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Lemon Problem and Pecking Order theory: An Investigation on Indian Corporate sector*

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Abstract

This paper uses the evidence from Indian corporate sector during the period of 2002 to 2010 to understand the pecking order theory and its effect on capital mix decision in Indian companies. For the purpose of the study, the standard explanation of pecking order as given by Myers and Majluf had been taken to understand the effect on leverage. Standard regression equation with lagged leverage was tested to find the effect of the pecking order theory. The Financial deficit as explained by Shaym Sunder and Myers were tested to find the pecking order effect. The paper concludes that there is no evidence of use of pecking order theory in Indian Corporate sector.

Key words: *Pecking order theory, Market to book value ratio, Debt ratio and financial deficit and Adaptability*

Introduction

Akerloper 1970 George Akerloper came up with a study where he used defective cars popularly called as "lemons" and the selling and buying of these cars in the market. He hit upon a phenomena where he explained that buyers and sellers do not have the same amount of information which leads to imperfect decision making. If the buyer has several sellers, each of them having one or more than one cars to sell, the buyer based on his information on each of the cars would negotiate the price with the seller and eventually create a preferential ladder based on the net earnings measured by net present value that the cars would make for him. Depending on the number of cars that he proposes to buy, he would exhaust the preferential list from the top, as long as the cut-off point of purchase provides non-negative NPV. This concept was popularly termed as "lemon problem".

Similar pattern of decision-making has been used by creating such ladder of preference for investments in the financial market where information plays a key role in deciding the sourcing and pricing of the investments. Hence, the investor will try to make an investment decision by eliminating many positive net present value investments decision and create a ladder of investment in order to reach the optimal

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decision. This theory propounded the concept of information asymmetry, which was later verified by Mayers and Majluf (1984) in what was called the "Pecking Order theory".

Mayers and Majluf (1984) propounded the theory of Pecking order. Simply speaking, this theory speaks of creating an order of risk- return profile in the investor. The higher the risk, higher will be the chance that investor would require higher premium or return to fund such investment. This is in order to compensate the possibility of bad investment . This makes the risk sticky.

This has a greater impact on capital decisions of the firms. Since a firm that chooses to get its capital decisions funded by the investors will face the pecking order of the investors and thus creating a degree of choice difference between debt and equity. If the firm goes to the market to fund a relatively higher risk project with debt capital, the investor will ask for higher premium or may force the firm to change the pattern of capital it seeks to fund its project that is; from debt to equity.

Mayers (1984) addressed the capital structure puzzle and drew a conclusion that the pecking order does affect the firm's capital structure decisions.

Objective and Scope of the Paper

This objective is to test the effect of pecking order theory on the capital investment decision in Indian firms and to understand whether the corporate managers act in accordance with the theory. The study covers the period of 2001-02- 2009-10, for which the largest density of data could be collected from the CMIE-PROWESS. Data pertaining to manufacturing firms listed in NSE have been used for this purpose.

Literature Survey

As noted earlier, under the theory of pecking order the capital structure will be driven by a hierarchical preference starting from the least risky to the more risky capital. This is a behaviour, which is observed by both investors and firms. The preferred capital of funding a new project by a firm will therefore always be debt capital with less risk. The investors may ask for more premium on their investment in such new projects as they suffer from asymmetric information bias. They found out the pecking order theory is very valid for the developed country where they prefer internal funds as their first preference to fund their new projects.

¹ . In their original paper, Mayers and Majluf draws the analogous comparison that pecking order comes from the behaviour of the pet hens, which when fed with chose to peck on the grains close to its feet then the ones which are scattered faraway. This behaviour is learned from the fact that it is safer to peck the grains near the feet then venture far away where, there may be a fox waiting in the bush to pounce on the hen (instinct driven phenomena which lends to risk aversion). But, if the hen wants to be well fed then it will leave the crowd and venture out towards the outer rim there by getting premium fed with the risk of the fox looming large still .

Chirinko and Singha (2000) classified the pecking order as strong, semi strong and weak forms. Strong form firms always use internal resource to fund new projects, the semi strong firm admits some equity issue to fund the new projects and the weak firms will prefer equity followed by debt capital to form their capital structures.

