



## The Relationship between Firm Performance and Capital Structure: Evidence from Taiwan

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### ABSTRACT

The purpose of this study is to investigate the relationship between capital structure and firm's financial performance by using five years data from 2011 to 2016 of Taiwan exchange-listed companies. Data were analyzed by using descriptive statistics and correlation analysis to find out the association between the variables and t-statistics to test the hypothesis. The findings at the overall market as well as sector levels were unspectacular but remarkably consistent. Capital structure and various financial parameters exhibit correlation coefficients that were mixed in signs with a relatively weak correlation strength. Further, the results suggest that t-test statistics registered statistical insignificance for the three research objectives.

**Key words:** Capital Structure, Financial Performance, Leverage Ratio, TWSE.

**JEL:** C32, C180, F43.

### Introduction

The central domain of Corporate Finance literature encompasses three key and interrelated considerations. These are namely 'Financing', 'Investing', and 'Distribution'. 'Financing' decision dictates the firm's cost of capital and its related challenges; which impacts its long-term capital structure orientation and funding mix preference. 'Investing' decision

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essentially focuses on utilization and maximization returns of surplus cash and capital via various financial appraisal techniques. 'Distribution' decision relates to discretionary (dividend payment) and fixed (interest payment) obligations to both ordinary shareholders and bondholders or creditors.

This paper focuses on the relevant of 'Financing' decision and its impact on firms' financial performance and profile. Though there are many research papers dedicated to the study of firms' capital structure or leverage impact, most of these revolve using economic theory and econometric models (via sophisticated statistical packages). Few papers linked capital structure impact on firms' financial performance (directly via financial statements components and ratios) in local Taiwan context. This study seeks to address this imperative issue.

### **Literature Review**

The relationship between capital structure and firm's financial performance has been the subject of considerable debate, both theoretically and empirically. The hot debates concerning the issue of capital structure and firm performance has been started since the influential work of Miller and Modigliani (1959). He stated that capital structure of the firm has no effect on the market value of the firm if the firm treating in the perfect market. But this theory is based on several assumptions and has not existed in real sense due to the brokerage cost and individual taxes which are not remained in the perfect market situation, and it is impossible for the investors to take the same rate that practiced in companies.

After the M.M theory, there were five main theories of capital structure introduced by a different researcher. Jensen and Meckling (1976) first time gave the agency theory in the corporate world. According to the agency theory, the principal or the shareholders have given the authority to run the operations of companies to agents or managers of the companies. In particular, manager's work in companies for their own interests not for the welfare or value maximization of the companies and this may include in agency problem. In order to reduce the conflict, the firms should give ownership to the managers in companies. In this way, equity will increase and firm take debt in a lesser amount; moreover, managers avoid the leverage for minimizing the risk of the companies. Ross (1977) developed signaling theory, through which he argued that managers make the capital structure as the signal of the company to the investors. If the company takes debt the investors influence and interrupt it by giving a signal that in the

future outflow of cash will be increased. In this way, this is showing that company has the attractive options in near future.

In addition, based on the implications of capital structure theories, many researchers have studied the relationship between capital structure and firms' financial performance from different perspectives in different environments and found mixed results. Abor (2005) examined the relationship between capital structure and firm profitability by taking evidence from USA manufacturing and service industry firms. The findings of the study showed a positive relationship between short-term debt to total assets, total debt to total assets, and profitability of service industry and short-term debt to total assets, long-term debt to total assets, total debt to total assets and profitability of manufacturing industry. Gansuwan and Onel (2012) tested the influence of capital structure on firm's performance of 174 nonfinancial Swedish firms. The results of the study revealed that there is a significant negative relationship between capital structure and firm performance of listed Swedish firms. Ebaid (2009) investigated the impact of capital structure choice on firm performance in Egypt and result of the study exposed that firm performance has a weak to no relationship with capital structure choice. Abu-Rub (2012) also analyzed the impact of capital structure on the firm performance of firms in Palestine, the results showed that firm's capital structure had a positive impact on the firm's performance measures, in both the accounting and market's measures.

