
THE APPLICATION OF STANDARD MAGNITUDE VARIANCE IN OPTIMAL CAPITAL STRUCTURING /WORKING CAPITAL MANAGEMENT IN BUSINESS ORGANISATIONS

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Abstract

The study focused on the application of standard magnitude variance ratio analysis in optimal capital structuring and/or working capital management in Nigerian business organizations. The main objective of the study was to determine the applicability of standard magnitude variance model in ascertaining the probability of selectivity of best capital structure options within the business organizations. Data were collected from both primary and secondary sources. The data were thereafter analyzed using the study's model. One study hypothesis was formulated and tested using chi-square statistic. Findings had shown that STAMAVAR model can significantly be used to determine optimal level of firms' capital structure as compared to any other conventional method. Based on findings the study strongly recommended that business operators as well as investors should make effort to apply standard magnitude variance in the determination of their firms' optimal capital structure level vis-a-vis probability of selectivity of best or higher option.

As observed by Effiong, (2004) and Gupta (2002), with the growing size and ever-increasing competition, the problems of the business enterprises are becoming complex and they are using more and more statistical methods in decision-making, especially in key areas like pricing, capital structuring and management, investment decision, etc. However, the use of ~~Academic Excellence~~ in the solution of business problems belongs almost exclusively to the 20th century. Moreover, management has become a specialized job and a manager is called upon to plan, organize, supervise and control the operations of the business enterprise. Since very little personal contact is possible with customers these days, a modern business firm faces a much greater degree of uncertainty concerning future operations than it did when the size of business was usually small. A businessman who has to deal in an atmosphere of uncertainty can no longer adopt the method of trial and error in taking decisions. If he is to be successful in his decision-making, he must be able to deal systematically with the uncertainty itself by careful evaluation and application of statistical methods, concerning the business activities. Business indeed runs on estimates and probabilities. The higher the degree of accuracy of a businessman's estimates, the greater is the success attending on business. In recent years it has become increasingly evident that statistical methods have provided the businessman with one of his most valuable tools for decision-making in areas of capital structuring for optimal usage, pricing, etc.

However, it should be remembered that though statistical methods are extremely useful in taking decisions, they are not perfect substitute for commonsense. A practitioner of business statistics must, therefore, combine the knowledge of the business environment in which he operates

and its technological characteristics with a heavy dose of commonsense and ability to interpret statistical methods to non-statisticians (Gupta, 2002).

Conceptual Framework and Review of Related Literature Risk and Capital Structure Theory

Peltzman (1976) argues that managers of firms which are susceptible to political costs have incentives to undertake less risky investments. According to the Peltzman's argument, low-risk firms would tend to adjust their ratios towards the target more quickly (have higher partial adjustment coefficients (.), than would high-risk firms since the cost of being out of equilibrium for low-risk, high political cost firms is greater. For high political cost firms, the cost of being out of equilibrium (not adjusting to the target) could result in antitrust action, increased regulation, taxes, and possibly other wealth transfers. Since the Peltzman's hypothesis assumes that firms more susceptible to political costs tend to have higher expectation adjustment coefficients, (a), such a prediction is consistent with our normal predictions regarding the characteristics of firms most susceptible to political costs and with the stability of the target and information uncertainty arguments. Thus, low-risk firms tend to adjust their ratios towards the desired target more quickly and to adjust their expectations more rapidly than do high-risk firms.

A default on a debt contract is costly, so contracts that define a breach in terms of accounting numbers provide incentives to choose accounting procedures that reduce the probability of a breach. If a breach is expected to occur under one accounting method, managers could conceivably, switch procedures to avoid the breach. Thus, the existence of debt contracts may influence managers' operating decisions and choice of accounting procedures and resulting ratios.

