
F(147, 1175)	1.538927	P-value(F)	0.000102
Log-likelihood	-7716.268	Akaike criterion	15728.54
Schwarz criterion	16496.31	Hannan-Quinn	16016.36
rho	-0.107134	Durbin-Watson	2.073885

Source: author's calculation

poor R^2 of **0.161446** indicates a poor goodness of fit. All these evidences support the pecking order hypothesis. As it is evident from the previous results that the borrowing decisions of the firms depends upon the composite financial deficit parameter (as defined in equation 2), the same, as per the theory, should also depend on the individual components of the deficit. The major determinant of the financial deficit- namely the change in real investment, change in working capital, dividend paid, internal cash flow are taken along with another variable effecting the borrowing decisions- the change in retained earnings to develop equation (6).

$$\Delta D_{it} = a + b\Delta RI_{it} + c\Delta WC_{it} + d\Delta RC_{it} + e\,DIV_{it} + yC_{it} + \varepsilon_{it} \qquad (6)$$

Where, ΔD_{it} = Change in the long-term borrowing of ith company at time t.

ΔRI_{it} = Change in real investment of the ith company at time t.

ΔWC_{it} = Change in Working capital of the ith company at time t.

ΔRE_{it} = Change in retained earnings of the ith company at time t.

C_{it} = internal cash flow of the ith company at time t.

DIV_{it} = dividend paid by the ith company at time t

The pooled panel fixed effect regression results are depicted in equation 7 and Table 3 .

Table 3: Fixed-effects, using 1323 observations
Included 147 cross-sectional units
Time-series length = 9
Dependent variable: Change_in_Borrowings

	Coefficient	Std. Error	t-ratio	p-value	
const	-5.44839	24.9921	-0.2180	0.82746	
Change_in_F.asset	0.360355	0.00812964	44.3262	<0.00001	***
Change_in_Worki	0.288045	0.0217376	13.2510	<0.00001	***
Dividend_paid__	-0.508375	0.0718139	-7.0791	<0.00001	***
d_Retained_prof	-0.864694	0.0504194	-17.1500	<0.00001	***
Net_Cash_flow	-0.0905732	0.0309863	-2.9230	0.00353	***

Mean dependent var	307.7152	S.D. dependent var	1538.343
Sum squared resid	5.95e+08	S.E. of regression	712.8789
R-squared	0.809782	Adjusted R-squared	0.785254
F(151, 1171)	33.01397	P-value(F)	0.000000
Log-likelihood	-10487.72	Akaike criterion	21279.45
Schwarz criterion	22067.97	Hannan-Quinn	21575.04
rho	-0.096085	Durbin-Watson	1.900630

Source: author's calculation

$$\Delta D_{it} = -5.44839 + 0.360355\Delta RI_{it} + 0.288045\,\Delta WC_{it} - 0.864694\Delta RE_{it} - 0.508375DIV_{it} - 0.0905732C_{it} + \varepsilon_{it} \qquad (7)$$

This new model shows that with the change in real investment and working capital needs, firms' increase their level of borrowings, but the change of borrowing is negatively related with the change in retained profit, dividend paid and the internal cash flow. The intercept term is not different from zero at 1% level of significance, while the rest of the coefficients are significantly different from zero at 1% level. The high R^2 value of **0.809782** indicates improved *"goodness of fit"* as compared to the old model. This new model correctly depicts the pecking order from the observation that higher is the growth in retained earnings, the lesser will be the change in borrowing level, indicating the preference of internal financing over external debt financing by a firm. But the fact that the coefficient of dividend paid is negative does not go well with the old model, which states that the higher is the dividend paid, the higher will be

the financial deficit and in the event that the pecking order holds, the higher will be the change in the borrowing level. On the contrary, the new model predicts that the higher is the level of dividend-paid, the lower is the increase in the borrowing level. The observation can be explained as follows- normally, managers pay higher dividend to the shareholders when they predict that the future rate of returns on invested capital is less than the cost of capital of the firm. This is in accordance with the Walter's model of dividend policy (Walter, J.E, 1956). In such an environment of low future rate of return prospect, growth in real investment and working capital will be lower; thereby, the deficit will also be lower. Now, if the deficit is low, change in firms' borrowing should also be low as per the pecking order - this result is evident from equation (7). Thus, it can be said that the new model (given by equation 6) is a better estimator of pecking order, as compared to the old model given by equation (1).