Luper and Isaac (2012) examined the impact of capital structure on the performance of 15 Nigerian manufacturing companies. The results show that there is a negative and insignificant relationship between short-term debt to total assets, long-term debt to total assets, and return on asset and profit margin; while total debt to equity is positively related with return on asset and negatively related with a profit margin. Short-term debt to total assets is significant using return on asset while long-term debt to total assets is significant using the profit margin. The work concludes that statistically; capital structure is not a major determinant of the firm performance.

Cai and Ghosh (2003) further deploy empirical evidence to claim the 'stickiness' (inelastic) optimal capital structure of a firm. The thrust of their study pivots on the notion that optimal capital structure usually lies within a planned range of values, instead of an absolute value. A firm shall only adjust this leverage ratio when it is out of the acceptable range. Myers (2001) also supports this dynamic capital structure existence, in responding to the ever-changing capital market environment. The relevance of capital

structure, hence, translates into possible strong correlation relationship with firms' shareholders' wealth maximization potential.

In summary, there is no single theory of capital structure choice and empirical studies have given inconclusive results regarding the capital structure choice and its effect on firms' financial performance. Thus, this study attempts to seek the effect of capital structure on the financial performance of the firm.

### **Research Objectives**

In this study, firms' leverage profile and their financial performances are further dissected and analyzed into three key dimensions. These three key parameters are translated into research questions and examined further to verify their respective correlation and statistical significance.

The three Research Questions which this paper attempts to study are:

**Research Question 1** - Does Capital Structure possess a significant correlation with firms' Profitability measurement?

**Research Question 2** - Does Capital Structure possess a significant correlation with firms' Shareholders Wealth Maximization?

**Research Question 3** - Does Capital Structure possess a significant correlation with firms' Capital Market Perception?

In the first key research question, capital structure is investigated against its impact on firms' profitability. Two popular profitability indicators are explored; namely Return on Assets (ROA) and Return on Equity (ROE) perspective. Quantitative bi-variate data (hence their possible relationship) are first tested on its correlation strength and subsequently assessed statistically at 5% level of significance:

#### **Capital Structure versus ROA**

#### **Capital Structure versus ROE**

In the second key research question, capital structure is investigated against its impact on firms' shareholders' wealth maximization. The key indicator used here refers to the absolute share price. Economic Value Added (EVA) and Total Shareholders Return (TSR) were initially explored at proposal stage but were subsequently aborted due to both non-availability of public data (particularly on Weighted Average Cost of Capital - WACC) and costly data compilation of interim dividend at September cut-off. These quantitative bi-variate data (hence their possible relationship) are first tested on its correlation strength and subsequently assessed statistically at 5% level of significance:

### Capital Structure versus Share Price

In the third key research question, capital structure is investigated against its impact on firms' capital market perception. Two frequently used price multiples are calibrated and further investigated. They are Price-To-Earnings Ratio (PER) and Price-To-Book Ratio (PBR). Again these quantitative bi-variate data (hence their possible relationship) are first tested on its correlation strength and subsequently assessed statistically at 5% level of significance:

#### Capital Structure versus PER

#### Capital Structure versus PBR

#### Research Framework

This research work focuses on the collection of sample data from Taiwan Exchange (TWSE) over a 5-year horizon. A sample is a subset of a population. The paper assumes normal distribution characteristics exist as the sample chosen for various key and subtests are reasonably large. 172 qualified stocks that fulfill the selection criteria of this study were selected from the total TWSE universe of 768 entities. Instead of using conventional December calendar year-end as the financial cut-off, the period under review commenced from September 2011 and ended in September 2016.

Respective year-ends were defined as below.

