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Leveraging Financial Data for Research: An Empirical Demonstration of Statistical Tools on Key Variables

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ABSTRACT

The paper has made an attempt to understand the application of financial variables on research. The paper has identified some key variables in accounting and finance and the way the ratios show the relationship among the variables. The paper has brought forth statistical application of accounting variables for selected companies during the period. By applying the technique of ANOVA, it is understood that the selected companies employ different amount of debt during the period by showing the significant difference in terms of leverage ratio. The application of correlation and regression techniques show the relationship between Non-Performing Asset (NPA) and Return on Equity (ROE)and the extent to which ROE is affected by NPA for the selected period by taking into account of various banks. With the help of Altman Z score the discriminant analysis is carried out to identify the financial health of the firm for the selected period.

Keywords: Leverage Ratio, Return on Equity, Non-Performing Assets, ANOVA, Z score.

INTRODUCTION

Financial statements are prepared to understand the financial position of firm. Financial statements are referred by various stakeholders such as Investors, Suppliers, Employees, Tax authorities, Government, Competitors and customers. In this line, financial statements of corporates are used by researchers too. The Information extracted from the financial statements are considered to be the data and the financial statements are the data sources for carrying out Industrial and academic research. As the financial statements are audited statements, the data extracted therefrom stands reliable and valid for research. The data extracted from the financial statements are known as financial / accounting variables. The accounting variables are interrelated to each other and one or more accounting variable(s) will have an impact over the other variable(s). The interrelationship amongst the accounting variables and the impact of one or more accounting variable(s) over the other can be brought to light through statistical tools and the results therefrom can be interpreted and concluded in a systematic way. There is a wide scope for considering the Financial variables for research by applying both Descriptive statistic and Inferential Statistics. Beyond that It is also possible to construct Linear Regression model(s), Multiple Regression Models(s), Discriminant Model(s) and Structural Equation Model(s) using the financial variables. Financial variables are also widely used in Time series analysis with the help of various econometric tools. With the help of Financial Variables, it is quite possible to study a firm, Sector and the economy as whole. Enormous studies were conducted with the help of Financial variables worldwide. Altman's Z score, Du Point Analysis, Capital Asset Pricing model, Capital Structure Theories, Dividend Theories, Random Walk Theory, Efficient Market Hypothesis, CAMEL Model, Arbitrage Pricing Theory etc are the famous studies conducted in the area of accounting and finance with major utilization of Accounting/ Financial Variables. Hence it is essential for the present-day researchers to acquire skillset for analysing the accounting/ Financial Variables nothing but secondary Data. In this connection, an attempt has been made in this paper to exhibit how to perform statistical analysis with accounting variables by using MS-Excel and SPSS.

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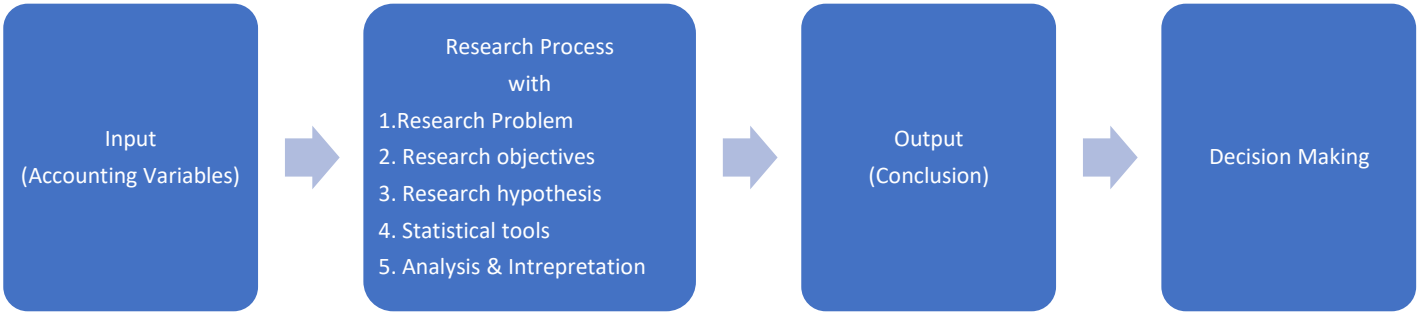
Scope for accounting Variables into research

