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The Relationship between Capital Structure and Profitability of the Limited Liability Companies

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Abstract: *Capital structure is very important, especially the decision which concern with this problem, because the profitability of a company is directly affected by such decision. The successful choice and use of capital is one of the key components of the enterprises financial strategy. This means that it is the vital to pay attention and proper care capital structure. The aim of this paper is to investigate the relationship between capital structure and profitability of the limited liability companies from an agricultural sector in the Czech Republic over the past six year period from 2008 to 2013. Data was obtained and processed from the database of enterprises of Albertina and was analyzed by using descriptive statistics, i.e. mean, median, variation range, standard deviation, coefficient of variation, skewness, kurtosis, and correlation analysis to find out the association between the variables. The results of this paper describe a small negative correlation between the debt ratios and profitability ratios.*

Key words: Capital structure, profitability, limited liability companies, statistics, correlation.

JEL classification: G32, Q14

1 Introduction

Capital structure is one of the most used terms in corporate finance literature (Brounen, Eichholtz, 2001). This concept can be described as the combination of debt and equity that make the total capital of firms. The proportion of debt to equity is an important choice of managers because the capital structure decision is the vital one since the profitability of a company is affected by such decision.

It is important to find out an optimal capital structure. The enterprises that are situated too far from the optimum faced greater risk of failure. The enterprises make efforts to increase leverage when they face growth opportunities or when poor performances reduce equity value. The enterprises could gain advantage when rapid growth reduces financial slack. With unplanned capital structure, enterprises may fail to economize the use of their funds. Consequently, it is being increasingly realized that an enterprise should plan its capital structure to maximize the use of funds (Pandey, 2009). One of the financial decisions which facing enterprises are the choice between debt and equity capital (Glen, Pinto, 1994)

The aim of enterprises is the maximization of wealth or value of these companies (Modigliani, Miller, 1958, 1963; Miller, 1977). The analysis of relationship between capital structure and profitability was subject over the past decade throughout the irrelevance theory. Miller and Modigliani (1958) presented the theory of irrelevance, where they argued that capital structure is unrelated to firm's value. They (Modigliani, Miller, 1963) said that the market value of the firm is positively related to the amount of long term debt used in its capital structure. On the contrary, Brander and Lewis (1986) and Maksimovic (1988) observed that the objective of enterprises is to maximize the

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wealth of shareholders and they show that market structure affects capital structure by influencing the competitive behavior and strategies of companies.

Most of the studies found out a negative relationship between profitability and leverage. For example Titman and Wessels (1988) found that enterprises with high profit levels want to maintain relatively lower debt levels since they can realize such funds from internal sources. In addition, Kester (1986) contend that there is a negative relation between profitability and debt to asset ratios. Rajan and Zingalas (1995) confirmed a negative correlation between profitability and leverage too, in their study. Although some authors have a different opinion. These authors find out a significant positive relationship between profitability and debt levels. Such as Taub (1975) who find out a positive association between debt and profitability, he used regression analysis in his work. Abor (2005) observed a significantly positive relationship between total debt and profitability too. It follows that there are need more empirical researches. An important thing for enterprises is to know whether increase debt or increase equity.

Peterson and Rajan (1994) found out a positive association between profitability and debt ratios in their work. Abor (2005) said that there is a positive relationship between the ratios of short term debt to total assets and profitability but a negative association between the ratio of long term debt to total assets and profitability. Margaritis and Psillaki (2010) have reported the relationship between capital structure, ownership structure and firm performance across different industries using a sample of French manufacturing firms. They investigated that there is a negative relationship between past profitability and leverage and there will be a positive relation between profitability and leverage.

The main aim of this paper is to analyze the relationship between capital structure and profitability of the limited liability companies in the Czech Republic for time series 2008 to 2013, using the statistical and correlation analysis.

The objective is the following:

i) To find out the relationship between capital structure and profitability.

2 Materials and methods

Data were obtained from the database of enterprises Albertina for time series 2009 to 2013. There were analyzed 706 limited liability companies with focusing on crop and agriculture production. In order to be able to generalize about the research finding to the population, it is necessary to select samples of sufficient size (Jankowicz, 2005). A large sample size will in general improve the quality of the research. Saunders, Lewis and Thornhill (2009) highlighted that the larger the sample size, the lower the likely error in generalizing.

