

The Effect of Capital Structure on Profitability of Energy American Firms:

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ABSTRACT : *This paper empirically aims to analyze the effect of capital structure on financial performance. Two main sets of variables were used: For profitability, return on assets (ROA) as the ratio of net income to total assets, and return on equity (ROE) as the ratio of net income to total shareholders' equity were adopted as a proxy for financial performance; and to indicate capital structure, short-term debt, long-term debt, total debt, debt to equity ratio, and firm's size were used. A sample of 30 Energy American firms for a period of nine years from 2005 – 2013 was considered. Secondary data were collected from financial statements which were taken from Mergent online. The data were analyzed by using Smart PLS (Partial Least Square) version 3. Multiple regressions indicated that 10% of ROE and 34% of ROA were predicted by the independent variables. Findings also presented that the total debt has a significant negative impact on ROE and ROA, while size in terms of sales has significantly negative effect only on ROE of the American firms. However, a short debt significantly has a positive influence on ROE. An insignificant either negative or positive relationship was observed between long term debt, debt to equity and size in terms of total assets and profitability. A generalization of the results is limited because of the small sample size. For future research, the author suggests addressing a longer period of time with a large sample size of firms. It would be more accurate if future studies included more independent variables such as taxation and concentration.*

KEYWORDS: *Financial Performance, Capital Structure, Leverage, Return on Equity, Return on Assets, and Profitability.*

I. INTRODUCTION

The capital structure is defined as the combine of debt and equity that the firm utilizes in its operation. It is very commonly known that the value of a firm can be maximized by minimizing its capital cost. Therefore, one of the major goal in current strategic management is to identify the optimal capital structure. The optimal capital structure is existed when the debt and equity can be combined to reduce the cost of capital and enhance the firms' profitability. If this did not happen, and firm's manager failed to manage it properly then it is reasonable to expect that the firm's capital structure would affect firm's growth and profitability which will further escort to financial distress and finally firms can go bankrupt. Researchers in finance have never yet find a model to determine an optimal capital structure despite the fact that there are many theories tried to explain the capital structure (Gill et al., 2011, P. 3). A number of these theories explain the relationship between cost of capital, and value of the firm. It has been argued that that firms with a high growth rate have a high debt to equity ratio, and it was observed that bankruptcy costs (peroxide by firm size) has an important effect on capital structure (Zeituna and Tianb, 2007).

This discussion on the importance of capital structure management, its various components and their impact on profitability leads the author to examine the relationship between capital structure and profitability of the 30 Energy American firms for the nine-year period between 2005 – 2013. Several factors play an important role directly or indirectly in effecting profitability. In this research, and after going through the literature review, profitability is measured and explained by the internal factors (Short-Term Debt, Long-Term Debt, Total Debt, Debt to Equity Ratio, and Firm's Size). It is hypothesized that these factors have no significant impact on financial performance. This study adopted this tool, which relies on traditional accounting report systems, because it is still being utilized nowadays. The rest of the research is organized as follows: Section two summarizes the results of previous empirical studies Section three specifies the research method, estimation model, and data used in the study. Section four concludes the research

II. LITERATURE REVIEW

This section sheds some light on previous empirical research. These empirical studies attempted to measure firms' financial performance by analyzing the effect of various financial and non-financial factors. The final results of these studies proved inconsistent in some areas, and consistent in others.