- |                    |   |                                     |
|--------------------|---|-------------------------------------|
| a) Year ended 2016 | : | 30 September 2016 - 01 October 2015 |
| b) Year ended 2015 | : | 30 September 2015 - 01 October 2014 |
| c) Year ended 2014 | : | 30 September 2014 - 01 October 2013 |
| d) Year ended 2013 | : | 30 September 2013 - 01 October 2012 |
| e) Year ended 2012 | : | 30 September 2012 - 01 October 2011 |

Spearman's Rank Correlation Coefficient ['SRCC' hereafter] is used to ascertain the strength of correlation relationship between two variables under investigation, followed by testing the significance of these correlation relationships at 5% level of significance using test-statistic. Profitability is represented by Return on Assets [ROA] & Return on Equity [ROE]. Shareholders Wealth Maximization is measured by absolute Share Price movement. Capital Market Perception is defined by Price-To-Earnings [PER] and Price-To-Book [PTB] ratios. Assessment of correlation coefficient relationship was based on yoy (year-on-year) rate of percentage (%) change between two variables. The analytic of ascertaining the strength of correlation relationship using SRCC and two-tailed t-statistics test to ascertain whether there is a significant relationship was further expanded to cover below sub-analytic:

- i) By overall market analysis
- ii) Analysis on 4 key market sectors (i.e. Consumer, Financial, Industrial and Others)

### Hypothesis Formulation:

H<sub>1</sub>: There is a significant correlation relationship between Capital Structure (Leverage Ratio) and Profitability.

H<sub>2</sub>: There is a significant correlation relationship between Capital Structure (Leverage Ratio) and Shareholders Wealth Maximization

H<sub>3</sub>: There is a significant correlation relationship between capital Structure (Leverage Ratio) and Capital Market perception.

### Results and Findings:

The empirical findings were systematically analyzed and presented, the three key Research Questions were translated into three quantifiable hypotheses where data were meticulously collated, screened, and computed categorically. Correlation results were then calibrated on yoy rate of percentage (%) change between leverage and five key financial parameters (i.e. ROA, ROE, Share Price, PER, and PTB).

#### Capital Structure (Leverage Ratio) and Profitability:

##### Overall Market Analysis:

Two vital financial ratios (ROA and ROE) were used to represent a proxy for Profitability. At overall market level, a total of 172 qualified firms was assessed systematically.

Table 1. Leverage Ratio & ROA

| S/N | YOY % Change | Correlation Coefficients [r] | Sample Size [n] | Critical Value (2 tailed) | t-test Results | Statistical Decision          |
|-----|--------------|------------------------------|-----------------|---------------------------|----------------|-------------------------------|
| 1   | 2015-2016    | +0.02081                     | 172             | +/-1.96                   | +0.27144       | Accept Null (H <sub>0</sub> ) |
| 2   | 2014-2015    | +0.03213                     | 172             | +/-1.96                   | +0.41908       | Accept Null (H <sub>0</sub> ) |
| 3   | 2013-2014    | +0.01421                     | 172             | +/-1.96                   | +0.18524       | Accept Null (H <sub>0</sub> ) |
| 4   | 2012-2013    | +0.00388                     | 172             | +/-1.96                   | +0.05054       | Accept Null (H <sub>0</sub> ) |

Table 1: Overall Results [yoy rate of percentage (%) change] - ROA (Hypothesis 1)

Table 2. Leverage Ratio &amp; ROE

| S/N | YOY % Change | Correlation Coefficients [r] | Sample Size [n] | Critical Value (2 tailed) | t-test Results | Statistical Decision |
|-----|--------------|------------------------------|-----------------|---------------------------|----------------|----------------------|
| 1   | 2015-2016    | +0.03318                     | 172             | +/-1.96                   | +0.43280       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.00865                     | 172             | +/-1.96                   | +0.11278       | Accept Null (Ho)     |
| 3   | 2013-2014    | +0.00788                     | 172             | +/-1.96                   | +0.10276       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.01050                     | 172             | +/-1.96                   | +0.13675       | Accept Null (Ho)     |

