CHAPTER IV

Data analysis and interpretation

Data analysis and interpretation

This chapter deals with data analysis, interpretation of results and suggestion of strategy for capital structure in selected Indian auto companies. Section I of this chapter discusses total debt equity ratio analysis, secured debt equity ratio analysis and unsecured debt equity ratio analysis. Section II of this chapter discusses on correlation analysis, multiple regression model and assumptions of multiple regression model. Section III of this chapter deals with the strategy of capital structure on the basis of the regression model findings.

Following auto companies are selected to study debt equity ratio and to understand the relationship between financial leverage and tangibility, size of firm, profitability, non debt tax shield, and growth of asset.

1) **Tata Motors Ltd.**
2) **Ashok Leyland Ltd.**
3) **Mahindra and Mahindra Ltd.**
4) **Eicher Motors Ltd.**
5) **SML Isuzu Ltd.**
6) **Maruti Suzuki India Ltd.**
7) **Hero Honda Motors Ltd.**
8) **Bajaj Auto Ltd.**
9) **TVS Motor Company Ltd.**

SECTION I

Debt – Equity ratio analysis

Section I

This section discusses on debt equity ratio of selected Indian auto companies in detail and debt equity ratio are used for the study in heavy and medium commercial vehicle segment, light commercial vehicle segment, passenger commercial vehicle segment and motorcycle vehicle segment.

Leverage ratios are also known as capital structure a ratio, as any firm has two sources of finance first is own funds and other is borrowed fund. The use of debt is advantageous to the shareholders in two ways , first shareholder can retain control of the firm with a limited stake and second their earning will be magnified , when the firm earns a rate of return higher than the interest rate on borrowed funds. The process of magnifying the shareholders return through the use of debt is called "financial leverage" or "financial gearing" or "treading on equity". Company has to use optimum combination of these two sources of fund in financing the firm's assets. So this leverage ratios or capital structure ratios implies a combination of owner and lenders fund. The leverage ratios are calculated with the help of balance sheet to determine the proportion of debt financing in total financing. Many variations of these ratios exist, but all these ratios are calculated to indicate the same thing – the extent to which the firm has relied on debt in financing assets. In this study following leverage ratios are considered

1) **Total debt to equity ratio**

Total debt is measured as sum of secured debt and unsecured debt and compared it with the equity. It compares to the fund provided by lenders to the funds provided by the owners. As more use of debt , debt equity ratio will increase and vice versa. Total debt equity relationship indicates a proportional relationship between debt and equity. A lower debt equity ratio indicates that total debt is relatively lower compared against equity and vice versa.

Total debt to equity ratio = Total debt / Equity capital

2) **Secured debt to equity ratio**

Secured debt equity ratio measures the proportion of secured debt with owner's fund. A high secured debt equity ratio implies that, a firm is aggressive in financing its asset through secured debt and lower debt equity ratio implies conservation approach of the firm.

Secured debt to equity ratio = Secured debt / Equity capital

3) **Unsecured debt to equity ratio-**

Unsecured debt equity ratio measures the proportion of unsecured debt with owner's fund. A high unsecured debt equity ratio implies that, a firm is aggressive in financing its asset through unsecured debt.

Unsecured debt to equity ratio = Unsecured debt / Equity capital

Interpreting debt ratio

A high debt ratio means that claims of creditors are greater than those of owners. A high level of debt introduces inflexibility in the firm's operations due to the increasing inference and pressure from creditors. A high debt company is able to borrow funds on very restrictive terms and conditions. The loan agreements may require maintaining a certain level of working capital or minimum current ratio or restricting the payment of dividends or fix the limit to salaries. Heavy indebtedness leads to creditor's pressure and constraints on the managements independent functioning and energies. During the periods of low profit, highly debt financed company suffers from great strains. It can not even pay the interest charges to the creditors. As a result, their pressure and control are tightened. To meet the working capital needs, the firm finds difficulty in getting the credit. It may have to borrow on highly unfavorable terms and thus firm gets entangled in a debt trap.

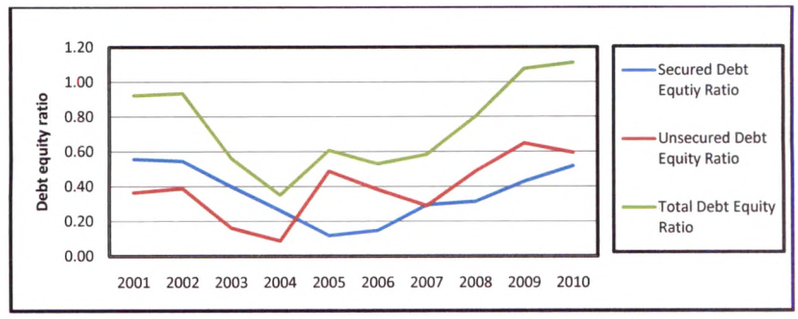
A low debt equity ratio implies a greater claim of owners than creditors. From creditor's point of view, it represents a satisfactory situation since a high proportion of equity provides a larger margin of safety for them. During the periods of low profits, the debt servicing will prove to be less burdensome for a company with low debt equity ratio. However shareholders point of view, there is a disadvantage during the periods when the cost of debt is less than the from overall rate of return on investment. Thus there is a need to strike a proper balance between the use of debt and equity. The most appropriate debt equity combination would involve a tradeoff between return and risk.

Debt equity ratio for sample companies in Heavy and Medium commercial vehicle segment

1) **Tata Motors Ltd.**
2) **Ashok Leyland Ltd.**

1) **Debt equity ratio analysis for Tata Motors Ltd.**

Figure No. 4.1 – Debt equity ratio analysis for Tata Motors Ltd 2001-2010



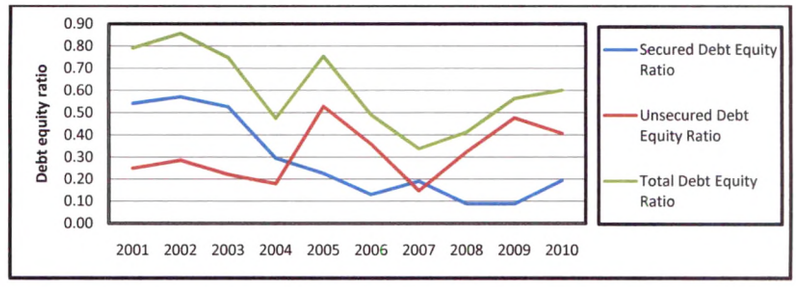
1) **Secured debt equity ratio** – During study period average secured debt equity ratio has found as 0.36 with standard deviation 0.16. Secured debt equity ratio has declined from 0.56 in 2001 to 0.15 in 2005 and again later it increase to 0.52 in 2010. Tata Motors Ltd. has used secured debt as non convertible debenture, loan from Technology Development Board with specific charge on movable assets, Loan from HDFC secured against pledge of company's investment in the ordinary shares of Tata Iron and Steel Co. Ltd., Loan from International Finance Corporation, Cash Credit facility from banks by hypothecation of raw materials, stock in trade, stores, work in process, book debt.
2) **Unsecured debt equity ratio** - During study period average unsecured debt equity ratio has found as 0.39 with standard deviation 0.18 and overall trend in unsecured debt equity ratio is volatile. Tata Motors Ltd has used unsecured debt as foreign currency convertible notes, inter corporate deposit, short term loan from banks, commercial paper.
3) **Total debt equity ratio** - Total debt equity ratio indicates in initial years Tata Motors Ltd has high debt in its capital structure, as total debt equity ratio is 0.92 , 0.94 respectively in 2001 and 2002. In later period, total debt equity ratio reduced to 0.56, 0.35 in 2003 and

2004. And again increased debt in capital structure as total debt equity ratio increased from 0.35 to 1.11 during 2004 to 2010. Average total debt to equity ratio in Tata Motors Ltd during study period is 0.75 with standard deviation 0.26. So conservative approach is observed during 2001 to 2004 and later period observed aggressive approach in financing.

Tata Motors Ltd is leading company in passenger vehicle segment, heavy and medium commercial vehicle segment. It has used combination of secured debt and unsecured debt to finance its operations. Overall fluctuating trend has observed in unsecured debt equity ratio, secured debt equity ratio and total debt equity ratio.

2) Debt equity ratio analysis for Ashok Leyland

Figure No. 4.2 – Debt equity ratio analysis for Ashok Leyland 2001-2010



1) **Secured debt equity ratio** - The declining trend is observable in secured debt to equity ratio , as it was 0.54 in 2001 increased to 0.57 in 2002 started to decline up to 0.13 in 2006. During 2006 to 2010, secured debt equity ratio revolved between 0.09 to 0.19 and in secured debt company has debentures and term loans from banks and financial institutions. During study period it is observed that, Ashok Leyland has reduced its secured debt from 54% to 19% in 2010. The average secured debt equity ratio is 0.29 with standard deviation 0.19.
2) **Unsecured debt equity ratio** - The average unsecured debt equity ratio is 0.32 with the standard deviation 0.13, it indicates that unsecured debt finances 50% of total debt equity ratio and from 2001 to 2010 unsecured debt equity ratio is fluctuating. In unsecured debt company has issued commercial paper, fixed deposits and loans and advances from banks and others, foreign currency convertible notes.

3) **Total debt equity ratio** - Above graph no .4.2 shows the overall declining trend in total debt equity ratio from 2001 to 2010. Total debt equity ratio which was 0.80 in 2001 declined to 0.34 in 2007 started to increase again to 0.60 in 2010. The average total debt equity ratio is 0.60 with the standard deviation 0.18

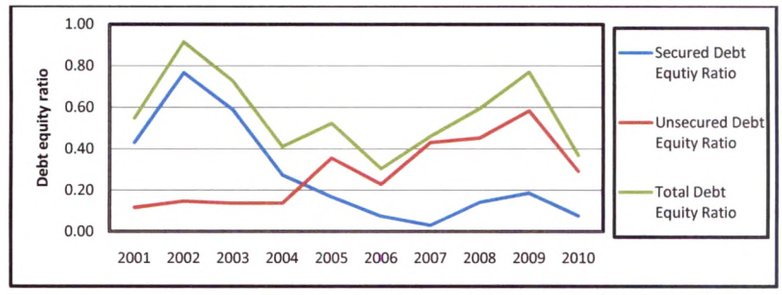
As Ashok Leyland is reducing its secured debt equity ratio from 2001 to 2010, but at the same time importance of unsecured debt equity ratio is visible during 2001 to 2010. During study period, average proportion of external sources is 60% compare to owner's fund. Average total debt equity ratio is 60% with standard deviation 0.18 indicates high debt component in capital structure.

Debt equity ratio for sample companies in Light commercial vehicle segment –

1) **Tata Motors Ltd.**
2) **Mahindra and Mahindra Ltd.**
3) **Eicher Motors Ltd.**
4) **SML Isuzu Ltd.**

1) **Debt equity ratio analysis for Mahindra and Mahindra Ltd.**

Figure No. 4.3 – Debt equity ratio analysis for Mahindra and Mahindra Ltd. Ltd 2001-2010



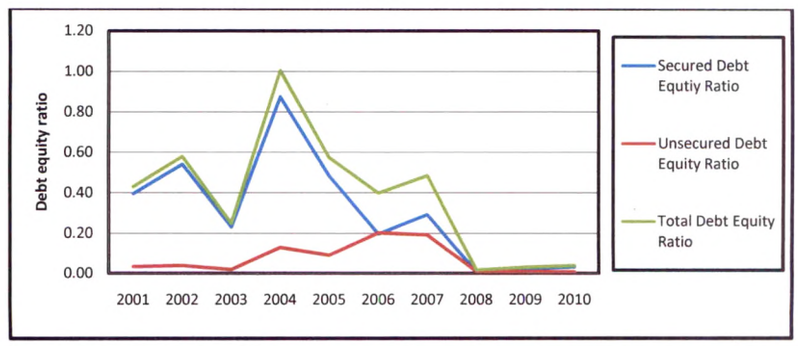
1) **Secured debt equity ratio** - In Mahindra and Mahindra Ltd., average secured debt equity ratio is found 0.27 with standard deviation 0.25. Overall trend in secured debt equity ratio is declining from 0.77 in 2002 to 0.08 in 2010. Mahindra and Mahindra Ltd. have used secured debt as debentures, foreign currency loans, cash credit facility from banks.

2) **Unsecured debt equity ratio** -Average unsecured debt equity ratio has found 0.29 with standard deviation 0.16 during 2001-2010. The overall trend in unsecured debt equity ratio has found increasing from 0.12 in 2001to 0.58 in 2009 and then 0.29 in 2010. Mahindra and Mahindra Ltd. has used unsecured debt as fixed deposit, short term loan from banks and companies, zero coupon convertible bonds, loans from financial institutions, fully and compulsory convertible debenture.
3) **Total debt equity ratio** - Average total debt equity ratio for Mahindra and Mahindra Ltd. is 0.56 with standard deviation 0.19 and total debt equity ratio was 0.92 in 2002 then declined to 0.30 in 2006 then increased to 0.77 in 2009 and again declined to 0.37. Overall trend in total debt equity ratio has found fluctuating during 2001-2010.