Performance Measure : Financial performance plays a large role in measuring the success of business firms. Evaluating the firm’s performance has three dimensions: the firms’ productivity, profitability, and market premium (Omondi & Muturi, 2013, p. 100). To this end, there are a plethora of measures of financial performance; such as return on assets (ROA), return on investment (ROI), return on equity (ROE), and operation profit margin (OPM). ROA, which was developed by Dupont (1919), is the most common measure used as a proxy for financial performance (Liargovas, 2008, p. 8; Mishra, Wilson, and Williams, 2009, p.7). The early contribution to empirical literature about profitability analysis began mainly with Bain (1951) who studied the relationship between profitability and structural variables, such as concentration, growth, economics of scales, and advertising. Bain found that concentration had a positive impact on profitability. Mann (1966) supported Bain’s findings when he indicated that there was a positive relationship between concentration and profitability. Additionally, other researchers such as Collins and Perston (1968), Weiss (1974), Porter (1979), Marvel (1980), and Bradburd and Caves (1982) have showed that industry concentration had a positive effect on profitability (Elmendorf, p.62). In the stock market, Ghosh, Nag, and Sirmans (2000) confirmed that ROA is widely used by market analysts as a measure of financial performance, as it measures the efficiency of assets in producing income. In another field, Mishra et al. (2009) indicated that returns on assets (ROA), a measure of financial performance commonly utilized in the farm management literature, is the ratio of net farm income plus interest payment to total assets. Because many researchers adopted and used return on assets to measure the firm’s financial performance, the current study also uses ROA as the dependent variable for analysis.

Economic Variables : The modern theory of capital structure was developed by Modigliani and Miller, (1958) who pointed out that capital structure had no impact on firm value. In 1963, Modigliani & Miller discussed the impact of tax firms on the valuation of firms. They indicated that because of debt tax shields, leveraged firms had value higher than firms without debt. This result had much subsequent discussion by Stiglitz (1969) who showed that if the rate of debt went up, the value of the firm would decrease, because of the existence of the risk of bankruptcy. On the other hand, it was indicated that an increased level of leverage tends to raise the value of firm because of tax savings (Pathirawasam 2013, p.65). Although the relationship between capital structure and financial performance of a firm can be either negative or positive (Pathirawasam, 2013, p. 65), Umer (2014) confirmed that the majority of empirical studies showed that a capital structure had a negative correlation with profitability. For example, Titman (1988) found that levels of debt had a negative influence of firms’ financial performance. This result was supported by Rajan and Zingales (1995) who addressed that profitability was negatively correlated with leverage. However, Gill, Biger, and Mathur (2011) indicated that short-term debt to total assets; long-term debt to total assets; and total debt to total assets had positive impact on profitability. Gill, Biger, and Mathur (2011) presented that the impact of short-term debt to total assets and total debt to assets on ROA was positive in both the service and manufacturing industries, whereas Omondi & Muturi (2013) showed that leverage had a significant negative effect on financial performance. Likewise, by examining the impact of adjustment in capital structure, Bouraoui and Louri (2014) addressed that leverage changes have a negative impact on performance. Although many theories have already been developed to explain the firms’ debt structure, there is still no consensus theory that managers can rely on to determine an optimal level of debt (Ben Ayed and Zouari, 2014, p. 96).

III. RESEARCH METHOD

Model Specification : This study adopted return on equity (ROE) and return on assets (ROA) as dependent variables for measuring firms’ financial performance, while a set of independent variables with difference expected signs were used to measure the effect on firms’ profitability.