Capital structure is measured with the two ratios – Debt to equity ratio (D/E) and Debt to assets ratio (D/A). Profitability is measured with the four ratios – Interest coverage ratio (ICr), Gross profit ratio (GPr), Net profit ratio (NPr) and Return on capital employed (ROCE).

Debt to equity ratio (Leavy, 2004) is a financial ratio that indicates the relative proportion of shareholders' equity and debt which is used to finance a company's assets. It can be calculated as total liabilities divided by total equity.

Debt to assets ratio (Welch, 2011) is the debt plus equity equals assets. Ratio shows the proportion of a company's assets. The enterprises with high debt could be in danger if creditors start to demand repayment of debt. It can be calculated as total liabilities divided by total assets.

The formula for the interest coverage ratio (Faulkender, Wang, 2006) used to measure a company's earnings relative to the amount of interest. It can be calculated as earnings before interest and taxes divided interest expense.

Gross profit ratio (Peterson, Fabozzi, 1999) is important for business. It should be sufficient to cover all expenses and moreover provide for profit. It can be calculated as gross profit divided by net sales.

According to the net profit ratio (Guthmann, Dougall, 1955), net profit is equal to gross profit minus operating expenses and income tax. Net profit ratio is a useful tool to measure the overall profitability of the enterprises. It can be calculated as net profit after tax divided by net sales.

Return on capital employed (Gill, Biger, Mathur, 2011) measures a company's profitability and the efficiency with which its capital is employed. The capital employed is the sum of shareholders' equity and debt liabilities. It can be calculated as earnings before interest and taxes divided by total assets minus current liabilities.

Statistical analysis is used to describe an account for the observed variability in the data. The purpose of statistics is to summarize and answer questions that were obtained in the research. The upper level of statistical significance for testing of hypotheses was set at 5 %. Statistical analysis involves descriptive and inferential statistics. Descriptive statistics is used to describe and summarize the behavior of the variables. Inferential statistics are used to draw conclusions about the reliability of the findings. In order to test the research hypotheses, there is used the correlation analysis (Anderson, 2011).

Mean, median, variation range, standard deviation, coefficient of variation, skewness and kurtosis belong to the descriptive statistics (Lewis, 2012; Bachman, 2004).

Variation range identifies the lowest, i.e. minimum, and highest, i.e. maximum, values among the observations of the variable.

Indicators of shape are skewness and kurtosis. It is an asymmetry of the probability distribution of a random variable about its mean.

The standard deviation is used to quantify the amount of variation or dispersion of a set of data value:

$$s = \sqrt{s^2} = \sqrt{\frac{\sum(X_i - \bar{X})^2}{n-1}}$$

The coefficient of variation measures relative dispersion by calculating an unit-less number that is defined as the ratio of variable′s standard deviation divided by its arithmetic mean:

$$CV = \frac{s}{\bar{X}} \cdot 100$$

A first-order serial correlation coefficient is:

$$r = \frac{\sum_{t=2}^{T} y_t y_{t-1}}{\sum_{t=1}^{T} y_t^2}$$

A serial correlation is a measurement of serial dependence in a sequence of observation that is similar to the measurement of dependence between two sets of observations x and y as furnished by the usual product-moment correlation coefficient, when the means are assumed zero.

$$r = \frac{\sum_{n=1}^{N} yy}{\sqrt{\sum_{i=1}^{N} x_i^2} \sqrt{\sum_{i=1}^{N} y_i^2}}$$

In this article were formulated the following minor hypotheses:

i) H1: There is a negative relationship between Debt to equity and Net profit/Gross profit.

ii) H2: There is a negative relationship between Debt to equity and Return on capital employed.

iii) H3: There is a negative association between Debt to equity and Interest coverage ratio.

iv) H4: There is a negative relationship between Debt to total assets and Net profit/Gross Profit.

v) H5: There is a negative relationship between Debt to total assets and Return on capital employed.