To complete the conclusion, the researcher tested the following equation.

$$\Delta E_{it} = a + b\Delta RI_{it} + c\Delta WC_{it} + d\Delta RC_{it} + e\,DIV_{it} + yC_{it} + \varepsilon_{it} \quad (8)$$

Where, ΔE_{it} = Change in the equity issue of the ith company at time t.

The result of the fixed effect regression is depicted in equation (9) and Table 4.

Table 4: Fixed-effects, using 1323 observations
Included 147 cross-sectional units
Time-series length = 9
Dependent variable: d_Issued_equity

	Coefficient	Std. Error	t-ratio	p-value	
const	9.08174	3.06002	2.9679	0.00306	***
Change_in_F.asset	0.000465383	0.000995388	0.4675	0.64020	
Change_in_Worki	0.00561955	0.00266153	2.1114	0.03495	**
Dividend_paid__	0.0243206	0.00879285	2.7660	0.00576	***
d_Retained_prof	-0.0105109	0.00617332	-1.7026	0.08890	*
Net_Cash_flow	0.00172288	0.00379394	0.4541	0.64983	

Mean dependent var	14.74643	S.D. dependent var	90.18652
Sum squared resid	8921355	S.E. of regression	87.28447
R-squared	0.170310	Adjusted R-squared	0.063321
F(151, 1171)	1.591852	P-value(F)	0.000024
Log-likelihood	-7709.239	Akaike criterion	15722.48
Schwarz criterion	16511.00	Hannan-Quinn	16018.08
rho	-0.125469	Durbin-Watson	2.105969

Source: author's calculation

$$\Delta E_{it} = 9.08174 + 0.000465383$$

$$\Delta RI_{it} = 0.00561955\Delta WC_{it} - 0.0105109\Delta RI_{it} + 0.00243206DIV_{it} + 0.00172288C_{it} + \varepsilon_{it} \quad (9)$$

The null hypothesis that the coefficient of ΔRI_{it}, ΔWC_{it} ΔRE_{it} and C_{it} are statistically not different from zero cannot be rejected at 1% level of significance. This indicates that the change of equity do not follow closely, the real investment and change in working capital as done by the change in debt. A low R^2 value of **0.170310**, hints toward poor *"goodness of fit"*. Thereby, it is evident that firms prefer borrowings more than equity issue to finance real investment and working capital needs and hence, growth. This finding buttresses the original pecking order theory. The coefficient of the change in retained earnings is statistically not different from zero, indicating that the decision of equity issue could not be traced to the retained earnings position of the company. Only, the coefficient of the dividend paid is appreciably different from zero at 1% level of significance. The equation (9) states that a 100% increase in the dividend payout by a firm is followed by a 2.4% increase in equity issue.

For analysis of the Pecking order theory, and the capital structure decisions of the high and consistently growing firms, 70 firms were chosen from the BSE listed "A group companies" , which registered a consistent PAT growth of 20% or

Table 5: Fixed-effects, using 280 observations
Included 70 cross-sectional units
Time-series length = 4
Dependent variable: Change_in_Borrowings

	Coefficient	Std. Error	t-ratio	p-value	
const	202.35	78.0183	2.5936	0.01017	**
DEF	0.512384	0.073928	6.9309	<0.00001	***

Mean dependent var	590.1119	S.D. dependent var	1378.247
Sum squared resid	1.73e+08	S.E. of regression	909.8848
R-squared	0.673517	Adjusted R-squared	0.564168
F(70, 209)	6.159365	P-value(F)	7.14e-25
Log-likelihood	-2264.088	Akaike criterion	4670.176
Schwarz criterion	4928.246	Hannan-Quinn	4773.688
rho	-0.245761	Durbin-Watson	1.765015

Source: author's calculation

more for the preceding 5 years. A time period of the last 5 years is taken in the analysis to trace the capital structure pattern of these firms in their high profitable phase.