Mahindra and Mahindra Ltd. have used both type of debt – secured debt and unsecured debt and average for both is same. Average secured debt equity ratio and unsecured debt equity ratio has found 0.27 and 0.29 respectively during 2001-10. Also total debt equity ratio indicates that Mahindra and Mahindra Ltd. have target debt equity policy. After touching higher and lower level of total debt equity ratio it return to its mean 0.56 and this can be confirmed during 2001, 2005 and 2008 as total debt equity ratio has found 0.55 in 2001 , 0.52 in 2005 and 0.59 in 2008.

2) **Debt equity ratio analysis for Eicher Motors Ltd.**

Figure No.4. 4 – Debt equity ratio analysis for Eicher Motors Ltd 2001-2010

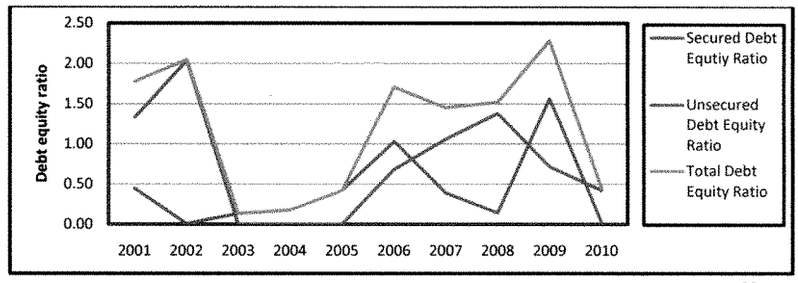


1) **Secured debt equity ratio** - Secured debt equity ratio is highly volatile during 2001 to 2010 in Eicher Motors Ltd, the average secured debt equity ratio is 0.31 with standard deviation 0.28. Secured debt equity ratio started to increase from 0.40 in 2001 to 0.87 in 2004 then declined to 0.01, 0.02, and 0.03 in 2008, 2009, 2010. Secured debt in Eicher Motors Ltd includes debentures, cash credit from banks, long term loan from banks, financial institutions, Technology development board.
2) **Unsecured debt equity ratio** - Average unsecured debt is Eicher Motors Ltd. is 7% with standard deviation 0.08. Unsecured debt equity ratio revolved between 0.01 to 0.20 during study period. In 2006 unsecured debt equity ratio has found high as 0.20 and in 2008, 2009, 2010 unsecured debt equity ratio found very low as 0.01,0.01,0.01 respectively. Unsecured debt in Eicher Motors Ltd includes security deposit from lender and others, commercial paper, loans from financial institutions and banks, interest free sales tax deferral.
3) **Total debt equity ratio** - The average total debt equity ratio has found 0.38 with standard deviation 0.31 during 2001 to 2010 and overall fluctuating trend has found from 0.43 in 2001 to 1.00 in 2004 and then sharply declines in next period to 0.04 in 2010.

In Eicher Motors Ltd. high volatility is observed in secured debt equity ratio, unsecured debt equity ratio and total debt equity ratio. It is observed that unsecured debt equity ratio has very negligible role to play in capital structure decisions. Secured debt equity ratio has more proportion as compare to unsecured debt equity ratio in total debt equity ratio and hence total debt equity ratio follow same trend as secured debt equity ratio. Overall conservative approach is observed in external financing after 2004 in Eicher Motors Ltd.

3) Debt equity ratio analysis for SML Isuzu Ltd.

Figure No.4.5 – Debt equity ratio analysis for SML Isuzu Ltd.2001-2010



1) **Secured debt equity ratio** - SML Isuzu Ltd. has found highly fluctuating trend in secured debt equity ratio during 2001-2010 as average secured debt equity is 0.43 with standard deviation 0.50. The secured debt equity ratio in 2001-10 reflects different picture from its peer companies, secured debt equity ratio has reached to high 0.45, 1.03 and 1.57 in 2001,2006 and 2009 then resulted to subsequent decline in secured debt equity ratio between 2001 and 2005, 2007 and 2008, 2010 respectively. SML Isuzu Ltd. has used as secured debt term loans from financial institutions, term loans and cash credit from bank and financial institutions. Term loans from banks and financial institutions are secured by mortgage of companies immovable assets and hypothecation of companies movable assets (including movable machinery, machinery spares, tools and accessories).
2) **Unsecured debt equity ratio** - Unsecured debt equity ratio has also found highly volatile with average unsecured debt equity ratio 0.76 and 0.69 standard deviation. After high unsecured debt equity ratio 1.33, 2.04 in 2001, 2002, next three years found SML Isuzu Ltd. has 0 unsecured debt equity ratios then again rising trend between 2006-2008 was observed and in last two years again declining trend was observed. SML Isuzu Ltd. has used as secured debt inter corporate deposits from company under the same management, short term and long term loans from banks.
3) **Total debt equity ratio** - Average total debt equity ratio has found 1.20 with very high standard deviation 0.82 and after steep increase in total debt equity resulted into sharp decline. This indicates high volatility in total debt equity ratio and this high volatility is largely influenced by unsecured and secured debt equity ratio.

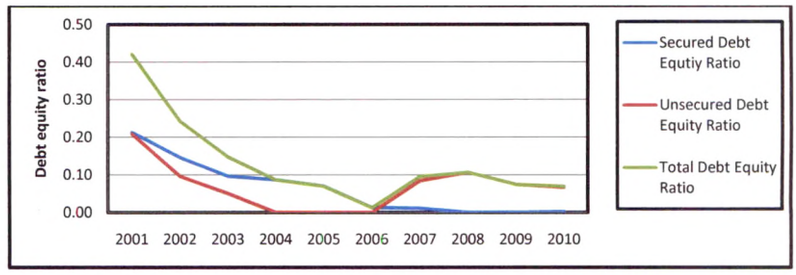
SML Isuzu Ltd. has very different and highly fluctuating capital structure policy for both secured debt and unsecured debt equity ratio. This high fluctuation in capital structure policy can observed with standard deviation 0.50, 0.69, 0.82 for secured debt, unsecured debt and total debt equity ratio. Average total debt equity ratio 1.20 indicates high total debt equity portion in capital structure and high volatility in capital structure policy forces the company to rigid pricing policy.

Debt equity ratio for sample companies in Passenger cars vehicle segment –

1) **Maruti Suzuki India Ltd.**
2) **Tata Motors Ltd.**

1) Debt equity ratio analysis for Maruti Suzuki India Ltd.

Figure No. 4.6 – Debt equity ratio analysis for Maruti Suzuki India Ltd.2001-2010



1) **Secured debt equity ratio** - Overall declining trend for Maruti Suzuki India Ltd. in secured debt equity ratio is observed and secured debt has very small portion against equity. Average secured debt equity ratio has found 0.06 with standard deviation 0.07 during 2001-2010 and during last 5 years company has almost 0 debt equity ratio. Maruti Suzuki India Ltd. has used secured debt as debenture, short term loan from banks - cash credit facility from banks, foreign currency loans against current asset, post shipment credit from bank.
2) **Unsecured debt equity ratio-** The similarity in secured debt equity ratio and unsecured debt equity ratio is observed as average unsecured debt equity ratio has found 0.06 with standard deviation 0.07 during study period. Unsecured debt equity ratio stared to decline from 0.21 in 2001 to 0.05 in 2003 then remains constant at 0 for next three years 2004, 2005, 2006 and increased to 0.11 in 2008 then remained constant at 0.07 in last two years. Maruti Suzuki India Ltd. has used unsecured debt as short term loans – (packing credit from banks, post shipment credit from banks, short term loan from banks) and long term foreign currency loan from banks
3) **Total debt equity ratio** - In case of total debt equity ratio overall trend is obvious declining with average total debt equity ratio 0.13 and standard deviation 0.12. Total debt equity ratio started to decline from 0.42 in 2001 to 0.11 in 2008 and then remained constant at 0.07 in last two years.

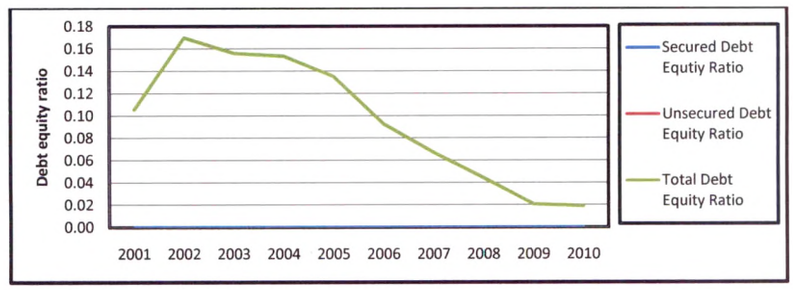
Maruti Udyog ltd is a company which has strong foothold in passenger commercial vehicle segment. Such high acceptance by consumer forces company to adapt pricing flexibility. Average total debt equity ratio in Maruti Suzuki India Ltd. has found 0.13 and this indicates lower total debt in its capital structure. Hence Maruti Suzuki India Ltd. on the basis of total debt equity ratio, secured debt equity ratio and unsecured debt equity ratio it is confirmed that company support its operations through internally generated funds and avoid debt. The overall debt equity ratio analysis indicates conservative approach in secured and unsecured debt equity ratio analysis in Maruti Suzuki India Ltd.

Debt equity ratio for sample companies in Motorcycle vehicle segment –

1) **Hero Honda Motors Ltd.**
2) **Bajaj Auto Ltd**
3) **TVS Motors Company Ltd.**

1) **Debt equity ratio analysis for Hero Honda Motors Ltd**

Figure No. 4.7- Debt equity ratio analysis for Hero Honda Motors Ltd 2001-2010



1) **Secured debt equity ratio -** Hero Honda Motors Ltd has no secured debt during study period then secured debt equity ratio is 0 during 2001-2010.
2) **Unsecured debt equity ratio -** Average unsecured debt equity ratio is 0.10 with standard deviation 0.06 and overall trend in unsecured debt equity ratio has found declining. Unsecured debt equity ratio was 0.11 in 2001 then it increased to 0.17 in 2002 and then it declined continuously to 0.02 in 2010. Hero Honda Motors Ltd has used as unsecured

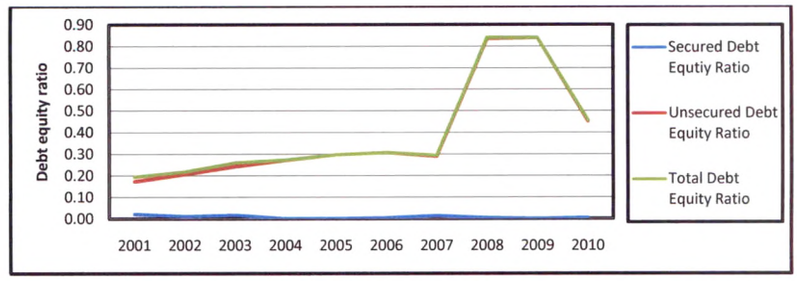
debt as short term loans and advances from banks, sales tax deferment from state government Haryana.

3) **Total debt equity ratio** - As there is no secured debt, so trend in total debt equity ratio is same as unsecured debt.

Hero Honda Motors Ltd has unique capital structure policy as company has nil secured debt equity ratio and in unsecured debt sales tax liability found dominant. This indicates that during study period company has heavy reliance on internally generated funds. Hero Honda Motors Ltd. is zero long term debt company and unsecured loan from state government of Haryana is interest free and has no holding costs. Overall debt equity ratio analysis in Hero Honda Motors Ltd. indicates conservative approach in external financing.

2) Debt equity ratio analysis for Bajaj Auto Ltd.

Figure No.4.8 – Debt equity ratio analysis for Ashok Leyland 2001-2010



1) **Secured debt equity ratio** - During study period it is observed that the Bajaj Auto Ltd. has very negligible secured debt equity ratio. The average secured debt equity ratio is 0.01 with same standard deviation 0.01. This indicates that company is not using secured debt to finance its operations. The overall trend remains the constant in secured debt equity ratio during 2001 to 2010. The company has secured debt from banks against hypothecation of stores, raw materials, finished goods.

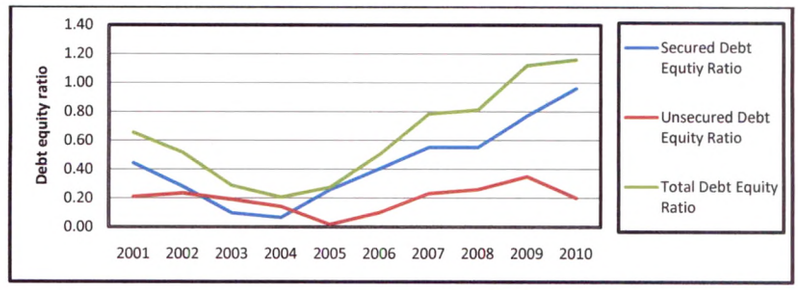
2) **Unsecured debt equity ratio** - The average unsecured debt equity ratio is 0.39 with standard deviation 0.25 and overall rising trend in unsecured debt equity ratio is observed during study period except 2010. Bajaj Auto ltd has unsecured debt as fixed deposit, sales tax deferral liability

3) **Total debt equity ratio** - As total debt equity directly relates to the unsecured debt equity ratio , average total debt equity ratio is 0.40 with 0.24 standard deviation and rising trend is observed in total debt equity ratio except 2010.