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Ownership Control Theory

The disciplining effects of stockholders provide a motivation to smooth performance measures such as earnings and ratios. Unexpected poor performance may increase the probability of outside takeover (DeAngelo, 1988), firing, or salary reduction. Unexpected good performance may cause future performance to appear poor by comparison (Dhaliwal, Salamon and Smith, 1982). Numerous researchers (Gordon, 1964; Mosen and Downs, 1965; Schiff, 1966; Amuhud, Kamin & Ronen, 1975; Smith, 1976) have argued that management sensitivity to the disciplining effects of Stockholders will depend on the degree of management's ownership control. Thus, management with small ownership control has greater incentives to adjust performance measures, indicating larger ratio adjustment coefficients (.) and (a) for such firms.

Working Capital Management

Working capital supports and is necessitated by the operations of the fixed assets. Whenever a project involving investment in fixed assets is evaluated, therefore, an inclusion should be made for the additional investment in working capital, which is required. Only in this way can it be ensured that working capital earns an appropriate rate of return on the investment in it, as do other assets. Once a project is proceeding, its working capital merges with that of all other activities and separate monitoring becomes impossible. It is, therefore, necessary for the financial manager to exercise control over working capital as a whole (Raymond, 1992).

Working capital cycle is the total length of time between investing cash in paying for raw material at the start of the production process and its recovery at the end through cash collection from debtors.

Strategic Management and Capital Structure

A firm's capital structure refers to the mix of its financial liabilities. As financial capital is an uncertain but critical resource for all firms, suppliers of finance are able to exert control over firms (Steams and Mizruchi, 1994). Debt and equity are the two major classes of liabilities, with debt holders and equity holders representing the two types of investors in the firm. Each

of these is associated with different levels of risk, benefits and control. While debt holders exert lower control, they earn a fixed rate of return and are protected by contractual obligations with respect to their investments. Equity holders are the residual claimants, bearing most of the risk, and correspondingly, have greater control over decisions.

Questions related to the choice of financing (debt versus equity) have increasingly gained importance in management research. Some management researchers have viewed capital structure ~~Academic Excellence~~ from the preferences of various stakeholders such as managers, board of directors and institutional investors (Bushee, 1998). Other researchers have viewed capital structure as an antecedent to firm strategy, such as diversification into new businesses (David, Yoshikawa, Chari and Rasheed, 2006). While these studies have definitely contributed to some understanding of the linkages between firm performance and capital structure, they have largely ignored some basic issues confronting researchers and managers alike, namely: does it matter how firms finance their assets? And do different modes of financing make a difference? (Kochhar, 1994).

The debt-to-equity ratio of a firm determines how cash flows will be shared between debt holders and equity holders. In other words, if firms are set up to maximize equity holders' wealth, then the proportion of cash flows disbursed to debt holders becomes important. The different types of financing, however, are also associated with different levels of costs. An examination of the net benefit of a firm's assets should incorporate these cost differences along with value of such assets (O'Brien, 2000).

Strategic Assets, Firm Specificity and Capital Structure

Resource-based theorists have developed certain characteristics of assets that generate sustained competitive advantage, naming them as strategic assets. One common feature underlying the various descriptions of strategic assets is their steady specific nature. Balakrishnan and Fox (1991), proposed that in addition to being valuable, resources should possess the key attributes of being rare, imperfectly imitable and non substitutable. Simerly and Li (2000), argued that these assets are non-tradable and non-substitutable. Strategic assets of a firm are often invisible. A firm succeeds by developing strategies that cultivate its unique core competencies or build on its dominant logic (Harris and Raviv, 1991). That is, for superior performance, these strategies exploit a firm's strategic assets. The conditions of imperfect mobility and imperfect tradability imply that no other user exists which can realize the same level of rents from the strategic assets as the current firm. Moreover, the greater the value of certain assets to that firm, the higher is their degree of firm-specificity (Helfat, 1998). Thus, a firm with a sustained competitive advantage gains value through the possession of rent-generating specific assets. The financing decision-mix of debt and equity represents a fundamental issue faced by financial managers of a firm. The study of capital structure has traditionally been carried out by finance researchers. Modigliani and Miller (1958) were the first to raise the question of the relevance of capital structure for a firm. They argued that, under certain conditions, the choice between debt and equity does not affect firm value and hence, the capital structure decision is "irrelevant." The conditions under which the irrelevant proposition holds include, among others, assumptions such as no taxes, no transaction costs in the capital market, and no information asymmetries among various market players.