The accounting variables are interrelated. The change in one will result in change in the other. In simple words one variable can sensitize the other. With this ideology, it is quite possible to study the position of a firm in the micro aspect and study the position of the sector and the whole economy in the macro perspective. A firm's performance is measured in terms of its Liquidity, Profitability, Turnover, operational efficiency, Return on Investment, Shareholder wealth etc. Similarly, a sector's performance is measured in terms of its Competitive advantage, Market share, Sustainability etc. whereas the economy's soundness can be assessed in terms of its Inflation, GDP, Growth Rate, Balance of Trade, Balance of Payment, Stock market efficiency, Financial policy and system etc.,The research over the position or performance of a firm, sector or the economy as the whole, warrants to consider the relevant accounting variables as metrics. The accounting variables are not only used to study the past and present performances and positions, those are also very much useful to predict the future trends, prospects, and patterns.

The market has been transformed to buyer oriented. Now the current market is decided by data. Under business analytics and the big data regimes, accounting variables have its own significance. Accounting variables plays a major role in the big the big data.

For obtaining accurate and optimum results, it is quite essential to melange the appropriate accounting variables with statistical tools as selected for analysis based on the Research problem, objectives and hypothesis.

The following figure illustrates the same:



In this paper, an attempt is made to empirically exhibit how to perform statistical analysis with accounting variables

LITERATURE REVIEW

Altman (1968), Made an attempt in predicting the corporate bankruptcy using his multiple discriminate analyses (MDS) model called Z-Score model/equation that exactly discriminated the 94% of the bankrupt companies a year prior to bankruptcy

Jayakkodi&Rengarajan (II), studied the impact of NPA on ROA of both public and private sector banks. From their study they found that there is a high degree of negative correlation between Gross Non-Performing Asset with Return on Asset of Punjab National Bank, Bank of Baroda, Bank of India, ICICI and HDFC Bank

Narula &singh (II), Mentioned in their study that NPA affects the liquidity, profitability, Asset Quality and Bank Survival

M.S.Ramaratnam&R.Jayaraman (2010), predicted the corporate bankruptcy of select companies of Indian Steel Industry. The study concludes that none of the select companies will be bankrupt as they are financially sound during the study period

M.S.Ramaratnam&R.Jayaraman (III), Studied the determinants of capital structure of Indian pharmaceutical sector. In their study the influence of financial variables such as tangibility ratio, return on total assets, net profit margin, and accumulated depreciation to total assets were analyzed with respect to the dependent variable of

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leverage ratio. From the analysis the relationship between the independent variable and dependent variable has been witnessed.

Data Analysis & Interpretations

Exhibit 1

Performance of ANOVA using financial variables

Objective	To test the significant difference among the Leverage ratio (capital structure) of select companies for the select time period
Sector	Indian Steel Industry
Companies	1. JSW Steel 2. Tata Steel 3. Hindalco 4. SAIL 5. Jindal Steel
Ratio used	Leverage Ratio
Variables used	1. Total Debt 2. Total Asset
Time period	Last five years
Data Source	www.moneycontrol.com

Research Output

Tables showing Computation of ANOVA using financial variables

	Year				
Leverage Ratio	**I**	**II**	**III**	**IV**	**V**
JSW Steel	0.60	0.66	0.62	0.55	0.51
Tata Steel	0.68	0.66	0.69	0.60	0.56
Hindalco	0.63	0.62	0.56	0.48	0.48
SAIL	0.41	0.45	0.51	0.53	0.51
Jindal Steel	0.66	0.57	0.57	0.56	0.52

Groups	***Count***	***Sum***	***Average***	***Variance***
JSW Steel	5	2.942876	0.588575	0.003476
Tata Steel	5	3.206813	0.641363	0.003234
Hindalco	5	2.769367	0.553873	0.005343
SAIL	5	2.418089	0.483618	0.002553
Jindal Steel	5	2.874381	0.574876	0.002578

anova: Single Factor

ANOVA						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***

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Between Groups	0.065858	4	0.016464	4.790745	0.00711	2.866081402
Within Groups	0.068734	20	0.003437			
Total	0.134592	24				

Inference

The above tables are related to the structure of ANOVA. The purpose of ANOVA in statistics is to ensure the difference in means of the given data. In this case the variable of leverage has been taken among the different steel companies in the steel industry. The concept of leverage is the application of debt in the capital structure such a way to take the benefit of the instrument. By using ANOVA, the inference can be made such as the employment of debt over the period among the selected companies may differ because the amount of debt will not be equal among the companies. In this context it is understood from the table that the variable leverage shows that there is significant difference in terms of employment of debt among the selected companies in the given period by displaying the F value and its corresponding p value which is less than 0.01