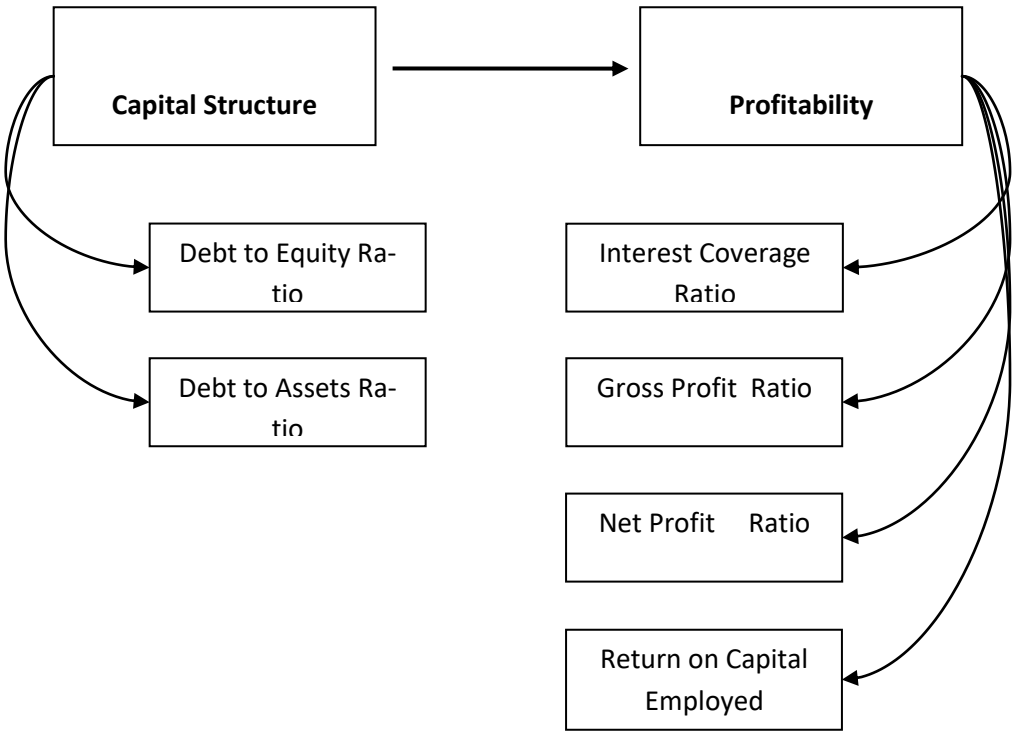
vi) H6: There is a negative association between Debt to total assets and Interest coverage ratio.

The first three hypotheses were formulated by Velnampy and Niresh (2012).

According to the research questions, which were put above, the conceptual model can be constructed. This model of capital structure combines that the profitability is a function of debt to equity and debt to total funds in the capital structure.