Bajaj Auto Ltd. has average 1% secured debt equity ratio and 39% unsecured debt equity ratio, this indicates the heavy reliance on unsecured debt finances compared to secured debt finances. On average during 2001 to 2010 , Bajaj Auto Ltd. has 40% total debt equity ratio.

4) Debt equity ratio analysis for TVS Motors Company Ltd

Figure No.4.9 – Debt equity ratio analysis for TVS Motors Company Ltd 2001-2010



1) **Secured debt equity ratio** - TVS Motors Company Ltd has used combination of secured debt and unsecured debt in the capital structure, where average secured debt to equity ratio is 0.44 with standard deviation 0.28. Secured debt equity ratio declined from 0.44 to 0.07 during 2001 and 2004 and then increased from 0.07 to 0.96 during 2004 to 2010. During study period TVS Motors Company Ltd used secured debt as external commercial borrowing from banks, secured non convertible debentures, secured loan from banks from hypothecation of movable assets.
2) **Unsecured debt equity ratio** – Average unsecured debt equity ratio is 0.19 with standard deviation 0.09. During study period minimum and maximum unsecured debt equity ratio found 0.02 and 0.35 respectively but lower standard deviation 0.09 indicates minimum variation of unsecured debt equity ratio from its mean 0.19. The graph clearly shows that unsecured debt equity ratio over the period spread around the mean line 0.20 (i.e 0.19). During study period TVS Motors Company Ltd used unsecured debt from banks, fixed deposits.

3) **Total debt equity ratio** - Average total debt equity ratio is 0.63 with standard deviation 0.34 during study period, high standard deviation is indication of large fluctuations in total debt equity ratio. The trend in total debt equity ratio is same as secured debt equity ratio, total debt equity ratio declined from 0.65 to 0.21 during 2001 and 2004, then total debt equity ratio started to increase from 0.21 to 1.16 during 2004 and 2010.

TVS Motors Company Ltd total debt equity ratio analysis shows its conservative approach on debt up to 2004, after 2005 its gradually increased risk appetite reflects as total debt equity ratio increased continuously. Even in 2008-09 and 2009-10, total debt has crossed equity base with total debt equity ratio 1.12 and 1.16 respectively. Above graph shows that, secured debts to equity ratio, unsecured debt equity ratio, total debt equity ratio have declining trend up to 2004, later period is observed rising trend continuously in all ratios.

SECTION II

Determinants of capital structure

Section II

This section discusses on determinants on financial leverage in selected Indian auto companies and to study the determinants of financial leverage five firm specific variables are considered tangibility, size of firm, profitability, non debt tax shield growth in asset. Following statistical techniques are used to understand the relationship between financial leverage and firm specific variables

1) Correlation – To understand the strength of relationship between the dependent and independent variables.
2) Multiple regression – To predict the relationship between the dependent and independent variables.
3) Analysis of variance – To assess the significance of model.
4) Residual analysis
    a. Multicollinearity – To avoid the strong relationship between independent variables .
    b. Homoscedasticity – To check variance error are constant.

Table No. 4.1 Correlation matrix of Tata Motors Ltd.

		Financial Leverage	Tangibility	Size of Firm	Profitability	Non Debt Tax Shield	Growth in Asset
Financial Leverage	Pear Cor.	1	-.236	.037	-.921**	-.365	.518
	Sig. (2-tailed)		.511	.920	.000	.299	.125
	N	10	10	10	10	10	10
Tangibility	Pear Cor.	-.236	1	-.946**	-.067	.937**	-.828**
	Sig. (2-tailed)	.511		.000	.854	.000	.003
	N	10	10	10	10	10	10
Size of Firm	Pear Cor.	.037	-.946**	1	.282	-.906**	.793**
	Sig. (2-tailed)	.920	.000		.431	.000	.006
	N	10	10	10	10	10	10
Profitability	Pear Cor.	-.921**	-.067	.282	1	.076	-.282
	Sig. (2-tailed)	.000	.854	.431		.835	.429
	N	10	10	10	10	10	10
Non Debt Tax Shield	Pear Cor.	-.365	.937**	-.906**	.076	1	-.875**
	Sig. (2-tailed)	.299	.000	.000	.835		.001
	N	10	10	10	10	10	10
Growth in Asset	Pear Cor.	.518	-.828**	.793**	-.282	-.875**	1
	Sig. (2-tailed)	.125	.003	.006	.429	.001	
	N	10	10	10	10	10	10

**. Correlation is significant at the 0.01 level (2-tailed). *0.05 level.

Interpretation of correlation coefficients

1) Tangibility has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.23 indicates weak relationship between financial leverage and tangibility.
2) Size of firm has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.03 indicates very weak relationship between financial leverage and size of firm.

3) Profitability has negative and significant correlation with financial leverage. The significant correlation coefficient -0.92 indicates very strong relationship between financial leverage and profitability at 1% significance level.
4) Non debt tax shield has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.36 indicates fair relationship between financial leverage and non debt tax shield.
5) Growth in asset has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.51 indicates moderate relationship between financial leverage and growth in asset.

Multiple regression analysis for Tata Motors Ltd.

Regression model results includes tangibility, size of firm, profitability , non debt tax shield, growth in asset and table no. 4.2 shows that the problem of multicollinearity is detected in all variables as variance inflation factor is more than 10. Hence to avoid the problem of multicollinearity one variable having multicollinearity need to be excluded. Size of firm has VIF 75.61, need to be excluded from final regression model and also correlation matrix indicates negligible relation between size of firm and financial leverage. So exclusion of size of firm from model does not affect significantly to regression model.

Table No. 4.2 – Regression output with all variables for Tata Motors Ltd

Variable	**Tangibility**	**Size of firm**	**Profitability**	**Non debt tax shield**	**Growth in asset**
Coefficient	0.09	0.13	-2.12	1.60	0.00
VIF	19.26	75.61	12.44	18.86	14.42
P value	0.05	0.01	0.08	0.05	0.06
R^2 = 0.95, Adj R^2 = 0.89			**ANOVA Sig. = 0.00**		

After exclusion of size of firm from regression model , again the problem of multicollinearity is detected in tangibility and non debt tax shield. Hence to avoid the problem of multicollinearity tangibility is excluded.

Table No. 4.3 – Regression output after excluding size of the firm

Variable	Tangibility	Profitability	Non debt tax shield	Growth in asset
Coefficient	-0.109	-1.511	-1.233	-0.007
VIF	10.46	1.611	11.14	5.78
P value	0.62	0.01	0.72	0.95
R^2 =0.94, Adj. R^2 = 0.89			**ANOVA Sig. = 0.00**	

Final regression model includes profitability, non debt tax shield and growth in asset as tangibility and size of firm has indicated the presence of multicollinearity in table no. 4.3 . The results of final regression model are as follows.

Table No. 4.4- Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.968	.937	.905	.02429

Table No. 4.5 ANOVA Output

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	.052	3	.017	29.634	.001
Residual	.004	6	.001		
Total	.056	9			

Table No. 4.6 –Coefficients of regression output

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	.504	.090		5.619	.001		
Profitability	-1.457	.188	-.894	-7.765	.000	.795	1.258
Non Debt Tax Shield	-2.497	2.057	-.277	-1.214	.270	.202	4.946
Growth in Asset	0.000012	.000	.023	.097	.926	.187	5.344

1) Final regression model

Financial Leverage = 0.504 -1.457 Profitability -2.497 Non Debt Tax Shield +0.000012 Growth in Asset

2) **Model Significance**

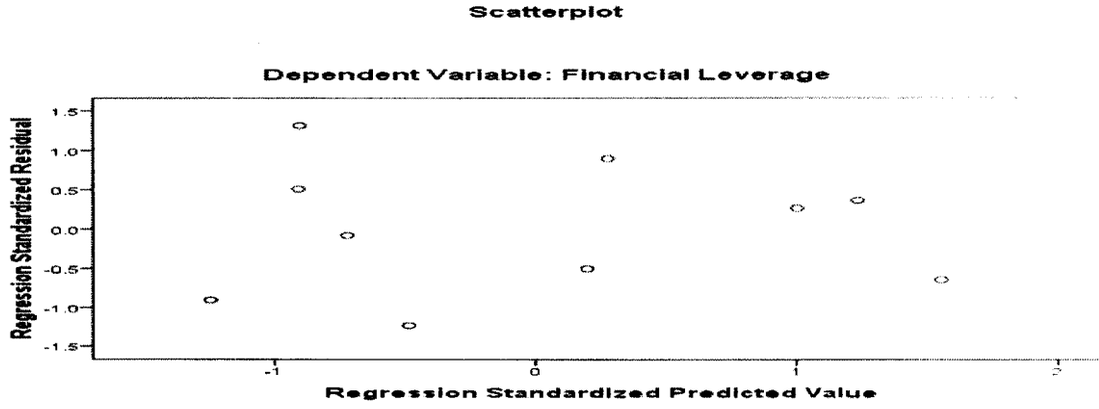
Table value for 3 degree of freedom for numerator and 6 degree of freedom for denominator and at 5 % significance level is 4.75. Since calculated F-value 29.63 is greater than table value 4.75 and so null hypothesis of ANOVA is rejected and concluded that overall final regression model has found significant. Hence null hypothesis of ANOVA is rejected, that financial leverage (y) does not depend on independent variable (X's).

3) **Profitability: -** Profitability has significance value 0.00 (0.00 < 0.05), hence null hypothesis is rejected that there is no relationship between profitability and financial leverage of the firm. So linear relationship between profitability and financial leverage is confirmed. Profitable firms avoid external borrowing and finance their projects through internally generated funds. Hence negative relationship between profitability and financial leverage is obvious and results also support negative relationship between profitability and financial leverage.
4) **Non Debt Tax Shield: -** Non debt tax shield has significance value 0.27 (0.27 > 0.05), hence null hypothesis is accepted that there is no relationship between non debt tax shield and financial leverage of the firm.
5) **Growth in asset: -** Growth in asset has significance value 0.92 (0.92 > 0.05), hence null hypothesis is accepted that there is no relationship between growth in asset and financial leverage of the firm.

Residual analysis

1) **Multicollinearity: -** Final multiple regression have three variables profitability, non debt tax shield and growth in asset. The variance inflation factors are 1.25, 4.94 and 5.34 respectively .Hence the problem of multicollinearity is rejected as no variance inflation is more than 10.
2) **Constant variance** – The scatter plot shows that the variances are almost constant and homoscedasticity is observed in residuals.

Figure No. 4.10 – Heteroscedasticity plot for Tata Motors Ltd.



Interpretation of regression coefficients

Final regression model has predicted 93.70% variability in financial leverage as value of R is 0.96 and adjusted R square has found 90.50% with standard error of estimate 0.02. Tangibility and size of firm is excluded from the final regression model as they presented strong multicollinearity. In final regression model, the null hypothesis associated with profitability is rejected and same for non debt tax shield and growth in asset is accepted. For profitability negative regression coefficient is -1.457 and it implies that as profitability of firm increases by one unit debt of firm reduces by 1.457 unit and vice versa. Hence it is concluded that profitability has linear relationship with debt. Profitability has negative regression coefficient it implies that, internally generated funds meet the investment requirement of the company. Also as profitability decreases and internally generated funds are unable to meet financing requirement company issue debt to meet financing gap. Hence on relationship between profitability and financial leverage presence of pecking order theory is accepted in Tata Motors Ltd. External borrowing put restrictions and obligations on the use of funds, which indirectly control smooth functioning of business. When firm is having good opportunity to invest which yield good return to investor in the long run, it retain the earnings in the interest of shareholders wealth maximization. The results of residual analysis of multiple regression model is as per the assumption of regression. There is no problem of multicollinearity, as all the variance inflation factor associated with independent variables is less than 10. Also the scatter plot shows that, variances are constant and there is no heteroscedasticity in residuals.

Table No. 4.7 – Results of hypothesis testing

Null Hypothesis	Tata Motors Ltd.	Status	Relation
H_1	There is no relationship between Profitability and financial leverage	Rejected	(-)
H_2	There is no relationship between non debt tax shield and financial leverage	Not Rejected	
H_3	There is no relationship between growth in asset and financial leverage	Not Rejected	

Table No. 4.8- Correlation matrix of Ashok Leyland Ltd

		Financial Leverage	Tangibility	Size of Firm	Profitability	Non Debt Tax Shield	Growth in Asset
Financial Leverage	Pear Cor.	1	.233	-.812**	-.446	.171	-.268
	Sig. (2-tailed)		.517	.004	.196	.636	.454
	N	10	10	10	10	10	10
Tangibility	Pear Cor.	.233	1	-.456	-.030	.458	-.192
	Sig. (2-tailed)	.517		.186	.934	.184	.596
	N	10	10	10	10	10	10
Size of Firm	Pear Cor.	-.812**	-.456	1	-.057	-.665*	.725*
	Sig. (2-tailed)	.004	.186		.875	.036	.018
	N	10	10	10	10	10	10
Profitability	Pear Cor.	-.446	-.030	-.057	1	.671*	-.692*
	Sig. (2-tailed)	.196	.934	.875		.034	.027
	N	10	10	10	10	10	10
Non Debt Tax Shield	Pear Cor.	.171	.458	-.665*	.671*	1	-.874**
	Sig. (2-tailed)	.636	.184	.036	.034		.001
	N	10	10	10	10	10	10
Growth in Asset	Pear Cor.	-.268	-.192	.725*	-.692*	-.874**	1
	Sig. (2-tailed)	.454	.596	.018	.027	.001	
	N	10	10	10	10	10	10

**. Correlation is significant at the 0.01 level (2-tailed). *0.05 level.

Interpretation of correlation coefficients

1) Tangibility has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.23 indicates weak relationship between financial leverage and tangibility.
2) Size of firm has negative and significant correlation with financial leverage. The significant correlation coefficient - 0.8[illegible] indicates very strong relationship between financial leverage and size of firm at 1% significance level.
3) Profitability has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.44 indicates fair relationship between financial leverage and profitability.