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Standard Magnitude Variance and Optimal Capital Structure Level

Standard magnitude variance which has an acronym of STAMAVAR, is a statistical measure of the extent of variability or scatter of data values about their means or averages. It measures the difference between the estimated values and actual values in an estimated particular

population and gives the reciprocal of the level of precision of the measurement of coefficient for observing the effect of an independent variable (x) on a dependent variable (y). Thus, describing how well the distribution is known or determined (Akpan, 2001). This model was developed with the primary purpose of determining the response pattern of subjects on test items of unequal scales such as essay test where there is no absolute zero in the response values.

To determine optimal level of capital structure in business organization's performance evaluation is very important and pertinent in business analysis as reviewed earlier on. For example, if in about five years, a business organization had the same total values in three different business variables that measure its debt, equity and profitability as hypothetically shown below:

Table 1.
Average % level of core business variables (Debt, Equity and Profit) used for the analysis.

Years	Debt level (%)	Equity level (%)	Profit level (%)	Total values	Optimal index
1	9	6	5	20	.364
2	8	6	6	20	.353
3	7	7	6	20	.349
4	6	7	7	20	.354
5	5	7	8	20	.381*

* Qualified for selection for best/optimal capital structure and profit level.

Source: Akpan (2001:75)

Research Method

Research Design

The research design adopted for this study was survey-inferential. This design was preferred primarily because it is concerned with identifying the actual situation and establishing the relationship existing among variables. The study surveyed capital structures of firms, as well as their profitability (performance) in order to determine the applicability of standard magnitude variance (STAMAVAR) in the ascertainment of optimal capital level and performance of firms. The survey was limited to petroleum organizations operating in Calabar Metropolis. Their investment and income records as kept by the Ministry of Commerce and Industries as well as Federal Office of Statistics were examined to obtain the relevant data. Also questionnaires were developed and administered on respondents in these firms.

Population, Sample Size and Sampling Technique

The population of study comprises of fifty-five petroleum firms that are operating in Calabar Metropolis, of these thirty firms were purposively selected for the study.

Model Specification

The model that was used in this study is the standard magnitude variance (STAMAVAR) model, which was used to test for independence of the variable.

$$\text{Optimal Index} = \sum_{i \text{ or } j=1} \phi_{ij}$$

And

$$\phi_{ij} = \sqrt{\frac{\sum (x_i - a_i)^2 \times (x_i - a_i)^2}{(\sum A_j - \sum a_i)^2 (\sum A_i - \sum a_i)^2}}$$

Where

X_i = Maximum expected value

a_i = Observed value

$\sum A_j$ = Total maximum expected value along row cell (all variables, Debt, equity and profit).

$\sum a_j$ = Total observed value along row cells (all variables, debt, equity and profit)

$\sum A_i$ = Total maximum expected value along column (all organizations).

$\sum a_j$ = Total observed value along column (all organizations).

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Table 2:

5 years Average Capital Structure (Debt/Equity), Profit & Optimal Index for Petroleum Organizations in Calabar Metropolis.