Figure 1

Conceptual model



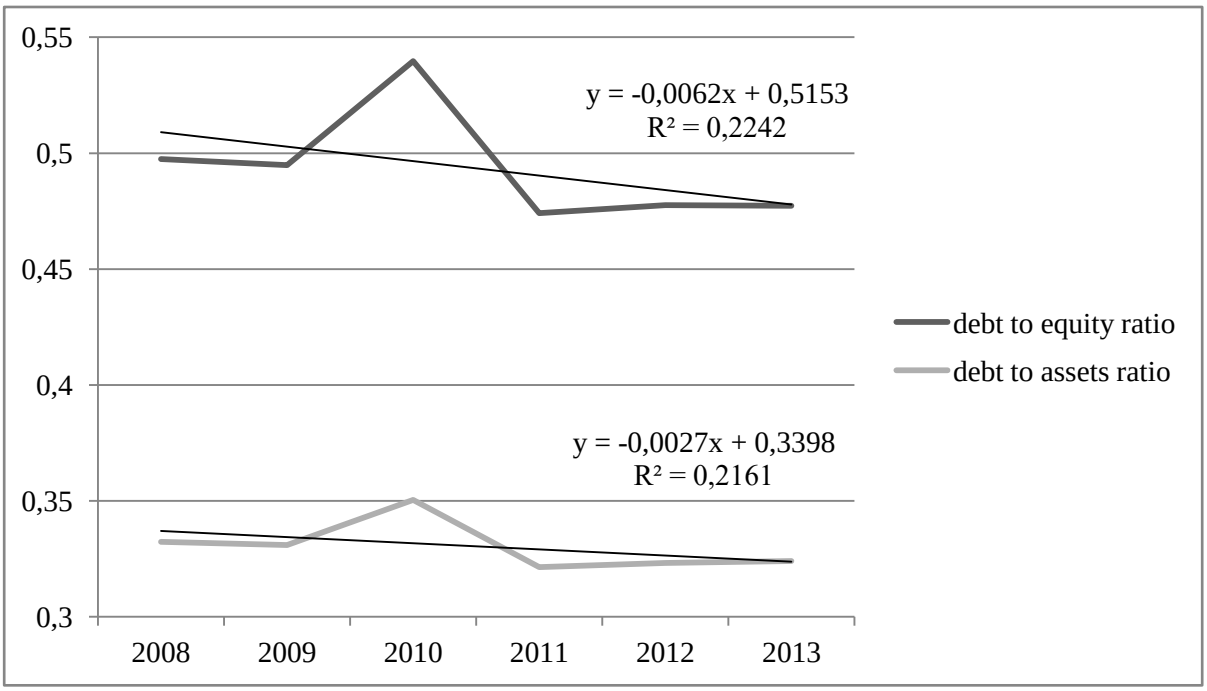
Source: Own processing

3 Results and discussion

This section presents the results of the paper analysis. Firstly, the descriptive statistics are stressed.

The graphs no. 1 and no. 2 describes the development of the ratios in time during the monitored period of 2008-2013. The graph no. 1 is devoted to the first two ratios, i.e. the debt to equity ratio and the debt to assets ratio. Both the debt to equity ratio and the debt to assets ratio increased in 2010 the most and decreased in 2011 the most during the monitored period. The decreasing trend for both ratios is not very clear because last two years of the monitored period there is a small increasing trend. The extreme values in the year 2010 can be the effect of the crisis and also the small increasing trend in the end of the period can be explained by a slow loosing of the strict financial debt management. Other factors might play crucial role in affecting the financial results of the limited liability companies in the agricultural sector, mainly the agro-environmental and weather conditions. However, the values generally are far below the optimal value that equals one. (Brigham, Ehrhardt, 2013).

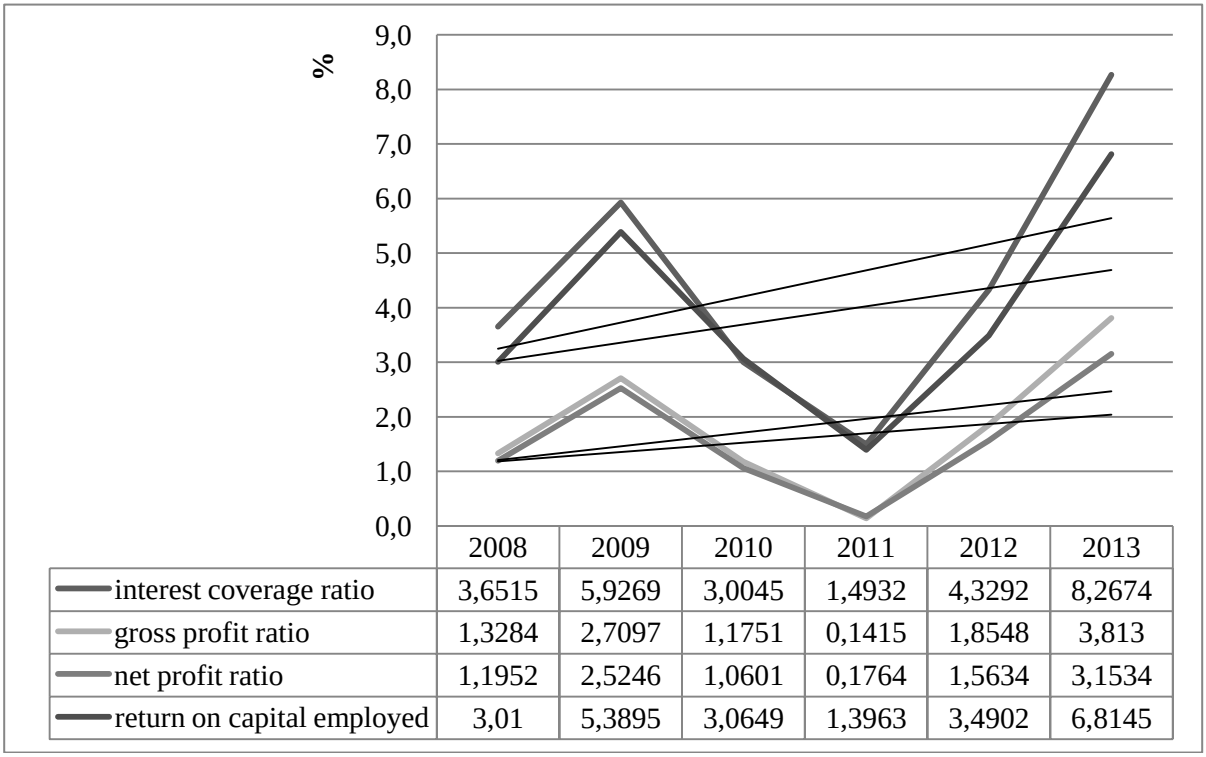
Graph 1
The debt to equity ratio and the debt to assets ratio, 2008-2013