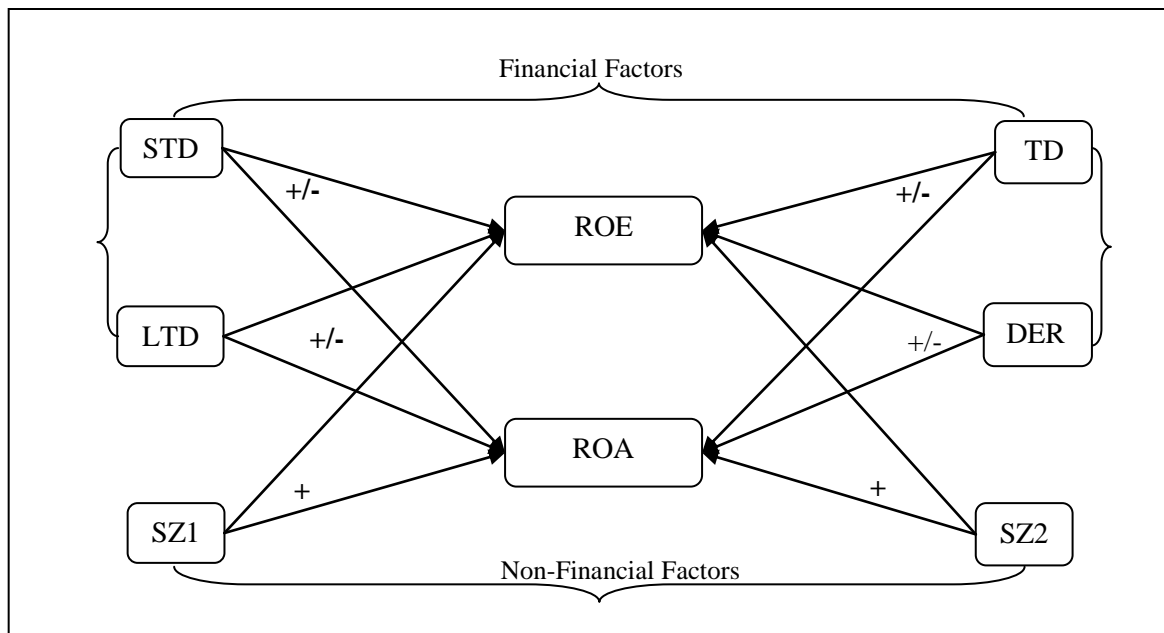
Table 1. Variables definition and predicted relationship

Variables	Full name	Measure	Signs*
Dependent			
ROA	Return on Assets	Net Income / Total Assets	
ROE	Return on Equity	Net Income / Total Shareholders’ Equity	
Independent			
STD	Short-Term Debt	Current Liabilities / Total assets	+/-
LTD	Long-Term Debt	Long term Liabilities / Total Assets	+/-
TD	Total Debt	Total Liabilities / Total assets	+/-
DER	Debt to Equity	Total Liabilities / Total Equity	+/-
SZ1	Size1	Log of total sales	+
SZ2	Size2	Log of total assets	+

* After going through the literature review, the author expected either a positive or negative sign on profitability

The conceptual framework of this study is shown in Figure 1, which explains the direct effect of each independent variable on the dependent variables.

Figure 1. Hypothesized Relations among variables



Note: ROE = return on equity; ROA = return on assets; STD = short-term- debt; LTD = long- term- debt; TD = total debt, DER = debt equity ratio; Size1=log of sales, Size2= log of assets.

According to this relationship, and consistent with the previous literature and empirical research, the following null hypotheses were developed to test the relationship between a firm’s financial performance and the independent variables: So, If capital structure has an impact on firm’s performance , then a strong correlation among profitability and capital structure can be existed.

- H01a: Short-Term Debt (STD) has no significant impact on performance of firm ROE.
- H01b: Short-Term Debt (STD) has no significant impact on performance of firm ROA.
- H02a: Long-Term Debt (LTD) has no significant impact on performance of firm ROE.
- H02b: Long-Term Debt (LTD) has no significant impact on performance of firm ROA.
- H03a: Total Debt (TD) has no significant impact on performance of firm ROE.
- H03b: Total Debt (TD) has no significant impact on performance of firm ROA.
- H04a: Debt to Equity (DER) has no significant impact on performance of firm ROE.
- H04b: Debt to Equity (DER) has no significant impact on performance of firm ROA.
- H05a: Company Size in terms of sales (SZ1) has no significant impact on performance of firm ROE
- H05b: Company Size in terms of sales (SZ1) has no significant impact on performance of firm ROA.
- H06a: Company Size in terms of assets (SZ2) has no significant impact on performance of firm ROE.
- H06b: Company Size in terms of assets (SZ2) has no significant impact on performance of firm ROA