4) Non debt tax shield has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.17 indicates weak relationship between financial leverage and non debt tax shield.
5) Growth in asset has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.26 indicates fair relationship between financial leverage and growth in asset.

Multiple regression analysis for Ashok Leyland Ltd.

Regression model results includes tangibility, size of firm, profitability , non debt tax shield, growth in asset and table no.4.9 shows that the problem of multicollinearity is detected in size of firm, profitability and growth in asset as variance inflation factor is more than 10 . Hence to avoid the problem of multicollinearity one variable having multicollinearity need to be excluded. Growth in asset has VIF 27.71, need to be excluded from final regression model.

Table No.4.9- Regression output with all variables for Ashok Leyland Ltd

Variable	Tangibility	Size of firm	Profitability	Non debt tax shield	Growth in asset
Coefficient	-0.25	-0.21	-0.08	-1.33	0.00
VIF	2.30	18.68	15.83	9.14	27.71
P value	0.20	0.03	0.93	0.69	0.36
R^2 =0.95, Adj. R^2 = 0.89			**ANOVA Sig. = 0.00**		

Following table no.4.10 shows multiple regression results by excluding growth in asset as it has high variance inflation factor (27.71). After second regression analysis the problem of multicollinearity is observed in non debt tax shield. So non debt tax shield and growth in asset is excluded from the final regression model to avoid the problem of multicollinearity and the results are as follows.

Table No.4.10- Regression output after excluding growth in asset for Ashok Leyland Ltd

Variable	Tangibility	Size of firm	Profitability	Non debt tax shield
Coefficient	-0.17	-0.15	-0.83	-1.47
P Value	0.29	0.00	0.15	0.66
VIF	1.78	3.72	4.85	9.13
R^2 = 0.97, Adj. R^2 = 0.89			**ANOVA Sig = 0.00**	

Following table shows multiple regression results by excluding growth in asset and non debt tax shield as it has high variance inflation factor. Final regression model includes tangibility, size of firm and growth in asset and results are as follows.

Table No.4.11 -Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.968	.938	.907	.02153

Table No. 4.12 – ANOVA output

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.042	3	.014	30.086	.001
	Residual	.003	6	.000		
	Total	.045	9			

Table No.4.13- Coefficients of regression output

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	1.700	.195		8.714	.000		
Tangibility	-.215	.118	-.209	-1.822	.118	.789	1.267
Size of Firm	-.138	.017	-.937	-8.153	.000	.787	1.270
Profitability	-1.037	.210	-.506	-4.944	.003	.993	1.007

1) **Final Regression Model –**

Financial Leverage = 1.700 -0.215 Tangibility –0.13 Size of firm - 1.037 Profitability.

2) **Model Significance**

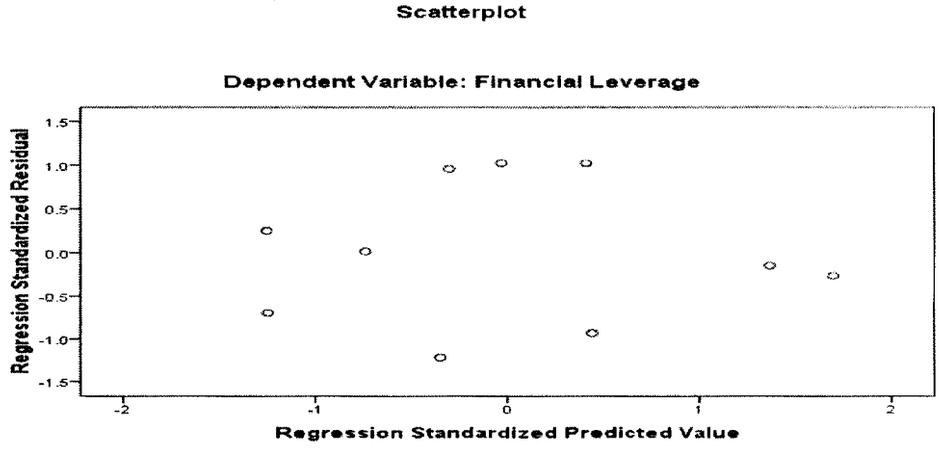
Table value for 3 degree of freedom for numerator and 6 degree of freedom for denominator and at 5 % significance level is 4.75. Since calculated F-value 30.08 is greater than table value 4.75 and so null hypothesis of ANOVA is rejected and concluded that overall final regression model has found significant. Hence null hypothesis of ANOVA is rejected, that financial leverage (y) does not depend on independent variable (X's).

3) **Tangibility:** - Tangibility has significance value 0.11 (0.07 > 0.05), hence null hypothesis is accepted that there is no relationship between tangibility and financial leverage of the firm. Hence it is concluded that there is no relationship between tangibility and financial leverage.
4) **Size of firm:** - Size of firm has significance value 0.00 (0.00 < 0.05), hence null hypothesis is rejected that there is no relationship between size of firm and financial leverage of the firm. The regression coefficient and significance value indicate negative and significant relationship between size of firm and financial leverage.
5) **Profitability** – Profitability has significance value 0.00 (0.00 < 0.05), hence null hypothesis is rejected that there is no relationship between profitability and financial leverage of the firm. The regression coefficient and significance value indicate negative and significant relationship between profitability and financial leverage.

Residual analysis

1) **Multicollinearity** :- As in final regression model have three independent variables tangibility, size of firm and profitability and variance inflation factor for these three variables is 1.26, 1.27, 1.00 respectively which less than 10. Hence there is no problem of multicollinearity.
2) **Constant Variance:** - Following graph shows that, variance are not constant during study period , the funnel out pattern is observed in the residuals and heteroscedasticity is confirmed.

Figure No. 4.11 – Heteroscedasticity plot for Ashok Leyland Ltd.



Interpretation of regression coefficients

Final regression model has predicted 93.80% variability in financial leverage as value of R is 0.96 and adjusted R square has found 90.70% with standard error of estimate 0.02. Non debt tax shield and growth in asset is excluded from the final regression model as they presented strong multicollinearity. In final regression model, the null hypothesis associated with tangibility is accepted and same for size of firm and profitability is rejected. For profitability negative regression coefficient is -1.037 and it implies that as profitability of firm increases by one unit debt of firm reduces by 1.037 unit and vice versa. Hence it is concluded that profitability has linear relationship with debt. Profitability has negative regression coefficient it implies that, internally generated funds meet the investment requirement of the company. Higher profitable firms have sufficient internal earnings to finance their future operations, so they avoid additional borrowing. For size of firm negative regression coefficient is -0.138 and it implies that as size of firm of firm increases by one unit debt of firm reduces by 0.138 unit and vice versa. Hence it is concluded that size of firm has linear relationship with debt. The results of residual analysis of multiple regression model shows there is no multicollinearity but the variances are heteroscedastic.

Table No. 4.14 – Results of hypothesis testing

Null Hypothesis	Ashok Leyland Ltd	Status	Relation
H_1	There is no relationship between tangibility and financial leverage	Not Rejected	
H_2	There is no relationship between size of firm and financial leverage	Rejected	(-)
H_3	There is no relationship between profitability and financial leverage	Rejected	(-)

Table No.4.15- Correlations matrix of Mahindra and Mahindra Ltd.

		Financial Leverage	Tangibility	Size of Firm	Profitability	Non Debt Tax Shield	Growth in Asset
Financial Leverage	Pear Cor.	1	.001	-.480	-.918**	-.041	-.158
	Sig. (2-tailed)		.998	.161	.000	.911	.663
	N	10	10	10	10	10	10
Tangibility	Pear Cor.	.001	1	-.791**	-.150	.945**	-.861**
	Sig. (2-tailed)	.998		.006	.679	.000	.001
	N	10	10	10	10	10	10
Size of Firm	Pear Cor.	-.480	-.791**	1	.577	-.757*	.907**
	Sig. (2-tailed)	.161	.006		.080	.011	.000
	N	10	10	10	10	10	10
Profitability	Pear Cor.	-.918**	-.150	.577	1	-.104	.236
	Sig. (2-tailed)	.000	.679	.080		.775	.512
	N	10	10	10	10	10	10
Non Debt Tax Shield	Pear Cor.	-.041	.945**	-.757*	-.104	1	-.836**
	Sig. (2-tailed)	.911	.000	.011	.775		.003
	N	10	10	10	10	10	10
Growth in Asset	Pear Cor.	-.158	-.861**	.907**	.236	-.836**	1
	Sig. (2-tailed)	.663	.001	.000	.512	.003	
	N	10	10	10	10	10	10

**. Correlation is significant at the 0.01 level (2-tailed). *0.05 level.

Interpretation of correlation coefficients:-

1) Tangibility has failed to show any relationship with financial leverage. The insignificant correlation coefficient 0.00 indicates no relationship between financial leverage and tangibility.
2) Size of firm has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.48 indicates fair relationship between financial leverage and size of firm.
3) Profitability has negative and significant correlation with financial leverage. The significant correlation coefficient -0.91 indicates very strong relationship between financial leverage and profitability at 1% significance level.

4) Non debt tax shield has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.04 indicates weak relationship between financial leverage and non debt tax shield.
5) Growth in asset has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.15 indicates weak relationship between financial leverage and tangibility.

Multiple Regression analysis for Mahindra and Mahindra Ltd.

Following table no. 4.16 shows that, except profitability and non debt tax shield for all variables have variance inflation factor is more than 10. Hence to avoid the problem of multicollinearity one variable need to exclude from the final model.

Table No. 4.16 - Regression output with all variables for Mahindra and Mahindra Ltd.

Variable	Tangibility	Size of firm	Profitability	Non debt tax shield	Growth in asset
Coefficient	-0.13	-0.02	-0.96	-1.107	0.00028
VIF	11.16	30.20	5.82	9.91	19.04
P value	0.69	0.79	0.12	0.81	0.94
R^2 = 0.87, Adj. R^2 = 0.72			**ANOVA Sig. = 0.05**		

As problem of multicollinearity is detected in all variables except profitability and non debt tax shield, hence by excluding growth in asset multiple regression results are as follows. The table no.4.17 shows that again problem of multicollinearity is detected in tangibility and results are as follows

Table No.4.17 - Regression output after excluding growth in asset for Mahindra and Mahindra Ltd. Ltd

Variable	Size of firm	Profitability	Non Debt Tax Shield	Tangibility
Coefficient	-0.03	-0.93	-1.12	-0.134
VIF	6.58	2.54	9.89	11.05
P value	0.45	0.02	0.78	0.65
R^2 = 0.87, Adj R^2 = 0.78			**ANOVA Sig. = 0.01**	

Following table shows multiple regression results after excluding growth in asset and non debt tax shield and the results are as follows.

Table No. 4.18- Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.937	.877	.816	.02546

Table No. 4.19 – ANOVA output

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	.028	3	.009	14.275	.004
Residual	.004	6	.001		
Total	.032	9			

Table No. 4.20- Coefficients of regression output

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	T	Sig.	Tolerance	VIF
(Constant)	.762	.377		2.021	.090		
Tangibility	-.198	.164	-.359	-1.210	.272	.233	4.289
Size of Firm	-.032	.037	-.303	-.845	.431	.159	6.290
Profitability	-.959	.267	-.797	-3.589	.012	.415	2.409

Result interpretation

1) **Final regression model**

Financial Leverage = 0.762 -0.198 Tangibility -0.032 Size of Firm -0.959 Profitability

2) **Model Significance –**

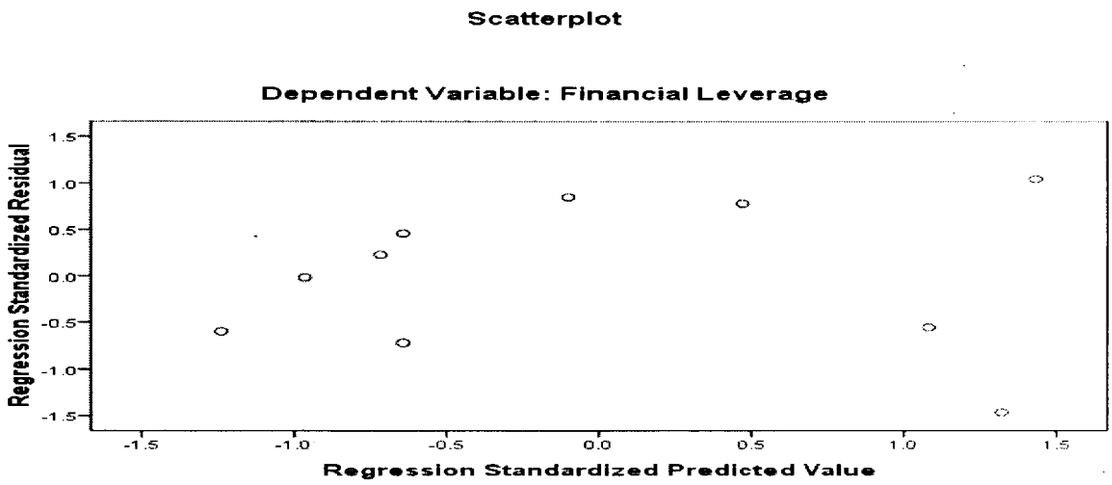
Table value for 3 degree of freedom for numerator and 6 degree of freedom for denominator and at 5 % significance level is 4.75. Since calculated F-value 14.27 is greater than table value 4.75 and so null hypothesis of ANOVA is rejected and concluded that overall final regression model has found significant. Hence null hypothesis of ANOVA is rejected, that financial leverage (y) does not depend on independent variable (X's).