The analysis starts with the general model of Pecking order theory given in equation (1). The results are depicted in equation (10) and in Table 5.

$$\Delta D_{it} = 202.35 + 0.512384 DEF_{it} + \varepsilon_{it} \qquad (10)$$

The result indicates that whenever the financial deficit increases by 100%, the firms increases their borrowing level by around 51% as opposed to 32% in case of the first sample. This indicates that the firms in their growth phase relies more on debt to finance growth. This inclination towards debt can be further ascertained by regressing equation (11), with this sample of 70 firms.

$$\Delta D_{it} = a + b\,\Delta RE_{it} + \varepsilon_{it} \qquad (11)$$

The result of the fixed-effect regression is displayed in equation (12) and in Table 6.

Table 6: Fixed-effects, using 280 observations
Included 70 cross-sectional units
Time-series length = 4
Dependent variable: Change_in_Borrowings

	Coefficient	Std. Error	t-ratio	p-value	
const	87.3456	84.4914	1.0338	0.30243	
Retained_profit	0.947227	0.123553	7.6666	<0.00001	***

Mean dependent var	590.1119	S.D. dependent var	1378.247
Sum squared resid	1.66e+08	S.E. of regression	891.4521
R-squared	0.686611	Adjusted R-squared	0.581648
F(70, 209)	6.541462	P-value(F)	1.89e-26
Log-likelihood	-2258.358	Akaike criterion	4658.715
Schwarz criterion	4916.785	Hannan-Quinn	4762.227
rho	-0.159922	Durbin-Watson	1.609565

Source: author's calculation

$$\Delta D_{it} = 87.3456 + 0.947227 \Delta RE_{it} + \varepsilon_{it} \qquad (12)$$

The intercept term is statistically not different from zero, and the coefficient of the "change in retained earning" term is statistically significant at 99% confidence level. The result depicts that a 100% increase in the retained earning position of a firm is followed by a 95% increase in borrowing level. Hence, it is apparent that even though retained earnings are substantial, high-growth firms are inclined towards more debt. Two reasons can be sited for this behavior- first during the phase of higher profit growth, all or most of the components of the financial deficit, namely the growth of real investment, growth of working capital and dividend payment also grow simultaneously at a still higher rate. In such a situation, retained earnings become insufficient to cope with this growing deficit, necessitating in the increase of borrowed capital. Second, during this high profitable phase, firms prefer higher borrowings to ensure that the earnings are utilized by the managers effectively. Higher level of borrowings inculcates managerial discipline by preventing sub-optimal investment of the retained earnings by the management. This aligns the manager's wealth maximization objective with that of the shareholders, and reduces the shareholder-manager conflict. This argument is supported by the agency cost theory (Jensen and Heckling, 1976).

The same model (11), when tested on the sample of 147 BSE listed "A group companies" over a period of 10 years (2000-09) reveals the following result.

Table 7: Fixed-effects, using 1323 observations
Included 147 cross-sectional units
Time-series length = 9
Dependent variable: d_Borrowings

	Coefficient	Std. Error	t-ratio	p-value	
const	385.275	36.4826	10.5605	<0.00001	***
d_Retained_prof	-1.10884	0.0872321	-12.7114	<0.00001	***

Mean dependent var	307.7152	S.D. dependent var	1538.343
Sum squared resid	2.01e+09	S.E. of regression	1308.293
R-squared	0.357149	Adjusted R-squared	0.276724
F(147, 1175)	4.440785	P-value(F)	7.63e-48
Log-likelihood	-11293.26	Akaike criterion	22882.52
Schwarz criterion	23650.30	Hannan-Quinn	23170.34
rho	0.433869	Durbin-Watson	1.010016

Source: author's calculation

$$\Delta D_{it} = 385.275 - 1.10884 \Delta RE_{it} + \varepsilon_{it} \qquad (13)$$

Figure 1 : Sensitivity Of The Change In Deficit To The Change In Retained Earnings During The Growth Phase