Source: Own processing

The graph no. 2 contains the development of the calculated values of the rest of the financial indicators, i.e. interest coverage ratio, the gross profit ratio, the net profit ratio and the return on capital employed ratio. Also in this graph there can be find a year when the values for those ratios increased the most and a year when the values decreased the most. All the ratios reach the highest value in 2013 and the lowest value in 2011 during the monitored period. There is an increasing trend for those ratios, mainly quite high in last two years of the monitored period there. The extreme low values in the year 2011 cannot be marked as an effect of the crisis; rather it might be an effect of other negative effects of harvest results or other agro-environmental conditions. When comparing to the other sectors of the economy the profitability ratios are lower that could be a reason for subventions.

Graph 2
The interest coverage ratio, the gross profit ratio, the net profit ratio and the return on capital employed ratio, 2008-2013



	2008	2009	2010	2011	2012	2013
interest coverage ratio	3,6515	5,9269	3,0045	1,4932	4,3292	8,2674
gross profit ratio	1,3284	2,7097	1,1751	0,1415	1,8548	3,813
net profit ratio	1,1952	2,5246	1,0601	0,1764	1,5634	3,1534
return on capital employed	3,01	5,3895	3,0649	1,3963	3,4902	6,8145

Source: Own processing

The first two tables show the descriptive statistics of the data analyzed in this paper.

The table no. 1 contains the mean, median, minimum, maximum and a variation range values for the respective ratios during the monitored period of 2008-2013. The mean is higher than the median for all calculated ratios that means that there are some extreme values in the data. When searching in the data set the year that reports those extreme high values are registered in 2010 for the debt ratios and 2013 for the interest coverage ratio and the profitability ratios, i.e. the gross profit ratio, the net profit ratio and the return on capital employed ratio. The highest variation range is the one for the interest coverage ratio and the lowest are those for debt to assets ratio and net profit ratio. However, this does not testify very much about the true variability of the variable because it is influence by the actual nominal value of the variable. The C.V. is a better statistical characteristic to see the true variation of the variable.

Table 1
Descriptive Statistics, using the observations 2008-2013

Variables	Mean	Median	Minimum	Maximum	Var. range (max-min)
D/E	0.4935	0.4862	0.4742	0.5397	0.0655
D/A	0.3304	0.3275	0.3215	0.3505	0.0290
ICr	4.4454	3.9903	1.4932	8.2674	6.7742
GPr	0.0184	0.0159	0.0014	0.0381	0.0367
NPr	0.0161	0.0138	0.0018	0.0315	0.0298
ROCE	0.0386	0.0328	0.0140	0.0681	0.0542

Source: Own processing

The table no. 2 lists the values of standard deviation, the coefficient of variation (C.V.), the skewness and the ex. kurtosis for all the ratios used in this paper. The highest standard deviation is the one for the interest coverage ratio and the lowest ones are those for the debt to assets ratio and net profit ratio. The high standard deviations are usual in the agribusiness due to specific characteristics of agriculture and its dependence mainly on weather and other agro-environmental conditions. The coefficient of variation (C.V.) as the ratio of the standard deviation to the mean is better statistical characteristic to describe the variation of the variable. The highest value of C.V. is the one for gross profit ratio and net profit ratio and the lowest ones are those for the debt ratios. As stressed above the profitability variation is so high thanks to the variability of the agricultural output and thus its returns. However, the values of C.V. are below 1 that means low variability during the monitored period. Also the values of skewness show a low or no asymmetry of profitability ratios close to normal distribution and higher asymmetry of debt ratios. The negative excess kurtosis for the profitability ratios and the interest coverage ratio means bigger positive and negative returns.