S/N	5 years Average Debt (N,000,000)	5 years Average Equity (N,000,000)	5 years Average profit (N,000,000)	Total (N,000,000)	Average (N,000,000)	Optimal Index
1	13.8	275.7	289.4	578.9	193.0	0.0148194
2	13.8	275.0	288.4	577.2	192.4	0.148185
3	12.5	276.9	289.4	578.9	193.0	0.0155685
4	2.2	42.9	45.0	90.0	30.0	0.0121919
5	2.3	45.9	48.2	96.5	32.0	0.0133975
6	6.9	137.8	144.7	289.4	96.5	0.0140472

7	11.5	229.7	241.2	482.4	160.8	0.0139758
8	3.5	68.9	72.4	144.7	48.2	*0.4673796
9	13.8	275.6	289.4	578.9	193.0	0.0163079
10	30.0	297.2	627.1	716.8	239.0	0.0313143
11	35	597.2	85	20	200.0	0.0011645
12	35	60	60	85	200.0	0.0161383
13	30	20	80	70	200.0	0.0284059
14	45	20	80	200	66.7	0.0249687
15	85	55	60	200	66.7	0.0038471
16	45	95	60	200	66.7	0.215795
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17	80	75	45	200	66.7	0.0398620
18	75	35	90	200	66.7	0.0085439
19	29	51	120	200	66.7	0.0935615
20	128	36	36	200	66.7	0.0510663
21	35	85	80	200	66.7	0.0079614
22	25	90	85	200	66.7	0.0355618
23	40	124	36	200	66.7	0.0863223
24	60	50	90	200	66.7	0.0437686
25	75	45	80	200	66.7	0.0335623
26	35	120	45	200	66.7	0.0138558
27	60	56	84	200	66.7	0.0359910
28	58	82	60	200	66.7	0.018698
29	90	60	50	200	66.7	0.0176143
30	70	82	48	200	66.7	0.0319314

Source: Field survey and Computation, 2011

- The Optimal values/indices were calculated using STAMVAR model specified above.
- Higher index means best capital structure option and higher probability of selectivity for possible combination.

Chi-square Test on Null Hypothesis of the Study

1. H_0 : STAMAVAR does not significantly determine the optimal level of firms' capital structure as compared to any other conventional method.
2. H_1 : STAMAVAR significantly determines the optimal level of firms' capital structure as compared to any other conventional method.
3. Decision Rule: Accept the null hypothesis (H_0) if the calculated $X^2 < X^2_{n-i}$ at 5% level of significance.

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The observed values are as obtained from the research questionnaires administered to 30 business operators in the Petroleum firms in Calabar Metropolis to seek their opinions on the use of STAMAVAR model as a statistical technique to determine optimal level of firms' capital structure. The business operators were allowed the options of six different opinions, ranging from Very Strongly Agree (VSA), Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD), to Very Strongly Disagree (VSD). Each of the expected values = $\frac{30}{6} = 5$

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Table 3
Chi-Square Values for Testing the Study Hypothesis

Variable	Observed (O)	Expected	O-E	(O-E) ²	(O-E) ² /E
VSA	5	5	0	0	0
SA	5	5	0	0	0
A	11	5	6	36	7.2
D	4	5	-1	1	0.2
SD	5	5	0	0	0
VSD	0	5	-5	25	5
Total	30	30			12.40

Source: Field survey and computation, 2011

$$X^2_{n-1} \geq \frac{\sum(O-E)^2}{E} = 11.07 \text{ at } 0.05 \text{ level}$$

Our calculated X^2 value = 12.40 and lies within the rejection region since $X^2_c > X^2_{n-i}$. Hence, we reject H_0 and conclude that STAMAVAR model significantly determines the optimal level of firms' capital structure as compared to any other conventional method.

Discussion

It has been observed through this study that some of the selected business organizations over the years, have not been able to withstand the problems of liquidity very favourably compared to others within the industrial sector, due probably to lack of optimal capital structure or poor capital structure, which by implication means high operating expenses and a high cost of leveraging, which eventually reduced profit. Traditionally, managers and operators of business firms strictly adhere to the use of financial ratios without taking into consideration the limitations of such ratios and the consequential effects of this action on the business operations and performance.

Conclusion

Based on the findings of the study, it was concluded that STAMAVAR model can significantly be used to determine the optimal level of firms' capital structure as compared to any other conventional method. Again when using the model, the higher index means best option among the alternatives and a higher probability of selectivity for possible action.