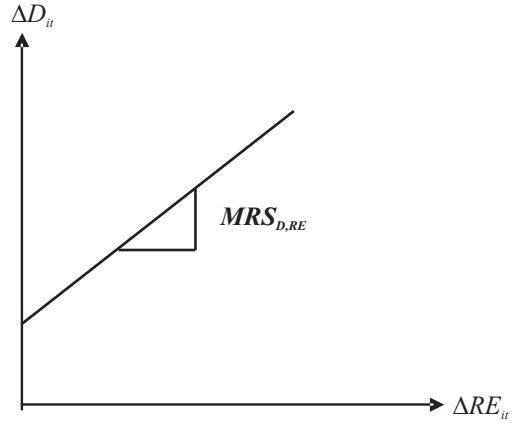
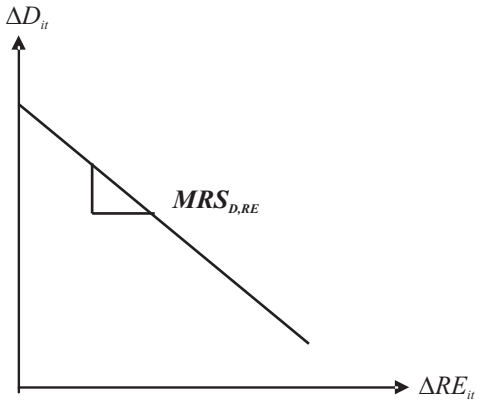


Figure 2 : Sensitivity Of The Change In Deficit To The Change In Retained Earnings Over A Wider Firm Sample



This sample consists of both high and low growth firms. The period of 10 years is wide enough to be biased toward the growth phase. It indicates that except for the phase when growth is high, firms generally prefer to reduce the level of borrowings when the retained earning positions are improving. The reason is straightforward - cost minimization - the cost of adverse selection of debt is always high than the cost of retained earnings and thereby, firms prefer internal financing to external financing of deficit. This is in accordance with the original pecking order theory.

The paper defines marginal rate of substitution of debt by retained earnings ($MRS_{D.RE}$) in financing deficit as follows:

$$MRS_{D.RE} \frac{\Delta D_{it}}{\Delta RE_{it}} \qquad (14)$$

The first sample of BSE listed 147 A group companies reveals a negative $MRS_{D.RE}$, whereas, the second sample of BSE listed 70 A group companies, which registered a consistent PAT growth of 20% or more for the preceding 5 years, reveals a positive $MRS_{D.RE}$ during their growth phase. This signifies that retained earnings of a firm generally substitute debt in financing deficit, except for a phase of high growth of profit, when in spite of high inflow of retained earnings, firms prefer to increase their borrowing levels. These observations hint toward non - linear relationship (possibly U shaped) between the borrowing and retained earning position of firms.

The Figure 1 indicates the borrowing behaviors of the firms at their high profitable phase. During this phase, firms are found to rely heavily on debt, thereby, $MRS_{D.RE}$ is positive. Figure 2 exhibits the pattern found among the more general sample of a firm over a wider time period, which shows a negative. $MRS_{D.RE}$.

To reinforce this conclusion presented above, the regression model (equation-11) is modified to include a square term of the change in retained earnings, and the same is tested on the parent sample of 147 companies across ten years (2000-09). The result is displayed in equation (16) and Table 8.

Table 8: Fixed-effects, using 1323 observations
Included 147 cross-sectional units
Time-series length = 9
Dependent variable: d_Borrowings

	Coefficient	Std. Error	t-ratio	p-value	
const	337.261	33.0338	10.2096	<0.00001	***
d_Retained_prof	-1.47828	0.0818211	-18.0672	<0.00001	***
sq_d_Retained_p	0.000369186	2.24497e-05	16.4450	<0.00001	***

Mean dependent var	307.7152	S.D. dependent var	1538.343
Sum squared resid	1.63e+09	S.E. of regression	1179.980
R-squared	0.477508	Adjusted R-squared	0.411641
F(148, 1174)	7.249499	P-value(F)	3.32e-91
Log-likelihood	-11156.13	Akaike criterion	22610.26
Schwarz criterion	23383.22	Hannan-Quinn	22900.02
rho	0.051700	Durbin-Watson	1.529193