3) **Tangibility:** - Tangibility has significance value 0.27 (0.27 > 0.05), hence null hypothesis is accepted that there is no relationship between tangibility and financial leverage of the firm.
4) **Size of firm:** - Size of firm has significance value 0.43 (0.43 > 0.05), hence null hypothesis is accepted that there is no relationship between size of firm and financial leverage of the firm.
5) **Profitability:** - Profitability has significance value 0.01 (0.01 < 0.05), hence null hypothesis is rejected that there is no relationship between profitability and financial leverage of the firm. So linear relationship between profitability and financial leverage is confirmed.

Residual analysis

1) **Multicollinearity:** - Tangibility, Size of firm, profitability, are included in final multiple regression model and results shows that variance inflation factor is 4.28, 6.29, 2.40 respectively less than 10. Hence there is no problem of multicollinearity in final model.
2) **Constant Variance:** - Following graph a show funnel out picture and indicates variance are not constant. Hence the regression assumption of homoscedasticity is not accepted.

Figure no. 4.12- Heteroscedasticity plot for Mahindra and Mahindra Ltd.



Interpretation of regression coefficients

Final regression model has predicted 87.70% variability in financial leverage as value of R is 0.93. and adjusted R square has found 81.60% with standard error of estimate 0.025. Growth in asset and non debt tax shield is excluded from the final regression model as they presented strong multicollinearity. In final regression model, the null hypothesis associated with profitability is rejected and same for size of firm and tangibility is accepted. For profitability negative regression coefficient is -0.959 and it implies that as profitability of firm increases by one unit debt of firm reduces by 0.959 unit and vice versa. Even correlation matrix indicates that only profitability is significantly related with financial leverage. Hence it is concluded that profitability has linear relationship with debt. Profitability has negative regression coefficient it implies that, with increasing profit firm use internal earnings than borrowing .The results of residual analysis of shows that there is no problem of multicollinearity but variances are found heteroscedastic.

Table No. 4.21 – Results of hypothesis testing

Null Hypothesis	Mahindra and Mahindra Ltd.	Status	Relation
H_1	There is no relationship between tangibility and financial leverage	Not rejected	
H_2	There is no relationship between size of firm and financial leverage	Not rejected	
H_3	There is no relationship between profitability and financial leverage	Rejected	(-)

Table No. 4.22 - Correlations matrix of Eicher Motors Ltd

		Financial Leverage	Tangibility	Size of Firm	Profitability	Non Debt Tax Shield	Growth in Asset
Financial Leverage	Pear Cor.	1	.553	.120	.417	.688*	-.028
	Sig. (2-tailed)		.097	.741	.231	.028	.939
	N	10	10	10	10	10	10
Tangibility	Pear Cor.	.553	1	.179	.629	.888**	-.150
	Sig. (2-tailed)	.097		.621	.052	.001	.680
	N	10	10	10	10	10	10
Size of Firm	Pear Cor.	.120	.179	1	-.057	.397	.921**
	Sig. (2-tailed)	.741	.621		.875	.256	.000
	N	10	10	10	10	10	10
Profitability	Pear Cor.	.417	.629	-.057	1	.546	-.283
	Sig. (2-tailed)	.231	.052	.875		.102	.427
	N	10	10	10	10	10	10
Non Debt Tax Shield	Pear Cor.	.688*	.888**	.397	.546	1	.105
	Sig. (2-tailed)	.028	.001	.256	.102		.772
	N	10	10	10	10	10	10
Growth in Asset	Pear Cor.	-.028	-.150	.921**	-.283	.105	1
	Sig. (2-tailed)	.939	.680	.000	.427	.772	
	N	10	10	10	10	10	10

**. Correlation is significant at the 0.01 level (2-tailed). *0.05 level.

Interpretation of correlation coefficients:-

1) Tangibility has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.55 indicates moderate relationship between financial leverage and tangibility.
2) Size of firm has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.12 indicates weak relationship between financial leverage and size of firm.
3) Profitability has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.41 indicates fair relationship between financial leverage and profitability.

4) Non debt tax shield has positive and significant correlation with financial leverage. The significant correlation coefficient 0.68 indicates moderate relationship between financial leverage and non debt tax shield at 5% significance level.
5) Growth in asset has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.02 indicates very weak relationship between financial leverage and growth in asset.

Multiple regression analysis Eicher Motors Ltd.

Following table no. 4.23 shows multiple regression results and overall model has found insignificant (0.50 > 0.05). Hence to avoid the problem of multicollinearity one variable need to exclude from the final model.

Table No. 4.23 – Regression output with all variables for Eicher Motors Ltd.

Variable	Tangibility	Size of firm	Profitability	Non debt tax shield	Growth in asset
Coefficient	-0.145	-0.09	0.11	9.05	0.000
VIF	8.36	20.66	1.794	6.61	20.69
P value	0.74	0.59	0.85	0.22	0.70
R^2 = 0.56, Adj. R^2 = 0.01			**ANOVA Sig. = 0.50**		

Following table shows multiple regression results by excluding growth in asset as it is having highest variance inflation factor i.e.20.69 and result are as follows.

Table No. 4.24 -Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.741	.548	.187	.07278

Table No. 4.25 –ANOVA output

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	.032	4	.008	1.518	.325
Residual	.026	5	.005		
Total	.059	9			

Table No. 4.26-Coefficients of regression output

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	.123	.271		.452	.670		
Tangibility	-.235	.326	-.534	-.720	.504	.164	6.095
Size of Firm	-.030	.041	-.272	-.735	.495	.660	1.515
Profitability	.080	.517	.062	.155	.883	.569	1.757
Non Debt Tax Shield	9.240	5.760	1.236	1.604	.170	.152	6.577

Result interpretation

1) Final multiple regression model :-

Financial Leverage = 0.123 -0.235 Tangibility -0.03 Size of Firm + 0.08 Profitability +9.240 Non Debt Tax Shield

2) Analysis of variance: -

Table value for 4 degree of freedom for numerator and 5 degree of freedom for denominator and at 5 % significance level is 5.19. Since calculated F-value 1.51 is less than table value 5.19 and so null hypothesis of ANOVA is accepted and concluded that overall final regression model has not significant. Hence null hypothesis of ANOVA is accepted, that financial leverage (y) does not depend on independent variable (X's).

3) **Tangibility:** - Tangibility has significance value 0.50 (0.50 > 0.05), hence null hypothesis is accepted that there is no relationship between tangibility and financial leverage of the firm
4) **Size of Firm:** - Size of firm has significance value 0.49 (0.49 > 0.05), hence null hypothesis is accepted that there is no relationship between size of firm and financial leverage of the firm.
5) **Profitability:** - Profitability has significance value 0.88 (0.88 > 0.05), hence null hypothesis is accepted that there is no relationship between profitability and financial leverage of the firm.
6) **Non Debt tax shield:** - Non debt tax shield has significance value 0.17 (0.17 > 0.05), hence null hypothesis is accepted that there is no relationship between non debt tax shield and financial leverage of the firm.

Interpretation of regression coefficients

Growth in asset is excluded from the final regression model as it presented strong multicollinearity. Final regression model has predicted 54% variability in financial leverage as value of R is 0.74 and adjusted R square has found 18% with standard error of estimate 0.074. In final regression model, the null hypothesis associated with ANOVA is accepted and concluded that tangibility, profitability, non debt tax shield, growth in asset are not significant determinant of capital structure.

Table No. 4.27 – Results of hypothesis testing

Null Hypothesis	Eicher Motors Ltd.	Status	Relation
H_1	There is no relationship between tangibility and financial leverage	Not Rejected	
H_2	There is no relationship between size of firm and financial leverage	Not Rejected	
H_3	There is no relationship between profitability and financial leverage	Not Rejected	
H_4	There is no relationship between non debt tax shield and financial leverage	Not Rejected	

Table No. 4.28 - Correlation matrix of SML Isuzu Ltd.

		Financial Leverage	Tangibility	Size of Firm	Profitability	Non Debt Tax Shield	Growth in Asset
Financial Leverage	Pear Cor.	1	.056	.164	-.907**	-.105	.553
	Sig. (2-tailed)		.878	.650	.000	.773	.097
	N	10	10	10	10	10	10
Tangibility	Pear Cor.	.056	1	-.200	-.036	.633*	.048
	Sig. (2-tailed)	.878		.580	.922	.050	.895
	N	10	10	10	10	10	10
Size of Firm	Pear Cor.	.164	-.200	1	-.146	.336	.872**
	Sig. (2-tailed)	.650	.580		.688	.342	.001
	N	10	10	10	10	10	10
Profitability	Pear Cor.	-.907**	-.036	-.146	1	.029	-.535
	Sig. (2-tailed)	.000	.922	.688		.936	.111
	N	10	10	10	10	10	10
Non Debt Tax Shield	Pear Cor.	-.105	.633*	.336	.029	1	.428
	Sig. (2-tailed)	.773	.050	.342	.936		.217
	N	10	10	10	10	10	10
Growth in Asset	Pear Cor.	.553	.048	.872**	-.535	.428	1
	Sig. (2-tailed)	.097	.895	.001	.111	.217	
	N	10	10	10	10	10	10

**. Correlation is significant at the 0.01 level (2-tailed). *0.05 level.

Interpretation of correlation coefficients:-

1) Tangibility has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.05 indicates very weak relationship between financial leverage and tangibility.
2) Size of firm has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.16 indicates weak relationship between financial leverage and size of firm.

3) Profitability has negative and significant correlation with financial leverage. The significant correlation coefficient -0.90 indicates very strong relationship between financial leverage and profitability at 1% significance level.
4) Non debt tax shield has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.10 indicates weak relationship between financial leverage and non debt tax shield.
5) Growth in asset has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.55 indicates moderate relationship between financial leverage and growth in asset.

Multiple regression analysis SML Isuzu Ltd.

Following table no. 4.29 shows multiple regression results, size of firm , growth in asset, have high variance inflation factor leading to problem of multicollinearity. Hence to avoid the problem of multicollinearity one variable need to exclude from the final model. Growth in asset is excluded from the model as it is having VIF 34.62.

Table No. 4.29 - Regression output with all variables for SML Isuzu Ltd.

Variable	Tangibility	Size of firm	Profitability	Non debt tax shield	Growth in asset
Coefficient	0.04	-0.39	-0.95	-18.15	0.02
P Value	0.92	0.20	0.53	0.15	0.13
VIF	3.40	25.10	6.93	2.92	34.62
R^2 = 92.50, Adj. R^2 = 0.83			**ANOVA Sig = 0.02**		

Following table shows multiple regression results after exclusion of size of firm and results are as follows.