Mayer (1984), Frank and Goyal (2003), Lemmon and Zender (2001) found that debt capacity factor as an limitation of issue of new debts. Debt capacity according to them is a function of asymmetric information in favour of the firm, making it temporarily advantageous for them to raise debt. Fama and French (2002) argued that firms might use equity finance without violating the pecking order theory when firms anticipate need for external financing in the near future for the implementation of new projects. If the foreseen debt requirements become unfeasible by a future debt ratio above the firms' capacity, it will issue new shares to be able to issue more debt in the future.

Shyam Sunder and Myers (1999) found strong support in favour of pecking order theory for firms, which have continuously traded from 1971 to 1989. Bento (2003) found that in a market-based economy such as UK the propensity to use debt capital is higher in comparison to new issue of equity.

Studies in Indian context are quite few. Bhole (1980) observed that there is no pecking order effect on Indian capital making decision. Singha (1995) analysed funding patterns of developing countries like India and found no evidence of pecking order. Cobham and Subramanian (1998) studied the Indian context and concluded that Indian firms use more equity finance than debt to fund new projects. Mahakud and Bhole (2003), Mahakud (2006) also concluded that there are no evidence that there is evidence of pecking order in Indian firms. Mahakud (2006), uses an aggregated accounting model of Pecking order on Indian corporates and concludes that there is no effect of pecking order on capital structure determination in India. Recent studies by Singh and Kumar (2010) (2012) outlines the use of pecking order theories in context of Indian companies with a view to compare it with the other theories namely agency theory, capital structure theory and trade off theory. The purpose of the paper was to validate the use of pecking order theory during the period of 1990-2007 using a regression model. The result of the study contradicted the use of pecking order in Indian firms. Anton (2010), studied a theoretical model to compare the pecking order theory with that of the other capital structure theories. He found that trade off theory can explain many facts about the capital structure, and it does not have many weaknesses except one, which is very important, i.e., negative correlation between debt and profitability. He further observed that pecking order theory provides straight explanation for this phenomenon that has mixed evidence regarding the pecking order theory. While developing the model in this paper this has been kept in mind as profitability holds a major part of the discussion.

The studies pertaining to India are varied. This study takes a substantial long and consistent data period to understand the effect of pecking order theory and lemon effect on the Indian firms' capital structure decision. This study tries to bridge the gap of intermittent study to form continuity in the study on pecking order for the Indian corporate sectors, by using larger data set.

Research Methods

Data set and source

The data for a period of 2001-02 to 2009-10 from the CMIE – PROWESS have been used taking the NSE Listed Manufacturing firms. Manufacturing firms have been taken for dual reason of frequent capital budgeting decision and tangible assets, which plays a significant role in understanding the pecking order impact on the firm’s decision. A total number of 652 companies were used resulting in a balanced panel set of 3965 observations. The study used Statistica V10 for the analysis.

Models specified

The model, which was tested, stands as

$$D_{it} = \alpha + \beta_1 TAN_{it} + \beta_2 MTB_{it} + \beta_3 S_{it} + \beta_4 PR_{it} + \beta_5 FIND_{it} + \epsilon_{it} \dots\dots\dots \text{Equation (1)}$$

Where;

D_{it} = Debt ratio (ratio of total debt to market capitalization), i value for t period of time².

TAN_{it} = Tangible asset to book value ratio of i value over t period of time

MTB_{it} = Market capitalization to book value ratio for i value for t period of time

S_{it} = Size of the firm, i value for t period of time

PR_{it} = Profitability denoted by operating profit to book value of assets for i value for t period of time

$FIND_{it}$ = Financial deficit denoted by sum of dividend, investment and change in working capital minus cash flows for I value for t period of time

α = The constant intercept of the equation

ϵ_{it} = Error term

D_{it-1} = Lagged leverage has been used as a dummy to test the effect on fixed effect firm and time model in the same equation simultaneously.

However, Shyam Sunder and Mayers (1999) argued that post IPO, equity issues are seldom used and the specified a model in which stands as below:

$$D_{it} = \alpha + \beta FIND_{it} + \epsilon_{it} \dots\dots\dots \text{Equation (2)}$$

According to them the pecking order hypothesis is that $\alpha = 0$ and $\beta = 1$. From this, we can assume that the effect of FIND will nullify the regression effect of the other variables.