Table 2
Descriptive Statistics, using the observations 2008-2013

Variables	Std. Deviation	C. V.	Skewness	Ex. kurtosis
D/E	0.0247	0.0499	1.2129	0.1287
D/A	0.0108	0.0326	1.1869	0.0965
ICr	2.3765	0.5346	0.4873	-0.7512
GPr	0.0128	0.6987	0.3193	-0.8474
NPr	0.0107	0.6652	0.2167	-1.0570
ROCE	0.0193	0.4999	0.4019	-0.9357

Source: Own processing

The table no. 3 sums up the results of the correlation analysis. The coefficients of correlations were calculated among all of the ratios analyzed in this paper. The very high positive correlation coefficients between the profitability ratios, i.e. the gross profit ratio, the net profit ratio and the return on capital employed, and the interest coverage ratio is set by the definitions of those ratios. The same is true for the high positive correlation coefficients between the debt ratios, i.e. the debt to equity ratio and the debt to assets ratio.

The very low negative correlation between the profitability ratios and debt ratios seems to mean a low effect of the debt structure and its changes on the profitability of the limited liability companies in the Czech agricultural sector.

Table 3
Correlation matrices for capital structure and profitability (Pearson Correlation), 5% critical value (two-tailed) = 0.8114

Variables	D/E	D/A	ICr	GPr	NPr	ROCE
D/E	1.0000	0.9992	**-0.2424**	**-0.1966**	**-0.1703**	**-0.1372**
D/A		1.0000	**-0.2099**	**-0.1650**	**-0.1399**	**-0.1056**
ICr			1.0000	0.9970	0.9898	0.9895
GPr				1.0000	0.9956	0.9930
NPr					1.0000	0.9949
ROCE						1.0000

Source: Own processing

4 Conclusion

The financial and economic crisis lowers the debt to assets ratio and the debt to equity ratio, but during the recovery period this development changes and it becomes to increase. Also the recovery period of last two years has a higher positive effect on the profitability ratios that increase the most in 2013, i.e. the end year of the monitored period.

The profitability ratios, i.e. the gross profit ratio and the net profit ratio, vary the most during the monitored period according to the values of the coefficient of variation. On the other hand, the debt ratios, i.e. the debt to equity ratio and the debt to assets ratio, vary the least during the monitored period according to the coefficients of variation. Thus the profitability variation might be so high thanks to the variability of the agricultural output and thus its variable returns.

The results for correlation analysis of the data for limited liability companies in the agricultural sector approve a little the hypotheses relating to the correlation among the selected financial indicators. The table no. 4 highlights the hypotheses of this paper and adds the information about the validity of the statements. The correlation coefficients between the ratios stated in the hypotheses are very low, nearly close to zero and they are not statistical significant.

Table 4
Tested hypotheses

Number	Hypotheses	Results
H1	There is a negative relationship between Debt to equity and Net profit/Gross profit.	True
H2	There is a negative relationship between Debt to equity and Return on capital employed.	True
H3	There is a negative association between Debt to equity and Interest coverage ratio.	True
H4	There is a negative relationship between Debt to total assets and Net profit/Gross profit.	True
H5	There is a negative relationship between Debt to total assets and Return on capital employed.	True
H6	There is a negative association between Debt to total assets and Interest coverage ratio.	True

Source: Own processing

The paper tries to contribute to the financial analysis of the agricultural companies and to evaluate and describe the capital structure of the limited liability companies in agricultural sector. The paper also tries to uncover the relationship of the debt ratios and profitability ratios as a proxy to the relationship between the capital structure and profits of the analyzed companies. However, more structured and complex analysis should be processed to fully analyze the financial condition of the limited liability companies.