Table No. 4.30 - Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.927	.860	.748	.07070

Table No. 4.31 – ANOVA output

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.153	4	.038	7.671	.023
	Residual	.025	5	.005		
	Total	.178	9			

Table No. 4.32 – Coefficients of regression outoput

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-.152	.926		-.164	.876		
Tangibility	.472	.485	.261	.974	.375	.391	2.555
Size of Firm	.075	.085	.195	.877	.420	.566	1.768
Profitability	-3.344	.674	-.861	-4.965	.004	.933	1.072
Non Debt Tax Shield	-13.818	12.410	-.310	-1.113	.316	.361	2.773

Result interpretation

1) **Final multiple regression model :-**

   Financial Leverage = -0.15 +0.47 Tangibility +0.075 Size of firm -3.344 Profitability -13.818 Non Debt Tax Shield

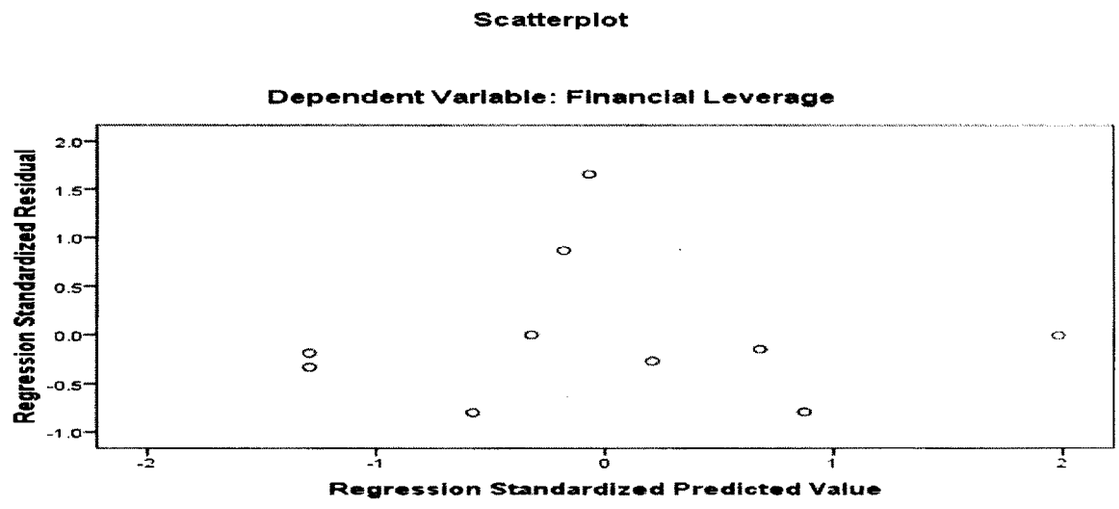
2) **Analysis of variance: -** Table value for 4 degree of freedom for numerator and 5 degree of freedom for denominator and at 5 % significance level is 5.19. Since calculated F-value 7.67 is greater than table value 5.19 and so null hypothesis of ANOVA is rejected and concluded that overall final regression model has found significant. Hence null hypothesis of ANOVA is rejected, that financial leverage (y) does not depend on independent variable (X's).
3) **Tangibility: -** Tangibility has significance value 0.37 (0.37 > 0.05), hence null hypothesis is accepted that there is no relationship between tangibility and financial leverage of the firm

4) **Size of Firm:** - Size of firm has significance value 0.42 (0.42 > 0.05), hence null hypothesis is accepted that there is no relationship between size of firm and financial leverage of the firm.
5) **Profitability:** - Profitability has significance value 0.00 (0.00 < 0.05), hence null hypothesis is rejected that there is no relationship between profitability and financial leverage of the firm.
6) **Non Debt tax shield:** - Non debt tax shield has significance value 0.31 (0.31 > 0.05), hence null hypothesis is accepted that there is no relationship between non debt tax shield and financial leverage of the firm.

Residual analysis

1) **Multicollinearity:** - Tangibility, Size of firm, profitability, non debt tax shied are included in final multiple regression model and results shows variance inflation factor is 2.55,1.76,1.07,2.77 respectively less than 10. Hence there is no problem of multicollinearity in final model.
2) **Constant Variance:** - Following graph a show except two outlier's variance are constant. Hence the regression assumption of homoscedasticity is accepted.

Figure No. 4.13 - Heteroscedasticity plot for SML Isuzu Ltd.



Interpretation of regression coefficients:-

Growth in asset is excluded from the final regression model as it presented strong multicollinearity. Final regression model has predicted 86% variability in financial leverage as

value of R is 0.92 and adjusted R square has found 74.80% with standard error of estimate 0.07. For tangibility, size of firm and non debt tax shield null hypothesis is accepted and concluded that there is no relationship with financial leverage. In case of profitability significant and negative regression coefficient -3.344 has found and it implies that as profitability of firm increases by one unit financial leverage decreases by 3.344 unit and vice versa. The results of residual analysis of regression model show that there is no problem multicollinearity and homoscedasticity is observed in residuals.

Table No. 4.33 – Results of hypothesis testing

Null Hypothesis	SML Isuzu Ltd.	Status	Relation
H_1	There is no relationship between tangibility and financial leverage	Not rejected	
H_2	There is no relationship between size of firm and financial leverage	Not rejected	
H_3	There is no relationship between profitability and financial leverage	Rejected	(-)
H_4	There is no relationship between non debt tax shield and financial leverage	Not rejected	

Table No. 4.34 - Correlation matrix of Maruti Suzuki India Ltd.

		Financial Leverage	Tangibility	Size of Firm	Profitability	Non Debt Tax Shield	Growth in Asset
Financial Leverage	Pear Cor.	1	.497	-.608	-.830**	.287	-.450
	Sig. (2-tailed)		.144	.062	.003	.421	.192
	N	10	10	10	10	10	10
Tangibility	Pear Cor.	.497	1	-.930**	-.256	.770**	-.910**
	Sig. (2-tailed)	.144		.000	.475	.009	.000
	N	10	10	10	10	10	10
Size of Firm	Pear Cor.	-.608	-.930**	1	.388	-.649*	.963**
	Sig. (2-tailed)	.062	.000		.268	.042	.000
	N	10	10	10	10	10	10
Profitability	Pear Cor.	-.830**	-.256	.388	1	-.116	.149
	Sig. (2-tailed)	.003	.475	.268		.749	.681
	N	10	10	10	10	10	10
Non Debt Tax Shield	Pear Cor.	.287	.770**	-.649*	-.116	1	-.615
	Sig. (2-tailed)	.421	.009	.042	.749		.059
	N	10	10	10	10	10	10
Growth in Asset	Pear Cor.	-.450	-.910**	.963**	.149	-.615	1
	Sig. (2-tailed)	.192	.000	.000	.681	.059	
	N	10	10	10	10	10	10

**. Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level

Interpretation of correlation coefficients:-

1) Tangibility has positive and insignificant correlation with financial leverage. The significant correlation coefficient 0.49 indicates fair relationship between financial leverage and tangibility.
2) Size of firm has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.60 indicates moderate relationship between financial leverage and size of firm.
3) Profitability has negative and significant correlation with financial leverage. The significant correlation coefficient -0.83 indicates very strong relationship between financial leverage and profitability at 1% significance level.

4) Non debt tax shield has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.28 indicates fair relationship between financial leverage and non debt tax shield.
5) Growth in asset has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.45 indicates fair relationship between financial leverage and growth in asset.

Multiple regression analysis of Maruti Suzuki India Ltd.

Following table no. 4.35 shows multiple regression results, all variables have high variance inflation factor more than 10 except non debt tax shield and overall model has found not significant (as significance value 0.10 > 0.05). Hence to avoid the problem of multicollinearity one variable need to excluded from the final model. Size of firm is excluded from the model as it is having VIF 158.46.

Table No. 4.35 - Regression output with all variables for Maruti Suzuki India Ltd.

Variable	Tangibility	Size of firm	Profitability	Non debt tax shield	Growth in asset
Coefficient	0.04	0.32	-1.03	0.41	-0.001
P Value	0.87	0.40	0.10	0.73	0.34
VIF	12.22	158.46	10.29	3.41	115.60
$R^2 = 83.40$, Adj. $R^2 = 62.60$			ANOVA Sig =0.10		

Following table 4.36 shows results after exclusion of size of firm from final regression and results are as follows. Overall model has found significant but still tangibility has variance inflation factor more than 10. So to avoid the problem of multicollinearity, tangibility needs to be excluded from final regression model.

Table No.4.36 - Regression output after excluding size of firm for Maruti Suzuki India Ltd.

Variable	Tangibility	Profitability	Non debt tax shield	Growth in asset
Coefficient	-0.17	-0.60	0.003	0.000
P Value	0.95	0.01	0.99	0.51
VIF	11.44	1.17	2.88	7.04
$R^2 = 79.8$, Adj. $R^2 = 63.70$			ANOVA Sig =0.05	

After exclusion of tangibility and size of firm from final regression model, the results are as follows.

Table No. 4.37 - Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.893	.798	.697	.03365

Table No. 4.38- ANOVA output

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.027	3	.009	7.904	.017
	Residual	.007	6	.001		
	Total	.034	9			

Table No. 4.39 –Coefficients of regression output

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	.205	.053		3.852	.008		
Profitability	-.598	.142	-.781	-4.206	.006	.977	1.024
Non Debt Tax Shield	-.042	.692	-.014	-.060	.954	.621	1.609
Growth in Asset	.000	.000	-.342	-1.463	.194	.616	1.624

Result interpretation

1) **Final multiple regression model :-**

Financial Leverage = 0.20 -0.598 Profitability -0.042 Non Debt Tax Shield +0.00 Growth in Asset

2) **Analysis of variance: -** Table value for 3 degree of freedom for numerator and 6 degree of freedom for denominator and at 5 % significance level is 4.75. Since calculated F-value 7.90 is greater than table value 4.75 and so null hypothesis of ANOVA is rejected

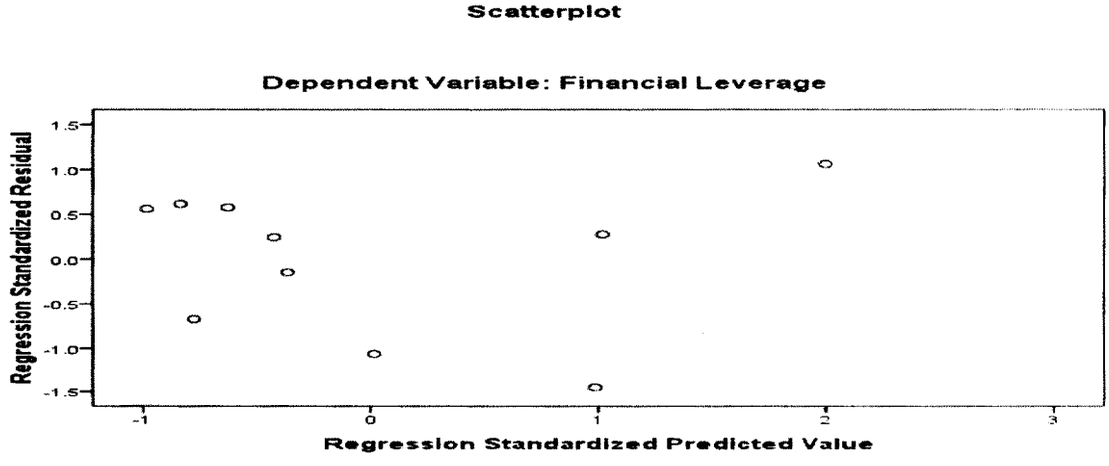
and concluded that overall final regression model has found significant. Hence null hypothesis of ANOVA is rejected, that financial leverage (y) does not depend on independent variable (X's).

3) **Profitability:** - Profitability has significance value 0.00 (0.00 < 0.05), hence null hypothesis is rejected that there is no relationship between profitability and financial leverage of the firm.
4) **Non Debt tax shield:** - Non debt tax shield has significance value 0.95 (0.95 > 0.05), hence null hypothesis is accepted that there is no relationship between non debt tax shield and financial leverage of the firm.
5) **Growth in asset:** - Growth in asset has significance value 0.19 (0.19 > 0.05), hence null hypothesis is accepted that there is no relationship between growth in asset and financial leverage of the firm

Residual analysis

1) **Multicollinearity:** - Profitability, non debt tax shield, growth in asset are included in final multiple regression model and results shows variance inflation factor is 1.02, 1.60, 1.62 respectively less than 10. Hence there is no problem of multicollinearity in final model.
2) **Constant Variance:** - Following graph shows that, there is funnel out approach in scatter plot. Hence the regression assumption of homoscedacty is not accepted.

Table No. 4.14 - Heteroscedasticity plot for Maruti Suzuki India Ltd.



Interpretation of regression coefficients:-

Final regression model has predicted 79.80 % variability in financial leverage as value of R is 0.89 and adjusted R square has found 69.70% with standard error of estimate 0.03. Size of firm and tangibility is excluded from the final regression model as it presented strong multicollinearity. For non debt tax shield, growth in asset null hypothesis is accepted and concluded that there is no relationship with financial leverage. In case of profitability significant and negative regression coefficient -0.598 has found and it implies that as profitability of firm increases by one unit financial leverage decreases by 0.598 unit and vice versa. The results of residual shows that there is no problem of multicollinearity and variance are found heteroscedastic.

Table No. 4.40 – Results of hypothesis testing

Null Hypothesis	Maruti Suzuki India Ltd.	Status	Relation
$\mathbf{H_1}$	There is no relationship between profitability and financial leverage	Rejected	(-)
$\mathbf{H_2}$	There is no relationship between non debt tax shield and financial leverage	Not rejected	
$\mathbf{H_3}$	There is no relationship between growth in asset and financial leverage	Not rejected	

Table No. 4.41- Correlation matrix of Hero Honda Motors Ltd.