Exhibit 2

Performance of Correlation using financial variables

Objective	To test the correlation among the Return on Equity and NPA of public sector Banking companies for the select time period
Sector	Indian Banking Industry
Companies	Indian Public Sector Banks
Variables used	1.Return on Equity 2.NPA
Time period	Five years
Data Source	www.moneycontrol.com www.rbi.org.in

Research Output

Table showing computation of correlation using financial variables

Correlations			
		NPA	ROE
NPA	Pearson Correlation	1	-.820**
	Sig. (2-tailed)		.000
	N	105	105
ROE	Pearson Correlation	-.820**	1
	Sig. (2-tailed)	.000	
	N	105	105
**. Correlation is significant at the 0.01 level (2-tailed).			

Inference

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In the second application, the tool of correlation was taken between the variable of Non-Performing Assets (NPA) and Return on Equity (ROE). The analysis was carried out in the banking industry by selecting the public sector banks. The purpose of the analysis is to show the close relationship between NPA and ROE.As per the theory higher NPA may lead to speedy erosion of profit. It is normally understood that the public sector banks are exposed more to advances which may in turn give a scope for bad quality of asset. In this aspect the above table shows the correlation between the two accounting variables of NPA and ROE, respectively. The result proves that a strong negative association by displaying the correlation coefficient of 0.82 with negative sign and the result is highly significant.

Exhibit 3

Performance of Regression using financial variables

Objective	To test the Impact of NPA on Return on Equity of public sector Banking companies for the select time period
Sector	Indian Banking Industry
Companies	Indian Public Sector Banks
Variables used	1.Return on Equity 2.NPA
Time period	Five years
Data Source	www.moneycontrol.com www.rbi.org.in

Research Output

Tables showing computation of Regression using financial variables

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.820[a]	.672	.669	6.52286	.672	210.970	1	103	.000

a. Predictors: (Constant), NPA PUBLIC SECTOR

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8976.272	1	8976.272	210.970	.000[a]
	Residual	4382.408	103	42.548		
	Total	13358.680	104			

a. Predictors: (Constant), NPA PUBLIC SECTOR

b. Dependent Variable: ROE PUBLIC SECTOR

Coefficients[a]

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ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8976.272	1	8976.272	210.970	.000[a]
	Residual	4382.408	103	42.548		
	Total	13358.680	104			

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	16.743	1.171		14.292	.000
	NPA PUBLIC SECTOR	-3.086	.212	-.820	-14.525	.000
a. Dependent Variable: ROE PUBLIC SECTOR						

Inference

As an extension of application and validation of correlation technique, Linear regression model is used to understand the extent to which the variables are influenced with each other. In this context NPA is taken as predictor variable and ROE is taken as outcome variable.

In the process it is understood that the variance in ROE is explained by the variance in NPA through the value of R squared which indicates 0.6 explaining the power of predictor variable over outcome variable. It shows that almost 60% of variance in the outcome variable such as ROE is explained by the predictor variable of NPA. Since the value of R square is reasonably good, the analysis is carried in the model of overall fit with the help of ANOVA table. As the table shows the significant result, it is observed that the fit aspect is validated.

The coefficient table shows the impact of NPA on ROE. From the table it is observed that the change in one unit of NPA may lead to 0.8 unit of erosion in terms of ROE and the result is also significant. The influence of NPA on ROE is exhibited through linear regression model.

Exhibit 4

Performance of Altman's Z-Score using Financial Variables

Objective	To test the financial health of Tata Power Company for the select time period using Altman's Z-Score
Sector	Indian Power Sector
Company	Tata Power Company
Variables used	1. Working Capital/Total Assets 2. Retained Earnings/Total Assets 3. Earnings before Interest and Taxes/Total Assets 4. Market Value of Equity/Book Value of Total Debt 5. Sales/Total Assets
Time period	Five years
Data Source	www.moneycontrol.com

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Altman's model takes the following form -:

$Z = 1.2A + 1.4B + 3.3C + 0.6D + .999E$ ……(1)

A = Working Capital/Total Assets

B = Retained Earnings/Total Assets

C = Earnings before Interest and Taxes/Total Assets

D = Market Value of Equity/Book Value of Total Debt

E = Sales/Total Assets

Measurement of Financial Health

Altman established the following guidelines to be used to classify firms as either financially sound or bankrupt.