² The pecking order creates a ladder based on cost and risk of capital. In this ladder debt is the least cost capital. A firm uses high debt in capital structure to reduce its overall cost of capital. Hence, higher debt to capital ratio will indicate preference to use lower cost of capital. This however, may lead to a situation of bankruptcy as more debt is used by the firm. Therefore, the firm which uses pecking order uses higher debt than equity.

Rational for usage of the variables

Harris and Raviv (1991) argued that firms with few tangible assets would have greater asymmetric information problems and accumulate more debt. However, conventional financial wisdom says that more tangible assets will generate more confidence in the investors and hence will lead to more debt accumulation.

Mayers (1977), Barclay et al (2001) have argued in favour of using market to book value, size of the firm and the profitability ratio in order to test the pecking order theory. They showed that the effect of debt capacity could be negative if the size and profitability increases, which would lead to a higher, market to book value ratio for the firm.

Titman and Werssels (1998) and Fama and French (2002) showed negative relation between firm size, debt capital usage and profitability. They further noted that due to better information accessibility large firms face lower information cost when borrowing.

Sunder and Myers (1999) tested the effect of financial deficit on net debt issued through IPO. Further Frank and Goyal (2002) suggested that financial deficit has a greater impact on study of pecking order as one unit increase in any component of financial deficit will have the same unit impact on debt ratio.

Statistical tools used

A conventional regression equation has been carried out to find the causation of the depended and the independent variables in this study of fixed effect firm and time models (stated in equation 1 above). A regression equation with lagged leverage as variable has been done to find the effect of Panel data model have been used to estimate the equation. Panel data [(Hasio (1986), Moulton and Randolph (1989) and Solon (1989))] observed that panel data controls the effect of missing or unobservable variables as well as the individual heterogeneity so that the risk of obtaining biased results are reduced. Panel data may be used in two ways. First, the unobservable effect can be included in error term. The variance covariance matrix of the resulting non-spherical error must be transformed to obtain consistent estimates of the standard errors. However, problem may arise if there is autocorrelation between the unobservable variables and the observable variables. Hence, dummy variables may be introduced to overcome this. This method is known as fixed effect method as it gives consistent estimates regardless of correlation between firm specific error component and regression. The shortcoming of the fixed effect method is that it involves too many parameters and the loss of degree of freedom is very high. This may be avoided if the error is accepted to be random. This is known as random effect model. This study has used the random effect model.

Before estimating the panel data, Likelihood Ratio (LR) test (Gourierous, Holly and Monfort 1982), Lagrange Multiplier (LM) test (Breusch and Pagan 1980) and Hausman Specification test (Hausman 1978) has been carried out to know the significance of the form and time effects in the data set and to find out a suitable panel data method for the estimation of the model.

Analysis of the Statistical Models

From Table 1.1, it is observed that the Likelihood Ratio (LRs) test shows that both the firm and time effect are present in the data. Lagrange multiplier (LM) test statistics shows that either the fixed effect or the random effect to be preferred to classical regression model accepting the use of panel data model. The Hausman test (HT) specification shows that the fixed effect firm and the time models are preferred over the conventional regression analysis.

Table 1.1: F-Test, Likelihood test, lagrange mulitpier test and Hausman Results for the study

Test	Test Statistics	P Value	Test Statistics	P Value
LR Test	χ^2 (652) = 4368.32	0.00	χ^2 (652)=4771.09	0.000
LM Test	χ^2 (1)	0.00	χ^2 (2)=68.98	0.000
Hausman Test	χ^2 (8)	0.00	χ^2 (8)=171.38	0.000

Note : Computed for 652 firms for period for 8 industries covering 3965

Table 1.2: Results of the regression with conventional pecking order variables and financial deficit (including lagged leverage)

Variables Conventional and lagged	Fixed effect from model			Fixed effect firm and time model			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	---	---	---	---	0.0189**	0.023**	0.021**
TAN		0.154*** (0.011)	0.179*** (0.012)	0.173*** (0.011)	0.173*** (0.012)	0.168*** (0.008)	0.182*** (0.016)
MTB		-0.039** (0.017)	- 0.031*** (0.011)	- 0.029*** (0.011)	-0.027** (0.012)	-0.029** (0.011)	-0.037** (0.018)
S		0.0289*** (0.009)	0.023** (0.011)	0.011** (0.003)	0.042** (0.008)	0.029** (0.014)	0.023*** (0.006)
PR		-0.173** (0.029)	-0.201** (0.037)	-0.161** (0.017)	-0.181** (0.028)	-0.182** (1.031)	-0.144** (0.015)
FIND		---	---	0.145** (0.006)	---	---	0.163** (0.007)
D_{it-1}		-----	-----	- 0.139*** (0.006)	-----	-----	- 0.141*** (0.008)
N		3965	3965	3965	3965	3965	3965
r^2		0.38	0.51	0.62	0.48	0.54	0.62