		Financial Leverage	Tangibility	Size of Firm	Profitability	Non Debt Tax Shield	Growth in Asset
Financial Leverage	Pear Cor.	1	.125	-.825**	.834**	.519	-.919**
	Sig. (2-tailed)		.730	.003	.003	.124	.000
	N	10	10	10	10	10	10
Tangibility	Pear Cor.	.125	1	-.527	-.184	.820**	-.447
	Sig. (2-tailed)	.730		.118	.612	.004	.195
	N	10	10	10	10	10	10
Size of Firm	Pear Cor.	-.825**	-.527	1	-.696*	-.728*	.924**
	Sig. (2-tailed)	.003	.118		.025	.017	.000
	N	10	10	10	10	10	10
Profitability	Pear Cor.	.834**	-.184	-.696*	1	.147	-.676*
	Sig. (2-tailed)	.003	.612	.025		.686	.032
	N	10	10	10	10	10	10
Non Debt Tax Shield	Pear Cor.	.519	.820**	-.728*	.147	1	-.781**
	Sig. (2-tailed)	.124	.004	.017	.686		.008
	N	10	10	10	10	10	10
Growth in Asset	Pear Cor.	-.919**	-.447	.924**	-.676*	-.781**	1
	Sig. (2-tailed)	.000	.195	.000	.032	.008	
	N	10	10	10	10	10	10

**. Correlation is significant at the 0.01 level (2-tailed). *0.05 level.

Interpretation of correlation coefficients:-

1) Tangibility has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.12 indicates weak relationship between financial leverage and tangibility.
2) Size of firm has negative and significant correlation with financial leverage. The significant correlation coefficient -0.82 indicates very strong relationship between financial leverage and size of firm at 1 % significance level.

3) Profitability has positive and significant correlation with financial leverage. The significant correlation coefficient 0.83 indicates very strong relationship between financial leverage and profitability at 1% significance level.
4) Non debt tax shield has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.51 indicates moderate relationship between financial leverage and non debt tax shield.
5) Growth in asset has negative and significant correlation with financial leverage. The significant correlation coefficient -0.91 indicates very strong relationship between financial leverage and growth in asset at 1% significance level.

Multiple regression analysis of Hero Honda Motors Ltd

Following table no. 4.42 shows multiple regression results, all variables have high variance inflation factor more than 10 except tangibility and overall model has found significant (as significance value 0.00 < 0.05). Hence to avoid the problem of multicollinearity one variable need to be excluded from the final model. Size of firm is excluded from the model as it is having VIF 20.26.

Table No. 4.42 - Regression output with all variables for Hero Honda Motors Ltd

Variable	Tangibility	Size of firm	Profitability	Non debt tax shield	Growth in asset
Coefficient	-0.04	0.006	0.074	-0.993	0.000
P Value	0.73	0.78	0.68	0.61	0.06
VIF	9.826	20.26	11.72	13.15	18.11
R^2 = 95.60 , Adj. R^2 = 0.90			**ANOVA Sig = 0.00**		

Following table no. 4.43 shows results after exclusion of size of firm from final regression and results are as follows. Overall model has found significant but still non debt tax shield and growth in asset has variance inflation factor more than 10. So to avoid the problem of multicollinearity, non debt tax shield need to be excluded from final regression model as growth in asset has found as significant determinant of financial leverage.

Table No 4.43 - Regression output after excluding size of firm for Hero Honda Motors Ltd

Variable	Tangibility	Profitability	Non debt tax shield	Growth in asset
Coefficient	-0.06	0.04	-0.936	-0.000095
P Value	0.38	0.72	0.59	0.03
VIF	4.39	5.91	13.00	14.90
R^2 = 95.50, Adj. R^2 = 91.90			ANOVA Sig = 0.00	

Following table shows results after exclusion of size of firm and non debt tax shield from final regression model and results are as follows

Table No. 4.44 - Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.976	.952	.928	.00608

Table No. 4.45 – ANOVA output

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	.004	3	.001	39.818	.000
Residual	.000	6	.000		
Total	.005	9			

Table No4.46 – Coefficients of regression output

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.083	.055		1.517	.180		
Tangibility	-.094	.053	-.261	-1.766	.128	.366	2.736
Profitability	.075	.084	.159	.885	.410	.248	4.025
Growth in Asset	-0.000081	.000	-.928	-4.715	.003	.206	4.863

Result interpretation

1) **Final multiple regression model :-**

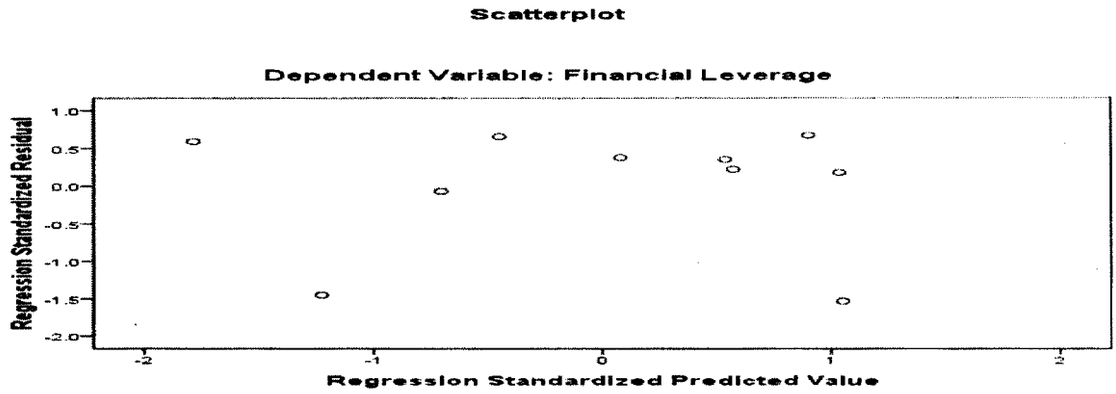
   Financial Leverage = 0.083 -0.094 Tangibility + 0.075 Profitability - 0.000081 Growth in Asset

2) **Analysis of variance: -** Table value for 3 degree of freedom for numerator and 6 degree of freedom for denominator and at 5 % significance level is 4.75. Since calculated F-value 39.81 is greater than table value 4.75 and so null hypothesis of ANOVA is rejected and concluded that overall final regression model has found significant. Hence null hypothesis of ANOVA is rejected, that financial leverage (y) does not depend on independent variable (X's).
3) **Tangibility: -** Tangibility has significance value 0.12 (0.12 > 0.05), hence null hypothesis is accepted that there is no relationship between tangibility and financial leverage of the firm.
4) **Profitability: -** Profitability has significance value 0.41 (0.41 > 0.05), hence null hypothesis is accepted that there is no relationship between profitability and financial leverage of the firm.
5) **Growth in asset: -** Growth in asset has significance value 0.00 (0.00 < 0.05), hence null hypothesis is rejected that there is no relationship between growth in asset and financial leverage of the firm

Residual analysis

3) **Multicollinearity: -** Tangibility, profitability, growth in asset are included in final multiple regression model and results shows variance inflation factor is 2.73, 4.02, 4.86 respectively less than 10. Hence there is no problem of multicollinearity in final model.
4) **Constant Variance: -** Following graph a show that, except two outlier's variance is constant. Hence the regression assumption of homoscedacty is accepted.

Table No. 4.15- Heteroscedasticity plot for Hero Honda Motors Ltd



Interpretation of regression coefficients:-

Final regression model has predicted 95.20 % variability in financial leverage as value of R is 0.97 and adjusted R square has found 92.80% with standard error of estimate 0.006. Size of firm and non debt tax shield is excluded from the final regression model as it presented strong multicollinearity. For tangibility and profitability null hypothesis is accepted and concluded that there is no relationship with financial leverage. In case of growth in asset significant and negative regression coefficient -0.000081 has found and it implies that as growth in asset of firm increases by one unit financial leverage decreases by 0.000081 unit and vice versa. The result of residual analysis shows that there is no problem of multicollinearity and the variance are almost constant.

Table No. 4.47 – Result of hypothesis testing

Null Hypothesis	Hero Honda Motors Ltd	Status	Relation
H_1	There is no relationship between tangibility and financial leverage	Not rejected	
H_2	There is no relationship between profitability and financial leverage	Not rejected	
H_3	There is no relationship between growth in asset and financial leverage	Rejected	(-)

Table No.4.48 –Correlations matrix of Baja Auto Ltd.

		Financial Leverage	Tangibility	Size of Firm	Profitability	Non Debt Tax Shield	Growth in Asset
Financial Leverage	Pear Cor.	1	.371	.549	.629	.024	-.288
	Sig. (2-tailed)		.291	.100	.051	.947	.420
	N	10	10	10	10	10	10
Tangibility	Pear Cor.	.371	1	-.415	.045	.682*	-.937**
	Sig. (2-tailed)	.291		.233	.903	.030	.000
	N	10	10	10	10	10	10
Size of Firm	Pear Cor.	.549	-.415	1	.792**	-.552	.559
	Sig. (2-tailed)	.100	.233		.006	.098	.093
	N	10	10	10	10	10	10
Profitability	Pear Cor.	.629	.045	.792**	1	-.192	.054
	Sig. (2-tailed)	.051	.903	.006		.596	.883
	N	10	10	10	10	10	10
Non Debt Tax Shield	Pear Cor.	.024	.682*	-.552	-.192	1	-.752*
	Sig. (2-tailed)	.947	.030	.098	.596		.012
	N	10	10	10	10	10	10
Growth in Asset	Pear Cor.	-.288	-.937**	.559	.054	-.752*	1
	Sig. (2-tailed)	.420	.000	.093	.883	.012	
	N	10	10	10	10	10	10

**. Correlation is significant at the 0.01 level (2-tailed). *0.05 level.

Interpretation of correlation coefficients:-

1) Tangibility has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.37 indicates fair relationship between financial leverage and tangibility.
2) Size of firm has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.54 indicates moderate relationship between financial leverage and size of firm.

3) Profitability has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.62 indicates moderate relationship between financial leverage and profitability.
4) Non debt tax shield has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.02 indicates very weak relationship between financial leverage and non debt tax shield.
5) Growth in asset has negative and insignificant correlation with financial leverage. The insignificant correlation coefficient -0.28 indicates fair relationship between financial leverage and growth in asset.

Multiple regression analysis of Bajaj Auto Ltd

Following table no. 4.49 shows multiple regression results, size of firm and growth in asset have high variance inflation factor more than 10 and overall model has found significant (as significance value 0.00 < 0.05). Hence to avoid the problem of multicollinearity one variable need to be excluded from the final model. Growth in asset is excluded from the model as it is having highest VIF 17.16 among other variables. But growth in asset, size of firm and profitability are found significant determinants of capital structure, so excluding one of the variables among them may affect overall prediction. So to avoid the multicollinearity tangibility is excluded from final regression model.

Table No. 4.49 - Regression output with all variables for Baja Auto Ltd.

Variable	**Tangibility**	**Size of firm**	**Profitability**	**Non debt tax shield**	**Growth in asset**
Coefficient	- 0.319	0.311	-0.96	-1.156	-0.003
P Value	0.26	0.00	0.00	0.30	0.00
VIF	9.92	10.65	6.79	2.44	17.16
R^2 = 97.10 , Adj. R^2 = 93.60			**ANOVA Sig = 0.00**		

Following table shows results after exclusion of tangibility from final regression and results are as follows.

Table No. 4.50 -Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.979	.959	.927	.01660

Table No. 4.51 – ANOVA output

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	.032	4	.008	29.408	.001
Residual	.001	5	.000		
Total	.034	9			

Table No. 4.52 –Coefficients of regression output

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-2.159	.314		-6.871	.001		
Size of Firm	.294	.040	2.041	7.330	.001	.105	9.510
Profitability	-.905	.223	-.936	-4.059	.010	.153	6.524
Non Debt Tax Shield	-1.137	1.052	-.153	-1.081	.329	.409	2.447
Growth in Asset	-.002	.000	-1.494	-7.687	.001	.216	4.630

Result interpretation

1) **Final multiple regression model :-**

   Financial Leverage = -2.159 +0.294 Size of Firm -0.905 Profitability -1.137 Non Debt Tax Shield -0.002 Growth in Asset

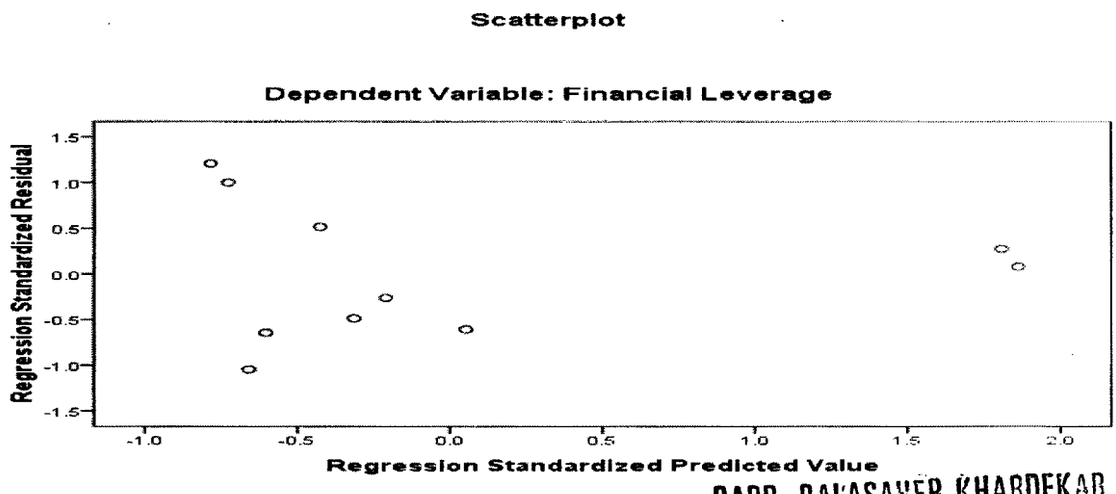
2) **Analysis of variance: -** Table value for 4 degree of freedom for numerator and 5 degree of freedom for denominator and at 5 % significance level is 5.19. Since calculated F-value 29.40 is greater than table value 5.19 and so null hypothesis of ANOVA is rejected and concluded that overall final regression model has found significant. Hence null hypothesis of ANOVA is rejected, that financial leverage (y) does not depend on independent variable (X's).
3) **Size of Firm:** - Size of firm has significance value 0.00 (0.00 < 0.05), hence null hypothesis is rejected that there is no relationship between size of firm and financial leverage of the firm.

