Determinants of leverage -An Empirical analysis on Indian metal sector

D. Vijayalakshmi	ASSISSTANT PROFESSOR, DEPARTMENT OF B.COM(AM), PSGR KRISHNAMMAL COLLEGE FOR WOMEN, PEELAMEDU, COIMBATORE, TAMILNADU, INDIA
Dr . Padmaja Manoharan	HOD & ASSOCIATE PROFESSOR (retd), DEPARTMENT OF COMMERCE, PSGR KRISHNAMMAL COLLEGE FOR WOMEN, PEELAMEDU, COIMBATORE, TAMILNADU, INDIA

ABSTRACT   *The principal sources of finance of a firm are owners' equity and the borrowed money. The decision on the composition of funds, otherwise, known as 'capital structure' is an essential decision, which influences the risk and return of the investors. Leverage plays an imperative role in framing the capital structure. Metal sector is a capital intensive sector, where greater importance has been given in constructing the capital structure. In this backdrop, the study makes an attempt to identify and analyse the determinants of leverage of Indian metal sector. A panel data approach has been applied to analyse the data. The study reveals that the variables, namely, profitability, size and tangibility are the key determinants of leverage of Indian metal sector.*

The success of any firm depends on the effective utilization of funds procured. The principal sources of finance of a firm are owners' equity and the borrowed money. The decision on the composition of funds, otherwise, known as 'capital structure' is an essential decision, which influences the risk and return of the investors. The decision taken by the firms with respect to capital structure has a great impact on their success.

Leverage is a metric that indicates the relationship between debt and equity. Any financing decision of the firm may affect its debt–equity mix. A proper mix of debt and equity plays a significant role for the firms' success. The equity shareholders, being the owners of the company are concerned about the ways of financing a company operation. The efficient management of leverage determines the route to create and enhance shareholder value. Leverage results from the use of fixed cost assets or funds to magnify return to the firm owners. Generally, increase in leverage results in increased return and risk. Firms have to analyse the factors determining the leverage before framing its capital structure. In this background, the study makes an attempt to identify and analyse the determinants of leverage of Indian metal sector for the period 1995-96 to 2009-10.

Metal Sector
Metal sector consist of iron and steel, alloy, aluminium, copper & copper products and other non ferrous metals.

Indian steel industry has shown a tremendous performance in terms of production, capacity utilization, exports and consumption which has made India to become a major competitor in the world. India has been ranked as the fourth largest producer of steel in the world in the year 2010, after China, Japan, and the USA as per the report of World Steel Association. The country has also been the largest producer of sponge iron since 2002. Steel producers have signed 222 memorandum of understanding (MoUs) with the state government for a planned capacity of 275.7 MT by 2020. The construction and infrastructure is the largest consumer of steel in India, accounting for 61 per cent of total consumption in 2010. The sectors such as construction, infrastructure, automobile and power will drive the growth of the steel industry in future.

Aluminium is the second most used metal in the world after steel. India has been the fifth largest producer of aluminium in the world. The country has the capacity to produce more than 2.7 million tones of aluminium per year. India is expected to have an installed aluminum capacity of 1.7 to 2 million tonnes per annum by 2020. India's share in world aluminium capacity is 3 per cent. The Indian copper industry has a moderate importance in the Indian economy, while it has a number of applications across several sectors such as cables, transformers, generators, power and telecommunication etc.,. Private copper producers are Hindalco industries, Sterlite industries etc...

Framework of the study
The dependent variables taken to represent the leverage are Long term debt ratio, Short term debt ratio and Total debt to asset ratio.

Dependent Variables	Formulae
Long term debt ratio (LTD)	Long term debt / Total assets
Short term debt ratio (STD)	Short term debt / Total assets
Total debt to total asset ratio (TDTA)	Total debt / Total assets

Determinants of leverage
Leverage depends on many factors, both internal and external. The following variables have been considered to study the determination of the leverage

Independent Variables	
Profitability	PBIT net of P&E / Total assets
Size	Natural logarthim of total assets
Tangibility	Net fixed assets / Total assets
Non debt tax shield (NDTS)	Depreciation + Amortization / Total assets
Growth	Growth rate in total assets
Business Risk (BR)	Standard deviation of PBIT net of P&E
Liquidty	Current assets / Current liabilities and provision
Free cash flow to total assets (FCFTA)	PAT net of P&E + depreciation /Total assets
Cost of borrowing (COB)	Interest paid / Total Borrowing
Tax rate (TR)	$1 - \dfrac{PAT \ net \ of \ P\&E}{PBT \ net \ of \ P\&E}$

Theories of capital structure
The capital structure is one of the most important debatable issues in the field of finance. The Modigliani and Miller (1958) have made the first attempt to explain the relationship between capital structure and the firm value. The capital structure has been revisited by many theories, such as, pecking order theory, static trade off theory, agency theory and signaling theory.