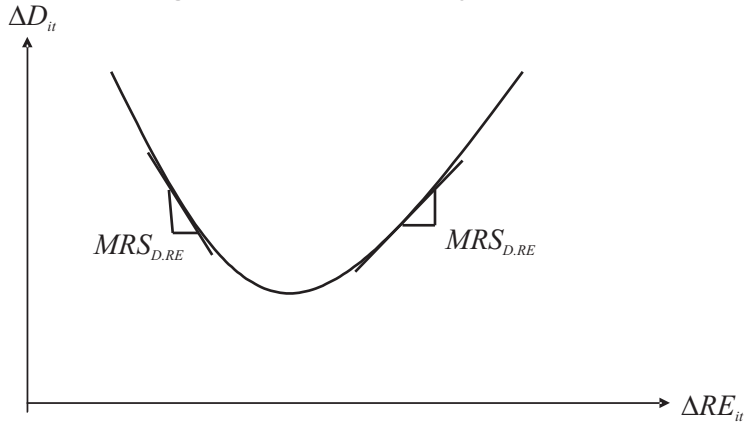
Source: author's calculation

$$\Delta D_{it} = a + b\Delta RE_{it} + c\Delta RE_{it}^{2} + \varepsilon_{it} \qquad (15)$$

$$\Delta D_{it} = 337.261 - 1.47828\Delta RE_{it} + 0.000369816\Delta RE_{it}^{2} + \varepsilon_{it} \qquad (16)$$

The coefficient of ΔRE_{it} is negative, but the coefficient of ΔRE_{it}^{2} is positive. This shows that the relationship between borrowings and retained earnings is U-shaped. The observations can be interpreted as follows- when the growths of earnings are low, firms follow a conservative financing policy of first utilizing the retained earnings and then debt to finance deficit. Thereby, an increase in retained earnings is followed by the decrease in borrowing levels of the firms. But when the change in retained earnings are higher, firms prefer to increase their level of borrowings either to prevent

Figure 3: : Sensitivity Of The Change In Deficit Over The Change In Retained Earnings Over The Entire Sample Horizon



the sub-optimal investment of the retained earnings by the management (the conflict between the shareholders and the management is higher in this situation) or because this huge growth is the result of huge real investment, which is impossible to be funded single handedly by the retained profit. This explains for the U-shaped relationship between the borrowing behaviors and internal funds of firms. It is depicted in the Figure 3.

The next phase of the study probed into whether the standard pecking order is a special case of the adverse selection argument of external financing that holds only if there is no asymmetric information about risk. The capital structure decision is subject to an adverse selection problem, since outside investors know less about the characteristics of the investment project than insiders do. Halov and Heider (2003) predicted that higher is the asymmetric information of risk relative to the value, the higher is the asymmetric cost of debt issue and therefore, the lesser is the propensity of the firms to issue debt relative to equity to finance deficit. The paper empirically probes into this hypothesis. The key differentiator in this analysis is the measure of a firm's past asset risk. This is the measure of the extent to which uninformed outside investors care about not knowing value relative to risk. As a proxy for the same, volatility of the assets of the firms over the past ten years (2000-09) are taken as a parameter based upon which the firms are segregated into two samples. The first sample consists of those firms whose past asset volatility, as measured by the standard deviation of the total asset, is more than 1000 units. They are termed as high asset risk firms. The rest of the firms are

Table 9: Fixed-effects, using 490 observations
Included 49 cross-sectional units
Time-series length = 10
Dependent variable: Change_in_Borrowings

	Coefficient	Std. Error	t-ratio	p-value	
onst	-435.614	83.808	-5.1978	<0.00001	***
DEF	1.2115	0.114501	10.5807	<0.00001	***

Mean dependent var	-252.3028	S.D. dependent var	2013.422
Sum squared resid	1.45e+09	S.E. of regression	1815.096
R-squared	0.268737	Adjusted R-squared	0.187301
F(49, 440)	3.299979	P-value(F)	2.12e-11
Log-likelihood	-4345.818	Akaike criterion	8791.637
Schwarz criterion	9001.357	Hannan-Quinn	8874.001
rho	0.000920	Durbin-Watson	1.121142