4) **Profitability:** - Profitability has significance value 0.01 (0.01 < 0.05), hence null hypothesis is rejected that there is no relationship between profitability and financial leverage of the firm.
5) **Non Debt Tax Shield:** - Non debt tax shield has significance value 0.32 (0.32 > 0.05), hence null hypothesis is accepted that there is no relationship between non debt tax shield and financial leverage of the firm
6) **Growth in asset:** - Growth in asset has significance value 0.00 (0.00 < 0.05), hence null hypothesis is rejected that there is no relationship between growth in asset and financial leverage of the firm

Residual analysis

5) **Multicollinearity:** - Size of firm, profitability, non debt tax shield, growth in asset are included in final multiple regression model and results shows variance inflation factor is 9.51, 6.52, 2.44, 4.63 respectively less than 10. Hence there is no problem of multicollinearity in final model.
6) **Constant Variance:** - Following graph shows that, the variance has funnel in pattern. Hence the regression assumption of homoscedacty is rejected.

Figure No. 4.16 - Heteroscedasticity plot for Bajaj Auto Ltd.



Interpretation of regression coefficients:-

Final regression model has predicted 95.90 % variability in financial leverage as value of R is 0.97 and adjusted R square has found 92.70% with standard error of estimate 0.016. Tangibility

is excluded from the final regression model as it presented strong multicollinearity. For non debt tax shield null hypothesis is accepted and concluded that there is no relationship with financial leverage. In case of size of firm significant and positive regression coefficient 0.294 has found and it implies that as size of firm increases by one unit financial leverage increases by 0.294 unit and vice versa. In case of profitability significant and negative regression coefficient -0.905 has found and it implies that as profitability of firm increases by one unit financial leverage decreases by 0.905 unit and vice versa. In case of growth in asset significant and negative regression coefficient -0.002 has found and it implies that as growth in asset increases by one unit financial leverage decreases by 0.002 unit and vice versa. Negative relationship between growth in asset and financial leverage implies that with growing asset financial leverage decreases and growth in asset is financed by internally generated funds. The results of residual analysis shows that there is no problem of multicollinearity and variance are not constant.

Table No. 4.53- Result of hypothesis testing

Null Hypothesis	Bajaj Auto Ltd.	Status	Relation
H_1	There is no relationship between size of firm and financial leverage	Rejected	(+)
H_2	There is no relationship between profitability and financial leverage	Rejected	(-)
H_3	There is no relationship between non debt tax shield and financial leverage	Not rejected	
H_4	There is no relationship between growth in asset and financial leverage	Rejected	(-)

Table No. 4.54 – Correlation matrix of TVS Motors Ltd.

		Financial Leverage	Tangibility	Size of Firm	Profitability	Non Debt Tax Shield	Growth in Asset
Financial Leverage	Pear Cor.	1	-.678*	.317	-.879**	-.904**	.691*
	Sig. (2-tailed)		.031	.372	.001	.000	.027
	N	10	10	10	10	10	10
Tangibility	Pear Cor.	-.678*	1	-.317	.535	.555	-.456
	Sig. (2-tailed)	.031		.372	.111	.096	.186
	N	10	10	10	10	10	10
Size of Firm	Pear Cor.	.317	-.317	1	-.513	-.514	.891**
	Sig. (2-tailed)	.372	.372		.129	.128	.001
	N	10	10	10	10	10	10
Profitability	Pear Cor.	-.879**	.535	-.513	1	.952**	-.809**
	Sig. (2-tailed)	.001	.111	.129		.000	.005
	N	10	10	10	10	10	10
Non Debt Tax Shield	Pear Cor.	-.904**	.555	-.514	.952**	1	-.814**
	Sig. (2-tailed)	.000	.096	.128	.000		.004
	N	10	10	10	10	10	10
Growth in Asset	Pear Cor.	.691*	-.456	.891**	-.809**	-.814**	1
	Sig. (2-tailed)	.027	.186	.001	.005	.004	
	N	10	10	10	10	10	10

**. Correlation is significant at the 0.01 level (2-tailed). *0.05 level.

Interpretation of correlation coefficients

1) Tangibility has negative and significant correlation with financial leverage. The significant correlation coefficient 0.67 indicates moderate relationship between financial leverage and tangibility at 5% significance level.
2) Size of firm has positive and insignificant correlation with financial leverage. The insignificant correlation coefficient 0.31 indicates fair relationship between financial leverage and size of firm.
3) Profitability has negative and significant correlation with financial leverage. The significant correlation coefficient -0.87 indicates very strong relationship between financial leverage and profitability at 1% significance level.

4) Non debt tax shield has negative and significant correlation with financial leverage. The significant correlation coefficient -0.90 indicates very strong relationship between financial leverage and non debt tax shield at 1% significance level.
5) Growth in asset has positive and significant correlation with financial leverage. The significant correlation coefficient 0.69 indicates moderate relationship between financial leverage and growth in asset at 5% significance level.

Multiple regression analysis of TVS Motors Ltd

Following table no. 4.55 shows multiple regression results, all variables have high variance inflation factor more than 10 except tangibility and overall model has found significant (as significance value 0.00 < 0.05). Hence to avoid the problem of multicollinearity one variable need to be excluded from the final model. Growth in asset need to be excluded from the model as it is having highest VIF 34.17 among other variables. But growth in asset, size of firm and tangibility are found significant determinants of capital structure, so excluding one of the variable among them may affect overall prediction. So to avoid the multicollinearity non debt tax shield is excluded from final regression model.

Table No. 4.55- Regression output with all variables for TVS Motors Ltd

Variable	Tangibility	Size of firm	Profitability	Non debt tax shield	Growth in asset
Coefficient	-0.44	-0.42	0.16	-1.20	0.002
P Value	0.01	0.00	0.62	0.60	0.01
VIF	1.47	15.23	12.24	14.15	34.17
R^2 = 98.40 , Adj. R^2 = 96.40			**ANOVA Sig = 0.00**		

After exclusion of non debt tax results of regression analysis in table no. 4.56 shows that, again multicollinearity is observed in size of firm and growth in asset. So to avoid the problem of multicollinearity growth in asset is need to be excluded from the final regression model.

Table No. 4.56- Regression output after excluding non debt tax shield

Variable	Tangibility	Size of firm	Profitability	Growth in asset
Coefficient	-0.45	-0.44	0.06	0.00
P Value	0.00	0.00	0.79	0.00
VIF	1.40	12.52	7.91	26.73
R^2 = 98.30 , Adj. R^2 = 96.90			**ANOVA Sig = 0.00**	

Final regression model includes tangibility, size of firm and profitability after exclusion of growth in asset and non debt tax shield and results of the final model as follows.

Table No. 4.57 - Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.928	.862	.793	.04503

Table No. 4.58- ANOVA output

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	.076	3	.025	12.504	.005
Residual	.012	6	.002		
Total	.088	9			

Table No. 4.59 – Coefficients of regression output

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	1.262	.532		2.373	.055		
Tangibility	-.441	.262	-.302	-1.682	.144	.711	1.406
Size of Firm	-.065	.058	-.199	-1.125	.304	.734	1.362
Profitability	-1.131	.274	-.819	-4.125	.006	.583	1.717

Result interpretation

1) **Final multiple regression model :-**

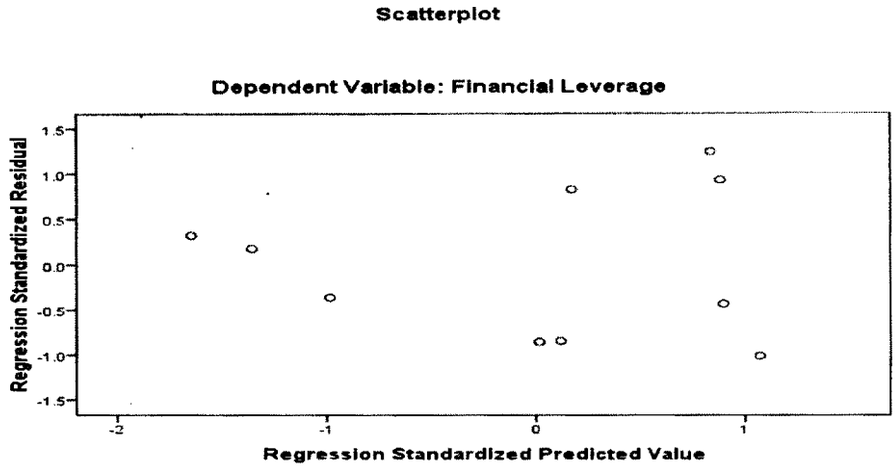
   Financial Leverage = 1.26 -0.44 Tangibility -0.065 Size of Firm – 1.131 Profitability

2) **Analysis of variance:** Table value for 3 degree of freedom for numerator and 6 degree of freedom for denominator and at 5 % significance level is 4.75. Since calculated F-value 12.50 is greater than table value 4.75 and so null hypothesis of ANOVA is rejected and concluded that overall final regression model has found significant. Hence null hypothesis of ANOVA is rejected, that financial leverage (y) does not depend on independent variable (X's).
3) **Tangibility:** - Tangibility has significance value 0.14 (0.14 > 0.05), hence null hypothesis is accepted that there is no relationship between tangibility and financial leverage of the firm.
4) **Size of firm:** - Size of firm has significance value 0.30(0.30 > 0.05), hence null hypothesis is accepted that there is no relationship between size of firm and financial leverage of the firm
5) **Profitability:** - Profitability has significance value 0.00 (0.00 < 0.05), hence null hypothesis is rejected that there is no relationship between profitability and financial leverage of the firm.

Residual analysis

1) **Multicollinearity:** - Tangibility, Size of firm, profitability are included in final multiple regression model and results shows variance inflation factor is 1.40, 1.36, 1.71 respectively less than 10. Hence there is no problem of multicollinearity in final model.
2) **Constant Variance:** - Following graph a show that, the variance has funnel out pattern. Hence the regression assumption of homoscedasticity is rejected.

Figure No. 4.17 - Heteroscedasticity plot for TVS Motors Ltd



Interpretation of regression coefficients:-

Non debt tax shield and growth in asset is excluded from the final regression model as it presented strong multicollinearity. Final regression model has predicted 86.20 % variability in financial leverage as value of R is 0.92 and adjusted R square has found 79.30% with standard error of estimate 0.045. For tangibility and size of firm null hypothesis is accepted and concluded that there is no relationship with financial leverage. In case of profitability significant and negative regression coefficient -1.131 has found and it implies that as profitability of firm increases by one unit financial leverage decreases by 1.131unit and vice versa. The residual analysis shows that, there is no problem of multicollinearity and funnel out pattern has found in residuals.

Table No. 4.60 – Result of hypothesis testing

Null Hypothesis	TVS Motors Ltd.	Status	Relation
H_1	There is no relationship between tangibility and financial leverage	Not rejected	
H_2	There is no relationship between size of firm and financial leverage	Not rejected	
H_3	There is no relationship between profitability and financial leverage	Rejected	(-)

SECTION III

Capital structure strategy

Capital structure strategy on the basis of findings

Capital structure is one of the important aspects of financial research. As capital structure decision directly affects the value of the firm, so for finance manger capital structure decision is important. For this study it is assumed that tangibility, size of firm, profitability, non debt tax shield and growth in asset are important variables considered by finance manager in capital structure decision.

The research findings indicate that companies selected in the heavy and medium commercial vehicle segment, light commercial vehicle segment, passenger vehicle segment, two wheeler segments have negative relationship between profitability and financial leverage. This finding indicates that selected auto companies follows pecking order or hierarchy of financial instruments in fund raising. The first source of finance is used internal generated funds, later debt and equity as last resort. The earnings of the firm are distributed to the shareholders as dividend or retained in the firm for further investment. But both the strategy affect share price and in turn market value of the firm. So retaining of internally generated funds need to be considered in broader context.

As auto companies gives first priority to internally generated funds , it is the responsibility of finance manager to evaluate the future return and if a company is able to invest earnings than opportunities available to the shareholders it is always in the interest of shareholders to retain all the profit than distributing as dividend. So in future by considering profitability and opportunities available to the shareholders company can consider retaining the funds or distributing the same to the shareholders. The drawback of this strategy is that, if firm fail to achieve return as available to shareholders it may decline share market price, in turn market value of the firm. Capital structure decisions are complicated not only profitable investment opportunities, but also cost of capital, presence of non debt tax shield, economic growth, debt tax shield and competition in the Indian auto market are other factors need to be considered in capital structure decisions.