Table 2: Overall Results [yoy rate of percentage (%) change] - ROE (Hypothesis 1)

From Tables 1 and 2 above, the illustrated results from this correlation analysis (via 2- tailed statistical test) were unspectacular but remarkably consistent. Using both ROA and ROE as proxies, these correlation coefficients ('r') registered weak but mix relationships (i.e. 5 positive and 3 negatives) between Leverage and Profitability. Using only ROA (Table 1), the results generally exhibited a positive relationship (except 1 negative pair) for the period under review from 1<sup>st</sup> October 2011 - 30<sup>th</sup> September 2016 (i.e. Years horizon). Their values between -0.01 to +0.03 led to t-test results of between -0.18 to +0.42. These fell within the critical Values of +/- 1.96 range, hence the null hypotheses are accepted. From ROA proxy, findings concluded that there was no significant correlation relationship between Capital Structure (Leverage Ratio) and Profitability. Using only ROE (Table 2), the results exhibited mix relationships (i.e. 2 positive and 2 negative) in the equivalent period under review. The 'r' values between less than -0.01 and +0.03 led to t-test results of between -0.10 and +0.43. These fell within the critical values of +/- 1.96 ranges, hence the null hypotheses were accepted. From ROE proxy, result reveals that there was no significant correlation relationship between Capital Structure (Leverage Ratio) and Profitability. A cross-examination between these 2 proxies, 'r' values for both ROA and ROE were fairly comparable with each other. Both indicated a consistently weak correlation relationship with leverage. From the total 8 pairs (ROA and ROE every 4 pairs) of correlation coefficients and their t-test results, study shows that though mix (i.e. no unanimous positive or negative) correlations exist; there was generally no significant correlation relationship between Capital Structure (Leverage Ratio) and Profitability at 5% level of significance.

### By Industry Sectors Analysis

The finding from overall market above was supported by results from industry sectors analytic. From the total sample of 172 firms, 4 key industry sectors were studied. Consumer, Financial, and Industrial sectors accounted for a combined total of 138 firms (or 80% of 172 firms were represented). The balance 34 firms were classified under 'Others' sector. All sectors' results were generally consistent with overall market level with a correlation between leverage and profitability remained statistically insignificant.

**Table 3. Capital Structure and Profitability**

| S/N   | YOY % Change | Correlation Coefficient [r] | Sample Size [n] | A                         | B              | Statistical Decision |
|---|--------------|-----------------------------|-----------------|---------------------------|----------------|----------------------|
|   |              |                             |                 | Critical Value (2 tailed) | t-test Results |                      |
| <i>Hypothesis 1A - Sector 1: Consumer [ROA]</i>           |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.11953                    | 41              | +/-2.02                   | -0.75184       | Accept Null (Ho)     |
| 2   | 2014-2015    | -0.06656                    | 41              | +/-2.02                   | -0.41622       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.19943                    | 41              | +/-2.02                   | -1.27101       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.05025                    | 41              | +/-2.02                   | -0.31418       | Accept Null (Ho)     |
| <i>Hypothesis 1A - Sector 2: Financial Services [ROA]</i> |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.15163                    | 40              | +/-2.02                   | -0.94564       | Accept Null (Ho)     |
| 2   | 2014-2015    | -0.06196                    | 40              | +/-2.02                   | -0.38268       | Accept Null (Ho)     |
| 3   | 2013-2014    | +0.49406                    | 40              | +/-2.02                   | +3.50295       | Reject Null (Ho)     |
| 4   | 2012-2013    | -0.25194                    | 40              | +/-2.02                   | -1.60480       | Accept Null (Ho)     |
| <i>Hypothesis 1A - Sector 3: Industrial [ROA]</i>         |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | +0.08698                    | 57              | +/-2.02                   | +0.64755       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.10096                    | 57              | +/-2.02                   | +0.75261       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.05823                    | 57              | +/-2.02                   | -0.43257       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.00536                    | 57              | +/-2.02                   | +0.03976       | Accept Null (Ho)     |
| <i>Hypothesis 1A - Sector 4: Others [ROA]</i>             |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | +0.26233                    | 34              | +/-2.02                   | +1.53784       | Accept Null (Ho)     |
| 2   | 2014-2015    | -0.02182                    | 34              | +/-2.02                   | -0.12340       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.05228                    | 34              | +/-2.02                   | -0.29617       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.12494                    | 34              | +/-2.02                   | +0.71235       | Accept Null (Ho)     |