Signaling Theory
The Signaling Theory has been originally developed by Leland and Pyle (1976) and Rose (1977). According to Leland and Pyle the value of a company is positively correlated with the managerial ownership and each change noticed on the level of the managerial ownership results in a modification in the financial policy followed by a new value of the company. He has argued that the higher is the managerial ownership in the capital of the company, the larger is the debt capacity. Such strong ownership is highly recognized by the bond holders and signals confidence in the future investments.

Static-trade off Theory

According to Static trade off model, the tax benefit – bankruptcy cost trade off models have predicted that companies seek to maintain an optimal capital structure by balancing the benefits and the costs of debt (DeAngelo and Masulis, 1980). The benefits include the tax shield whereas the costs include expected financial distress costs. This theory has predicted that companies maintain an optimum capital structure where the marginal benefit of debt equals the marginal cost. The implication of the trade-off model is that companies have target leverage and they adjust their leverage towards the target over time.

Objective of the study

➢ To identify and to analyse the determinants of leverage of Indian metal sector

Hypothesis

The following null hypothesis has been framed for the purpose of the study:

➢ Leverage is an independent function

Research methodology
Sample and Sampling design

A sample of 36 firms, which have been listed at both BSE and NSE stock exchange by applying purposive sampling technique have been taken for the study. The data has been collected from PROWESS 3.1 version maintained by Centre for Monitoring Indian Economy Pvt Ltd. The study has covered a period of 15 financial years from post-liberalisation era, namely, 1995 -1996 to 2009- 2010.

Tools of analysis

Panel data set has both cross section dimension and time series dimension. In particular, the same cross-sectional units (e.g. individuals, companies, firms, cities, states) are observed over time. It is different from the Pooled OLS ie., pooling independent cross sections across time. Two main models, viz., Fixed Effect Model (FE) and Random Effect model (RE) are available for panel data. All the three models (pooled OLS, FE and RE) have been applied in the study and further, two tests have been carried out to decide the appropriateness of these three models. Initially, the Lagrange multiplier (LM) test has been applied to find the existence of panel effect in the values. The classical model (Pooled OLS) and the RE model are compared and when there is no panel effect, the pooled OLS will be chosen for further analysis. Otherwise, the RE model will be chosen for the next step of application. As a second step, the RE model is compared with FE model using Hausman Specification test and the appropriate model is chosen for further analysis based on the significance of the chi-square valu

Results and Discussions
Long term Debt ratio

The following null hypothesis has been framed to find whether the selected variables have a significant influence on long term debt ratio:

H_0: "The variables, namely, profitability, size, tangibility, NDTS, growth, BR, liquidity, FCFTA, COB and TR do not have a significant influence on LTD ratio"

Table 1- LTD -Pooled OLS and Panel Data Regression-Metal

	Pooled OLS			Fixed Effect			Random Effect		
	B	t	Sig.	B	t-value	Sig.	B	z-value	Sig.
(Constant)	0.09416000	2.792	**	.1249418	3.06	**	.1229032	3.19	**
Profitability	1.09200000	5.704	**	.6798982	3.86	**	.7518441	4.39	**
Size	0.00818700	1.720	NS	.0010354	0.19	NS	.0020008	0.41	NS
Tangibility	0.36800000	11.383	**	.3523122	7.53	**	.3535323	8.65	**
NDTS	0.04409000	.143	NS	-.3788417	-1.36	NS	-.3235724	-1.19	NS
Growth	0.00000380	.567	NS	.0000193	3.31	**	.0000173	3.05	**
BR	0.00000916	.239	NS	0.000009180	0.29	NS	0.000006760	0.21	NS
Liquidity	0.00289800	.890	NS	.0095556	2.68	**	.0080641	2.39	*
FCFTA	-1.92300000	-8.797	**	-1.434337	-6.91	**	-1.529008	-7.64	**
COB	-0.00502800	-2.638	**	-.0044216	-3.04	**	-.0044282	-3.05	**
TR	-0.08830000	-3.972	**	-.0426435	-2.43	*	-.0468021	-2.69	**
R^2	.447			0.3879			0.3869		
F-statistic	32.677		**	23.62		**			
Wald (c^2)							289.27		**
Hausman(c^2)				11.79		NS			
LM (c^2)							527.28		**