Score Interpretation

Above 3.00 - The company is financially safe

2.77 – 2.99 - The company is on alert to exercise the caution

1.8 – 2.00 - There are chances that the company could go bankrupt in the next two years

Below 1.8 - The company's financial position is embarrassing

Research Output

Tables showing computation of Altman's Z-score using financial variables

	Year				
Tata Power Company	**I**	**II**	**III**	**IV**	**V**
WC	3,716.31	3,535.49	3,795.13	5,026.59	2,767.60
TA	33,561.19	30,539.03	28,092.86	25,117.71	21,205.30
RE	14,196.14	11,648.74	10,803.46	10,525.23	9,801.41
EBIT	1,515.65	1,491.16	1,703.38	1,682.87	1,111.82
Total Debt/Equity (X)	0.73	0.74	0.87	0.71	0.67
Total Operating Revenues	8,677.69	8,627.04	9,567.28	8,495.84	6,918.48

YEAR	**A**	**B**	**C**	**D**	**E**	**Z-Score**
I	11.07	42.30	4.52	1.37	25.86	3.47
II	11.58	38.14	0.05	1.35	28.25	3.50
III	13.51	38.46	0.06	1.15	34.06	4.11
IV	20.01	41.90	0.07	1.41	33.82	4.22
V	13.05	46.22	0.05	1.49	32.63	4.07

Inference

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Basically, Altman Z score is used to discriminate among the firms with viability of bankruptcy. The score is derived by taking total assets of the firm as a common denominator indicating the efficiency with which the firm coverts the total assets into sales as well as operating profit. In addition to that the firm's efficiency in terms of using current assets against the total assets with the help of working capital aspect and the portion of retained earning against the total assets revealing the usage of retained earnings to finance current assets and there by depending on external source of borrowing to the minimum extent. The weights are assigned according to the importance of ratios. The above tables give a clear picture that the selected company does not have a threat to become bankruptcy since the total value of the equation 1 is more than 3.0 for the selected years

Summarized outcomes

Exhibit	Objective	Statistical Tool used	Variables used	Result obtained
1	To test the significant difference among the Leverage ratio (capital structure) of select companies for the select time period	ANOVA	Leverage Ratio (Total Debt & Total Asset)	The leverage ratios of select companies are not uniform
2	To test the correlation among the Return on Equity and NPA of public sector Banking companies for the select time period	Correlation	Return on Equity and Non-Performing Asset	There is a high degree of negative correlation between ROE and NPA
3	To test the Impact of NPA on Return on Equity of public sector Banking companies for the select time period	Regression	Return on Equity and Non-Performing Asset	The NPA is negatively impacting ROE
4	To test the financial health of Tata Power Company for the select time period using Altman's Z-Score	Altman's Z-Score	1. Working Capital/Total Assets 2. Retained Earnings/Total Assets 3. Earnings before Interest and Taxes/Total Assets 4. Market Value of Equity/Book Value of Total Debt 5.Sales/Total Assets	The Firm has been maintaining sound Financial position over the years.

CONCLUSION

With few exhibits, the current paper explores the possibilities of accommodating the accounting/Financial variables into research work thereby obtaining solution for the various research problems in the fields of Economics, Commerce, Finance, Banking and Stock market. It is concluded that the scope for accounting variables in Business analytics is enormous.

REFERENCES

1. Altman,(1968). "Financial ratios discriminate analysis and prediction of corporate bankruptcy", Jour nal of finance, sep. 598

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2. Jayakkodi, D. &Rengarajan , D. P., II. Impact of non-performing assets on return on assets of public and private sector banks in India. International Journal of Applied Research, 2(9), pp. 696-702.
3. Narula, D. S. &singh, m., II. Empirical Study on Non-Performing Assets of Bank. International Journal of Advance Research in Computer Science and Management Studies, january, 2(1), pp. 194-199.
4. M.S. Ramaratnam and R. Jayaraman (III), Determinants of Capital Structurewith Special Reference toIndian PharmaceuticalSector: Panel Data Analysis, Journal of Commerce and Accounting Research, Volume 2 Issue 4 October III (Self-cited reference)
5. Ramaratnam, M. S., & Jayaraman, R. (2010). A study on measuring the financial soundness of select firms with special reference to Indian steel industry–An empirical view with Z score. Asian Journal of Management Research, Online Open Access publishing platform for Management Research, 724-73. (Self-cited reference) www.rbi.org.in www.moneycontrol.com