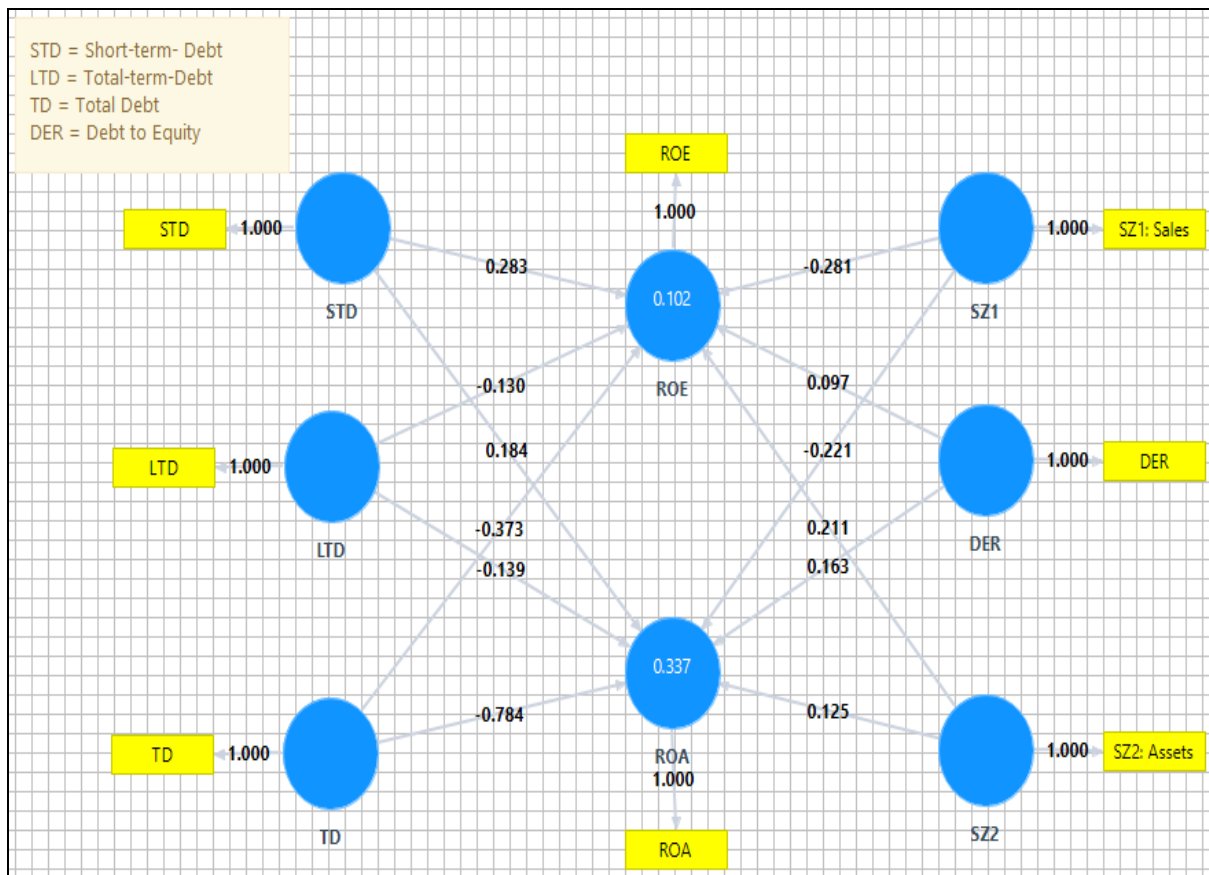
Sample and Data Selection : The empirical goal of this research is to investigate the impact of capital structure on profitability of energy American firms. To analyze some factors, the initial research sample consisted of 30 Energy U.S. firms for the period from 2005 to 2013. Each of these firms was classified as an active firms, and compute inside the U.S. 270 data observations (30 firms x 9 years) between 2005 and 2013 were employed as a sample for this study. The secondary data for this research were collected from annual financial reports which were taken from Mergent online (<http://www.mergentonline.com/login.php>). The data were analyzed by using Smart PLS (Partial Least Square) version 3, and the hypotheses were tested at ($\alpha = 0.05$) level of significance (0.95 confidence level).