Source: computed * significant at 5 per cent level ** significant at 1 per cent level

It is clear from the table 1 that the signs of the regression coefficient have been the same for all the independent variables in all the three models, except for the variable, non-debt tax shield in the pooled OLS model. The R^2 values have shown a moderate correlation between the selected independent variables and the LTD ratio. The F value and Wald chi-square value have revealed a significant correlation between the selected independent variables and the LTD ratio.

The **LM test** has been used to decide the model of the RE regression and a simple OLS regression. The result has shown that the chi-square value (527.28) is significant at one per cent level. Hence, the RE model has been preferred.

The **Hausman specification test** has indicated that the value of chi-square (11.79) is not significant. Hence, the RE model is preferred. Among the three models applied, the **RE model** has been chosen to further analyse the determinants of leverage.

The **RE model** has expressed that out of the eleven independent variables, four variables, namely, profitability, tangibility, growth and liquidity have a significant positive influence on LTD ratio and the other variables, namely, FCFTA, COB and TR have a significant negative influence on LTD ratio. Hence, the null hypothesis has been rejected in respect of these variables.

The three variables, namely, size, NDTS and BR have not been significant. Hence, the null hypothesis has been accepted for these variables.

To conclude, the leverage of metal sector has been determined by the variables, viz., **profitability, tangibility, growth, liquidity, FCF-TA, COB** and **TR** during the period of study.

Short term debt ratio

The following null hypothesis has been framed to find whether the selected variables have a significant influence on short term debt ratio:

H_0: "The variables, namely, profitability, size, tangibility, NDTS, growth, BR, liquidity, FCFTA, COB and TR do not have a significant influence on short term debt ratio"

Table 2 – STD - Pooled OLS and Panel Data Regression-Metal

	Pooled OLS			Fixed Effect			Random Effect		
	B	t	Sig.	B	t-value	Sig.	B	z-value	Sig.
(Constant)	0.66700000	16.883	**	.4620211	12.85	**	.4900143	12.87	**
Profitability	0.27500000	1.227	NS	-.0152422	-0.10	NS	.0186364	0.12	NS
Size	-0.02204000	-3.955	**	.0113996	2.44	*	.0078277	1.71	NS
Tangibility	-0.28000000	-7.394	**	-.260061	-6.31	**	-.2750196	-7.02	**
NDTS	0.56200000	1.560	NS	.1656419	0.67	NS	.1760154	0.71	NS
Growth	-0.00000475	-.607	NS	-.0000123	-2.40	*	-.0000131	-2.55	*
BR	-0.00005086	-1.134	NS	-.0000298	-1.06	NS	-.0000347	-1.22	NS
Liquidity	-0.03882000	-10.182	**	-.0326445	-10.39	**	-.0335941	-10.80	**
FCFTA	-0.52400000	-2.047	*	.0946685	0.52	NS	.031739	0.17	NS
COB	0.00034430	.154	NS	.0011682	0.91	NS	.001121	0.86	NS
TR	0.0979800	3.764	**	.0030899	0.20	NS	.0092547	0.59	NS
R^2	.402			0.2816			0.2792		
F-statistic	27.246		**	14.61		**			
Wald (c^2)							173.34		**
Hausm an (c^2)				26.05		**			
LM (c^2)							981.44		**

Source : Computed * significant at 5 per cent level ** significant at 1 per cent level

It is evident from the table 2 that the regression co-efficient signs have been uniform for all the independent variables in the FE and RE models, except for the variable, profitability and they differ in the pooled OLS model. The R^2 values have exhibited a low correlation between the selected independent variables and the STD ratio in the FE and RE models. A moderate correlation has been noticed in the Pooled OLS model. The F test and Wald chi-square test have been statistically significant at one per cent level showing the existence of a significant correlation between the selected independent variables and the STD ratio.