Recommendation

In view of the sensitivity with which STAMAVAR model has shown in determining the optimal capital structure of firms and the probability of selectivity of the most viable options when making business decisions involving many business variables/factors, the study was concluded by recommending that business operators and investors should adopt this model in taking statistical decisions in their businesses.

References

- Akpan, S.M. (2001). *Principles of research and statistics: An introductory approach*. Enugu, Nigeria: Executive Publishers. Pp. 75.
- Amihud, Y., Kamin, J. & Ronen, J. (1975). Managerialism and ownerism in risk-return preferences. *Ross Institute of Accounting Research, Working Paper* pp. 74-75, New York University.
- Balakrishnan, S. & Fox, I. (1991). Asset specificity, firm heterogeneity and capital structure. *Strategic management Journal*. 14:3-16.
- Bushee, B. (1998). The influence of institutional investors on Myopic R & D investment behaviour. *Accounting Review*, 73:305-333.
- De Angelo, I.E. (1988). Managerial competition, information costs, and corporate governance. *Journal of Accounting and Economics*, 3: 3-36.
- Dhaliwal, D., Salamon. G. & Smith, E. (1982). The effect of Owner Versus Management Control on the choice of accounting methods. *Journal of Accounting and Economics*, 7: 41-53.
- David, P.; Yoshukawa, T.; Chari, M. & Rasheed, A. (2006). Strategic Investments in Japanese Corporations; Do Foreign Portfolio Owners foster underinvestment or appropriate investment? *Strategic Management Journal*, 27:591-600.
- The Application of Standard Magnitude Variance...*
- Effiong, S.A. (2004). *Mathematics for business decisions*. Calabar: Wusen Publishers. Pp. 234.
- Gordon, M. (1964). Postulates, principles and research in accounting. *The Accounting Review*, 4: 251 - 253.

- Gupta, S.P. (2002). *Statistical methods*. New Delhi: Sultan Chard and Sons. Pp. 14.
- Helfat, C. E. (1998). Firm specificity in corporate applied research and development. *Organization Science*, 5:173-184.
- Harris, M. & Raviv, A. (1991). The theory of capital structure. *Journal of finance*, 46:297 - 335.
- Kochhar, R. (1994). Explaining firm capital structure. The role of agency theory Vs transaction cost economic *Strategic Management Journal*, 17:713 - 728.
- Monsen, R. & Down, A. (1965). A theory of large managerial firms. *The Accounting Review*, 4: 358 - 377.
- Mizruchi, M. & Steams, L. B. (1994). A longitudinal study of borrowing by large American Corporations. *Administrative Science Quarterly*, 39 (1): 118 - 140.
- Modigliani, F. & Miller, M. (1958). The cost of capital, corporate finance and the theory of investment. *American Economic Review*, 48: 261 - 297.
- O' Brien, J. (2000). The capital structure implication of pursuing a strategy of innovation. *Strategic Management Journal*, 24: 415 - 431.
- Peltzman, S. (1976). Toward a more general theory of regulation. *Journal of law and Economics*, 19 (8), 211 - 240.
- Raymow, B. (1992). *Financial management*. London, D.P. Publication Limited, Shepherds Brush Green.
- Simerly, R.L. & Li, M.F. (2000). Environmental dynamism, capital structure and performance: A theoretical integration and empirical test. *Strategic Management Journal*, 21:31-49.
- Schiff, M. (1995). The determinants of antitrust activity. *Journal of Accounting Research*, Spring, 62 - 67.
-
- Academic Excellence***
- Smith, C. W. & Warner, J. B. (1979). On financial contracting: An analysis of bond Covenants. *Journal of Financial Economic*, 7 (6): 117 - 161.
- Smith, E. (1976). The effect of the separation of ownership from control on accounting policy decisions'. *The Accounting Review*, 10: 707 - 723.