IV. EMPIRICAL RESULTS AND DISCUSSION

This section gives detailed information on the results of this study, with sophisticated discussion. In this section, we examined the factors likely to affect the financial performance measured by ROE, and ROA. Fig. 2 shows the regression model with respect to the ROE and ROA have an R^2 of 10% and 34% respectively (R^2 : ROE = 0.10; ROA = 0.337). This indicated that 10% variation in Return on equity was influenced by independent variables (short debt, long debt, total debt, debt to equity and firm’s size.). Note that the predictor

variables did not explain Return on Equity (ROE) very well, because the value of R^2 was quite low (10%). Here it can be seen that the remaining 90% can be explained by other variables which were not included in this study.

Figure 2: PLS Path Estimates: Partial Least Square Algorithm



Unlike the ROE, Fig.2 indicated that about 34% of ROA was explained by the independent variables. Statistically, 34% is acceptable to predicate the value of ROA by these explanatory variables.

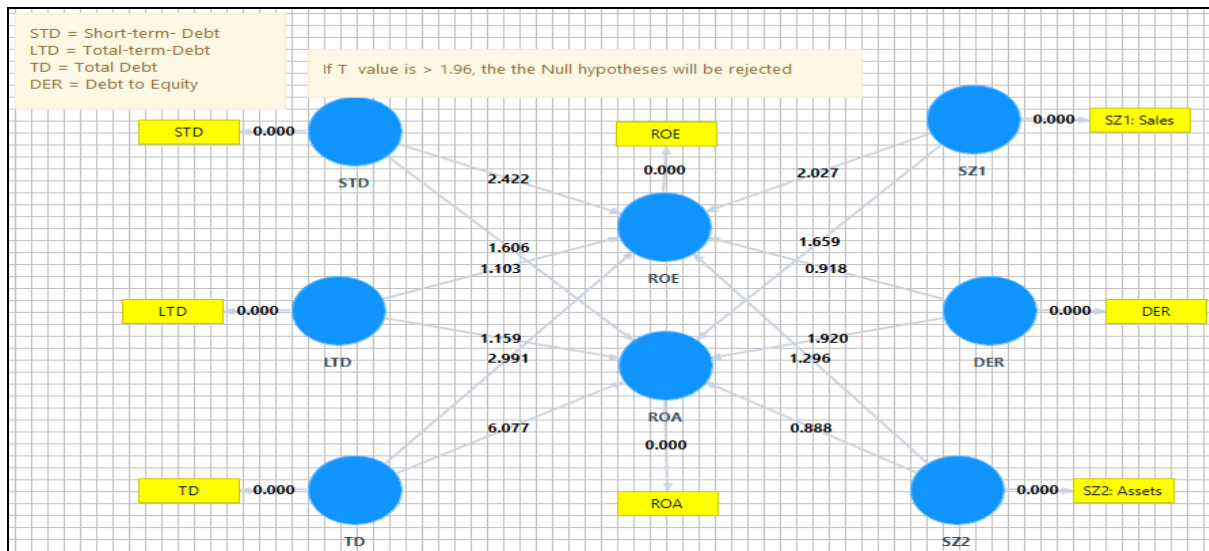
The research hypotheses were tested by using Smart PLS (Partial Least Square) at ($\alpha = 0.05$) level of significance (0.95 confidence level). So, if t value is higher than 1.96, then the null hypotheses will be rejected and the alternative one should be accepted. However, if t value is smaller than 1.96 the null hypotheses will be accepted (See Fig 3).