The **LM test** shows that the value of chi-square (981.44) is significant at one per cent level implying that the RE model has been preferred better than pooled OLS model.

The result of **Hausman specification test** shows that the chi-square value (26.05) is significant at one per cent level indicating that the FE model has been preferred to RE model. In all the three models applied, the **FE model** has been found appropriate to analyse the factors influencing the STD ratio.

The **FE model** has revealed that size, has a significant positive influ-

ence on STD ratio and the other variables, namely, tangibility, growth and liquidity have a significant negative influence on STD ratio. Hence, the null hypothesis has been rejected in respect of these variables.

The rest of the variables, namely, profitability, NDTS, BR, FCFTA, COB and TR have not had a significant influence on STD ratio. Hence, the null hypothesis has been accepted for these variables.

In general, it is found that the leverage of the metal sector has been influenced by **size, tangibility, growth** and **liquidity** during the study period.

Total debt to total asset ratio
The following null hypothesis has been framed to find whether the selected variables have a significant influence on total debt to total asset ratio:

H_0: "The independent variables, namely, profitability, size, tangibility, NDTS, growth, BR, liquidity, FCFTA, COB and TR do not have a significant influence on TDTA ratio"

Table 3-TDTA - Pooled OLS and Panel Data Regression-Metal

	Pooled OLS			Fixed Effect			Random Effect		
	B	t	Sig.	B	t-value	Sig.	B	z-value	Sig.
(Constant)	0.76100000	19.085	**	.5869629	14.59	**	.6208912	14.99	**
Profitability	1.36800000	6.041	**	.664656	3.83	**	.7504163	4.31	**
Size	-0.01386000	-2.462	*	.012435	2.37	*	.0085742	1.68	NS
Tangibility	0.08817000	2.304	*	.0922513	2.00	*	.0747394	1.73	NS
NDTS	0.60600000	1.667	NS	-.2131998	-0.78	NS	-.166592	-0.60	NS
Growth	-0.000000958	-.121	NS	0.000007000	1.22	NS	0.00000482	0.84	NS
BR	-0.00004170	-.921	NS	-.0000206	-0.65	NS	-.0000282	-0.89	NS
Liquidity	-0.03593000	-9.333	**	-.0230889	-6.57	**	-.0251867	-7.27	**
FCFTA	-2.44700000	-9.469	**	-1.339669	-6.55	**	-1.475881	-7.24	**
COB	-0.00468400	-2.078	*	-.0032533	-2.27	*	-.003313	-2.27	*
TR	0.00968300	.368	NS	-.0395536	-2.29	*	-.034211	-1.95	NS

R^2	.524			0.3338			0.3303			
F-statistic	44.514		**	18.67		**				
Wald (c^2)							234.03		**	
Hausman (c^2)				27.64		**				
LM (c^2)							697.80		**	

Source : Computed * significant at 5 per cent level ** significant at 1 per cent level

It is observed from the table 3 that the signs of the regression coefficient have been similar in FE model and RE model, while they differ in the pooled OLS model. The R^2 values have depicted a moderate correlation between the selected independent variables and the TDTA ratio. The F-Value and Wald-chi-square value have shown a significant correlation between the selected independent variables and the TDTA ratio.

The **LM test** has revealed that the value of chi-square (697.80) is significant at one per cent level showing the existence of panel effect; thereby, the RE model is preferred over the pooled OLS model.

The result of **Hausman test** shows that the chi-square value (27.64) is significant at one per cent level proving the **FE model** to be more appropriate for further analysis.

The **FE model** has exhibited that the significant variables, namely, profitability, size and tangibility have a significant positive influence on TDTA ratio and the rest of the significant variables, namely, liquidity, FCFTA, COB and TR have a significant negative influence on TDTA ratio. Hence, the null hypothesis has been rejected for these variables.

The three variables, namely, NDTS, growth and BR have not had a significant influence on TDTA ratio. Hence, the null hypothesis has been accepted in respect of these variables.

In respect of the metal sector, **profitability, size, tangibility, liquidity, FCFTA, COB** and **TR** have influenced the leverage during the study period.

Conclusion
The study has concluded that profitability, size and tangibility are the key determinants of leverage of Indian metal sector. The findings of the study have endorsed the prescriptions of the trade off theory and signaling theory.

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