Source: author's calculation

Table 10: Fixed-effects, using 979 observations
Included 98 cross-sectional units
Time-series length: minimum 9, maximum 10
Dependent variable: Change_in_Borrowings

	Coefficient	Std. Error	t-ratio	p-value	
const	-831.358	160.047	-5.1945	<0.00001	***
DEF	0.468211	0.0393457	11.8999	<0.00001	***

Mean dependent var	-11.47225	S.D. dependent var	4908.960
Sum squared resid	1.80e+10	S.E. of regression	4519.925
R-squared	0.237171	Adjusted R-squared	0.152219
F(98, 880)	2.791840	P-value(F)	2.33e-15
Log-likelihood	-9576.465	Akaike criterion	19350.93
Schwarz criterion	19834.70	Hannan-Quinn	19534.98
rho	-0.017009	Durbin-Watson	1.161382

Source: author's calculation

taken in the second sample and are designated as low asset risk firms. Based on this selection criterion, 98 firms were selected in the first sample and 49 in the second sample. It is to be noted in this regard that the past asset volatility is only taken as a criteria for segregating firms into these two samples. It is not used as a proxy for any explanatory variable in the study.

Now, the objective of the analysis culminates into testing the following two hypotheses-

Hypothesis 1: The standard pecking order should work well for firms that have the low asset risk.

Hypothesis 2: The standard pecking order should not work well for firms that have the high asset risk.

Both the hypotheses are tested by running regression (1) on both the samples one after the other.

$$\Delta D_{it} = a + b\Delta DEF_{it} + \varepsilon_{it} \qquad (1)$$

For the 49 low assets, risk firms the regression results are shown in equation (17) and Table 9.

$$\Delta D_{it} = -435.614 + 1.2115 DEF_{it} + \varepsilon_{it} \qquad (17)$$

For the 98 high assets, risk firms the regression results are shown in equation (18) and Table 10.

$$\Delta D_{it} = -831.358 + 0.468211 DEF_{it} + \varepsilon_{it} \qquad (18)$$

The coefficient of financial deficit in the low risk sample is 1.2115, which is much higher than the coefficient of financial deficit in the high risk sample (0.468211), indicating that both the hypotheses 1 and 2 are true. Hence, it can be concluded that Pecking order theory is a special case of the adverse selection argument of external financing, which works better in situations where the investors do not care about not knowing the risk of the projects taken by the firm.

SECTION V

CONCLUSION

The paper explores various facets of the pecking order theory over 147 BSE listed A-Group companies for a period of ten years (2000-2009) and obtained a mixed result. While, on the one hand, it supports Halov and Heider's finding that pecking order is a special case, which works best when the external investors do not care about not knowing the risk of the project, on the other hand, it questions the aggregated formula used by Shyam-Sunder and Myers and others in defining the financial deficit for testing the theory. The paper depicts that at times of higher dividend payment by the firms, the change in borrowings decreases, which advocates the separation of dividend from the aggregated *"financial deficit"* used in the regression studies. The reason is interpreted as follows- managers pay a higher dividend to the shareholders when they predict that the future rate of return from the invested capital is less than the cost of capital of the firm. This is in accordance with the Walter's model of dividend policy. In such an environment of low future rate of return prospect, growth in real investment and working capital will be lower; thereby, the deficit will also be lower. Now, if the deficit is low, change in firms' borrowing should also be low as per the pecking order. Working along the

same line, it is found that the degenerated form of the model (where the variable *"financial deficit"* is broken down into individual components), works better as compared to the old model in the Indian scenario. Further, the paper reveals a nonlinear U-shape relationship between the change in the borrowings and the change in the retained earning position of the firms. The observations can be interpreted as follows: When the growths of earnings are low, firms follow a conservative financing policy of first utilizing the retained earnings, and then debt to finance the deficit. Thereby, an increase in retained earnings is followed by the decrease in borrowing levels of the firms. However, when the changes in retained earnings are higher, firms prefer to increase their level of borrowings, either to prevent sub-optimal investment of the retained earnings by the management (the conflict between the shareholders, and the management is higher in this situation), or because this huge growth is the result of massive real investment, which is not possible to be funded singlehandedly by the retained profit.

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