Path STD □ Financial Performance: Performed the bootstrapping, the results showed for the path STD → ROE ($p = 0.016 < 0.05$, see table 2), hypothesis H01a, a t-value equal to ($t = 2.422 > 1.96$); for the path STD → ROA ($p = 0.109 > 0.05$), hypothesis H01b, a t-value equal to ($t = 1.606 < 1.96$). Therefore, the H01a which said that STD has no significant effect on ROE must be rejected while the H01b that STD has no significant impact on ROA must be accepted.

Path LTD □ Financial Performance : The findings addressed for the path LTD → ROE ($p = 0.271 > 0.05$), hypothesis H02a, a t-value equal to ($t = 1.103 < 1.96$); for the path LTD → ROA ($p = 0.247 > 0.05$), hypothesis H02b, a t-value equal to ($t = 1.159 < 1.96$). These results confirmed that null hypotheses that LTD has no significant influence on financial performance must be accepted.

Path TD □ Financial Performance: The result also pointed out for the path TD → ROE ($p = 0.003 < 0.05$), H03a has a t-value higher than 1.96 ($t = 2.991$) while for the path TD → ROA ($p = 0.000 < 0.05$). It can be confirmed that null hypothesis that TD has no significant effect on profitability can be rejected.

Figure 3: PLS Test Hypotheses: Partial Least Square Bootstrapping



Path DER □ Financial Performance : Fig 3 showed for the path DER → ROE ($p = 0.359 > 0.05$), hypothesis H04a, a t value ($t = 0.918 < 1.96$) while for the path DER → ROA ($p = 0.055 > 0.05$), hypothesis H03b, at value ($t = 1.920 < 1.96$). Thus, both H03a and H04b must be accepted so that DER has no significant effect on the profitability of energy firms.

Path SZ1 □ Financial Performance : Fig. 3 demonstrated for the path SZ1 → ROE ($p = 0.043^* < 0.05$), hypothesis H05a, a t value ($t = 2.027 > 1.96$). Thus, the null hypothesis that size in terms of sales has no significant impact on ROE can be rejected while for the path SZ1 → ROA ($p = 0.098 > 0.05$), hypothesis H05b, a t value ($t = 1.659 < 1.96$). Thus, we can accept the null hypothesis that size in terms of sales has no significant influence on ROA.

Path SZ2 □ Financial Performance :The result illustrated for the path SZ2 → ROE ($p = 0.196 > 0.05$) hypothesis H06, a t value ($t = 1.296 < 1.96$) and for the path SZ2 → ROA ($p = 0.375 > 0.05$), hypothesis H06b, a t value ($t = 0.888 < 1.96$). So, the null hypothesis that size of firm in terms of assets has no significant impact on performance of firm must be accepted.

Table 2 showed the outcome that can be utilized to answer and explain the proposed hypotheses in this study. Based on the results demonstrated in this table, STD with positive coefficient (0.283) was significantly related to ROE. It means that one unit changes in STD tends to increase the return on equity by (0.283). this result agreed with previous work by Gill, Biger, and Mathur (2011) who indicated that short-term debt had a positive impact on profitability.

Figure 2.The Results of Hypothesis Testing

The Relationships	Null hypotheses	Coefficient	T Statistics	P Values	Notes
STD -> ROE	H01 _a	0.283	2.422 > 1.96	0.016** < 0.05	Significant
STD -> ROA	H01 _b	0.184	1.606 < 1.96	0.109 > 0.05	No significant
LTD -> ROE	H02 _a	-0.130	1.103 < 1.96	0.271 > 0.05	No significant
LTD -> ROA	H02 _b	-0.139	1.159 < 1.96	0.247 > 0.05	No significant
TD -> ROE	H03 _a	-0.373	2.991 > 1.96	0.003** < 0.05	Significant
TD -> ROA	H03 _b	-0.784	6.077 > 1.96	0.000** < 0.05	Significant
DER -> ROE	H04 _a	0.097	0.918 < 1.96	0.359 > 0.05	No significant
DER -> ROA	H04 _b	0.163	1.920 < 1.96	0.055 > 0.05	No significant
SZ1 -> ROE	H05 _a	-0.281	2.027 > 1.96	0.043** < 0.05	Significant
SZ1 -> ROA	H05 _b	-0.221	1.659 < 1.96	0.098 > 0.05	No significant
SZ2 -> ROE	H06 _a	0.211	1.296 < 1.96	0.196 > 0.05	No significant
SZ2 -> ROA	H06 _b	0.125	0.888 < 1.96	0.375 > 0.05	No significant