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References

Abor, J. (2005). The Effect of Capital Structure on Profitability: An Empirical Analysis of Listed Firms in Ghana. *Journal of Risk Finance*, 6(5), 438-445.
Anderson, T. W. (2011). *The Statistical Analysis of Time Series.* New York: John Wiley & Sons.
Bachman, L. F. (2004). *Statistical Analyses for Language Assessment.* Cambridge: Cambridge University Press.
Brigham, E. & Ehrhardt, M. (2013). *Financial Management – Theory & Practice.* 14th ed. Mason: Cengage Learning.
Brander, J. A. & Lewis, T. R. (1986). Oligopoly and Financial Structure: The Limited Liability Effect. *American Economic Review*, 76(5), 956-970.
Brounen, D. & Eichholtz, P. M. A. (2001) Capital Structure Theory: Evidence from European Property Companies′ Capital Offerings. *Real Estate Economics*, 29(4), 615-632.
Margaritis, D. & Psillaki, M. (2010). Capital Structure, Equity ownership and Firm Performance. *Journal of Banking & Finance*, 34(3), 621-632.

Faulkender, M. & Wang, R. (2006). Corporate Financial Policy and the Value of Cash. *Journal of Finance*, 61(4), 1957-1990.
Gill, A., Biger, N. & Mathur, N. (2011). The effect of capital structure on profitability: Evidence from the United States. *International Journal of Management*, 28(4), 3-15.
Glen, J. D. & Pinto, B. (1994). *Debt or Equity? How Firms in Developing Countries Choose.* Washington: World Bank Publications.
Guthmann, H. G. & Dougall, H. E. (1955). *Corporate Financial Policy*, 3th ed. New York: Prentice-Hall.
Kester, W. C. (1986). Capital and Ownership Structure: A Comparison of United States and Japanese Manufacturing Corporations. *Financial Management*, 15(1), 5-15.
Jankowicz, A. D. (2005). *Business Research Projects.* 4th ed. Hampshire: Thomson Learning.
Leavy, A. M. (2004). Indexing Distributions of Data: Preservice Teachers' Notions of Representativeness. *School Science and Mathematics*, 104(3), 119-134.
Lewis, M. (2012). *Applied Statistics for Economists.* New York: Routledge.
Maksimovic, V. (1988). Capital Structure in Repeated Oligopolies. *RAND Journal of Economics*, 19(3), 389-407.
Miller, M. H. (1977). Debt and Taxes. *Journal of Finance*, 32(2), 261-275.
Modigliani, F. & Miller, M. H. (1958). The Cost of Capital Corporation Finance and the Theory of Investment. *American Economic Review*, 48(3), 261-297.
Modigliani, F. & Miller, M. H. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *American Economic Review*, 53(3), 433-443.
Pandey, I. M. (2009). Capital Structure Planning and Policy. *Financial Management*, 332-333.
Peterson, P. P. & Fabozzi, F. J. (1999). *Analysis of Financial Statements.* 1st ed. New York: Wiley.
Peterson, M. A. & Rajan, R. G. (1994). The Benefits of Lending Relationship: Evidence from Small Business Data. *Journal of Finance*, 49(1), 3-37.
Rajan, R. G. & Zingalas, L. (1995). What Do We Know about Capital Structure? Some Evidence from International Data. *Journal of Finance*, 50(5), 1421-1460.
Saunders, M., Lewis, P. & Thornhill, A. (2009). *Research Methods for Business Students.* 5th ed. Harlow: Prentice Hall.
Taub, A. J. (1975). Determinants of the Firm′s Capital Structure. *Review of Economics and Statistics*, 57(4), 410-416.
Titman, S. & Wessels, R. (1988). The Determinants of Capital Structure Choice. *Journal of Finance*, 43(1), 1-19.
Velnampy, T. & Niresh, J. A. (2012). The Relationship between Capital Structure & Profitability. *Global Journal of Management and Business Research*, 12(13), 66-73.
Welch, I. (2011). Two Common Problems in Capital Structure Research: The Financial-Debt-To-Asset Ratio and Issuing Activity Versus Leverage Changes. *International Review of Finance*, 11(1), 1-17.