Source: Computed. The value in bracket shows the stander errors. ** and *** 5% and 1 percent level of significance respectively. The fixed effect model does not have intercept and the standard errors are robust to heteroscedasticity.

Table 1.3: Pecking order of Funds using Shyam Sunder and Myer Model

Variables	Fixed effect firm models		Fixed Effect and time model	
(1)	(2)	(3)	(4)	(5)
Constant	----	----	0.007*** (0.002)	0.083*** (0.029)
FIND	0.363** (0.027)	0.228*** (0.018)	0.368*** (0.033)	0.243*** (0.017)
N	3965	3965	3965	3965
r ²	0.40	0.41	0.43	0.44

Source: Computed the value in bracket shows the stander errors. ** and *** 5% and 1 percent level of significance respectively. The fixed effect model does not have intercept and the standard errors are robust to heteroscedasticity

Table 1.2 shows the result of the conventional regression model. The estimated regression coefficient on the tangible assets, firm size, market to book ratio and profitability carry the signs as explained by the literature. The tangible assets carry a positive sign, which is against the pecking order theory. Column 3 and 6 of the table shows the result of leverage equation with both fixed effect firm and time models with financial deficit as an independent factor. The argument that with the inclusion of financial deficit the effect of the other variables will be wiped out is not proved, as there is no significant change in the coefficients. This is supported by the fact that, the adding of the financial deficit is not having much effect on the magnitudes and the significance of the coefficient on the other variables. In column, 4 and 7 the leverage equation has been re-estimated with laggard leverage as an additional as an additional explanatory variable with the other variables including the deficit financing variable. The regression coefficient on the lagged leverage is relatively large in magnitude and it is statistically significant. The negative sign on lagged leverage suggest that mean reversion is working as predicted by the trade off theory. Inclusion of lagged leverage does not affect the sign and significance of the other variables.

Table 1.3 shows the estimation given by equation 2 (Sunder and Myers, 1999 model). It shows that the regression coefficient in both the cases is very low, which rejects the usage of Pecking order theory for these Indian companies as the insignificant coefficients are statistically significant.

Major Findings

The major finding of the study can listed as follows:

1. The LR, LM and Hausman test shows that panel data can be used to test pecking order theory.

2. The conventional regression equation has rejected the presence of pecking order theory in the Indian companies' capital structure decision. Therefore, it can be noted that the Indian firms do not use pecking order theory for making capital decision. This is in conformity with the findings of earlier studies in the Indian Context.
3. For the other model, it has been found that financial deficit add a small amount of extra explanation however, does not change the role of conventional leverage factors.
4. There is no evidence of use of pecking order in Indian firms during the period of study.

Implications of the Study and Scope for Further Research

This study will help in understand the rational of pecking order theory and usage in the Indian corporate sector. Besides, this study will facilitate the further studies on this research problem of pecking order to indentify variables, which are not otherwise used in the model so that new avenues in research can be examined.

There are many opportunities of studying the effect of pecking order theory and its contrasting theories of capital usage in theory. The current study can be used to contrast and identify pecking order theory with agency theory and trade off theory by taking similar variables and using similar model specification to understand the effects of other theories as mentioned above. Besides, these are time bound panel data; hence, a changed frame of time and data might yield different result. It would be interesting to carry out such study in repeated succession to observe in improvement in usage of capital by the Indian firms.

Conclusions

The present study uses panel data for 652 companies with 3965 observations. The data has been tested for consistency and usability using LR, LM and Hausman test that have concluded that the data set can be used to test the pecking order theory. The regression equation analysis finds no evidence of use of the pecking order theory by Indian firms during the period of the study. This is because the magnitudes of the coefficient either contradicts the theory or are insignificant. Therefore, it is concluded that pecking order theory is not used while taking capital structure decision in India.

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