**significant at ($\alpha = 0.05$), ** $p < 0.05$

The findings, however, indicated a negative significant coefficient association between DT and financial performance measured by ROE and ROA. This implies that that one unit increases in TD tends to decrease the return on equity by (-0.373), and an increase in TD position is associated with a decline in return on assets ROA by (-0.784). Likewise, the profitability will be decreased by (-0.281), if the size of firm in terms of sales goes up by one unit. This confirmed that debts are usually more expensive than equity. So, the higher debt, the lower portability.

V. CONCLUSION

Capital structure is a very sensitive subject in the field of financial management because it partly affects its profitability. Thus, the intended aim of conducting this study was to investigate the impact of capital structure (short-term- debt, long- term- debt, total debt, debt equity ratio, and firm size) on financial performance as measured by return on equity (ROE) and return on assets (ROA) for a period of nine years starting in 2005. It was hypostasized that these factors are not significantly associated with firm's profitability. The main result indicated that the total debt has a significant negative impact on ROE and ROA, while size in terms of sales has significantly negative effect only on ROE of the American firms. However, a short debt significantly has a positive influence on ROE. An insignificant either negative or positive relationship was observed between long term debt, debt to equity and size in terms of total assets and profitability. These results cannot be generalized because of a small size of sample. Energy American firms should be able to manage and service their debts. So, it might be instructive to conduct the same or a similar study by analyzing other capital structure factors, such as taxation, and concentration.

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Appendix (A)
Descriptive Statistics

Year		Mean	Median	St.D	Variance	Kurtosis	Skewness	Min	Max	Count
2005	ROE	0.24	0.25	0.12	0.02	0.28	0.71	0.07	0.54	30
	ROA	0.09	0.11	0.06	0.00	(1.08)	0.39	0.02	0.21	30
2006	ROE	0.24	0.24	0.13	0.02	1.66	1.27	0.07	0.60	30
	ROA	0.10	0.10	0.06	0.00	0.16	0.75	0.02	0.27	30
2007	ROE	0.22	0.21	0.09	0.01	4.76	1.48	0.07	0.56	30
	ROA	0.08	0.07	0.05	0.00	(0.35)	0.74	0.03	0.20	30
2008	ROE	0.08	0.16	0.40	0.16	23.25	(4.61)	(1.92)	0.40	30
	ROA	0.04	0.04	0.12	0.01	12.49	(2.89)	(0.47)	0.20	30
2009	ROE	0.09	0.11	0.12	0.01	2.13	(0.62)	(0.24)	0.39	30
	ROA	0.04	0.03	0.05	0.00	1.20	0.23	(0.06)	0.16	30
2010	ROE	0.10	0.14	0.14	0.02	5.73	(1.41)	(0.39)	0.44	30
	ROA	0.04	0.04	0.05	0.00	1.79	0.39	(0.07)	0.19	30
2011	ROE	0.16	0.15	0.07	0.01	1.43	0.76	0.02	0.37	30
	ROA	0.06	0.05	0.04	0.00	0.84	1.00	0.01	0.18	30
2012	ROE	0.14	0.12	0.08	0.01	(0.33)	0.61	0.03	0.30	30
	ROA	0.06	0.05	0.04	0.00	0.55	1.04	0.01	0.17	30
2013	ROE	0.12	0.12	0.05	0.00	1.20	(0.53)	(0.02)	0.20	30
	ROA	0.05	0.04	0.03	0.00	(0.56)	0.57	-	0.12	30