**Table 3: Sectors Analytic [yoy rate of percentage (%) change] - Consumer, Financial Services, Industrial and Others - ROA (Hypothesis 1)**



**Table 4. Capital Structure and Profitability**

| S/N   | YOY % Change | Correlation Coefficient [r] | Sample Size [n] | A                         | B              | Statistical Decision |
|---|--------------|-----------------------------|-----------------|---------------------------|----------------|----------------------|
|   |              |                             |                 | Critical Value (2 tailed) | t-test Results |                      |
| <i>Hypothesis 1B - Sector 1: Consumer [ROE]</i>           |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | +0.01636                    | 41              | +/-2.02                   | +0.10221       | Accept Null (Ho)     |
| 2   | 2014-2015    | -0.05324                    | 41              | +/-2.02                   | -0.33295       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.10448                    | 41              | +/-2.02                   | -0.65605       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.05039                    | 41              | +/-2.02                   | -0.31509       | Accept Null (Ho)     |
| <i>Hypothesis 1B - Sector 2: Financial Services [ROE]</i> |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | +0.01645                    | 40              | +/-2.02                   | +0.10140       | Accept Null (Ho)     |
| 2   | 2014-2015    | -0.02624                    | 40              | +/-2.02                   | -0.16182       | Accept Null (Ho)     |
| 3   | 2013-2014    | +0.36342                    | 40              | +/-2.02                   | +2.40467       | Reject Null (Ho)     |
| 4   | 2012-2013    | +0.06780                    | 40              | +/-2.02                   | +0.41891       | Accept Null (Ho)     |
| <i>Hypothesis 1B - Sector 3: Industrial [ROE]</i>         |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | +0.07199                    | 57              | +/-2.02                   | +0.53526       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.05384                    | 57              | +/-2.02                   | +0.39989       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.01482                    | 57              | +/-2.02                   | -0.10993       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.04441                    | 57              | +/-2.02                   | -0.32967       | Accept Null (Ho)     |
| <i>Hypothesis 1B - Sector 4: Others [ROE]</i>             |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | +0.30801                    | 34              | +/-2.02                   | +1.83141       | Accept Null (Ho)     |
| 2   | 2014-2015    | -0.00679                    | 34              | +/-2.02                   | -0.03841       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.14422                    | 34              | +/-2.02                   | -0.82447       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.09038                    | 34              | +/-2.02                   | +0.51335       | Accept Null (Ho)     |

**Table 4:** Sectors Analytic [yoy rate of percentage (%) change] - Consumer, Financial Services, Industrial and Others - ROE (Hypothesis 1)

Out of the combined (ROA and ROE) total of 32 pairs of correlation from Table 3 and 4 above, 30 pairs pointed to acceptance of the null hypotheses. Only 2 pairs correlations (i.e. ROA and ROE each 1 pair) registered significant correlation at 5% of statistical significance, hence support the rejection of the null hypothesis. Table 3 summarized ROA results by 4 key sectors. Apart from Consumer sector which pointed to persistently weak negative correlation, the rest of the sectors (Financial, Industrial, and Others) listed weak but mix (both positive and negative) correlation coefficients. Tables 4 analyzed ROE results by 4 key sectors. These 4 key sectors (i.e. Consumer, Financial, Industrial, and Others) listed weak but mix (both positive and negative) correlation coefficients. These

sectors were again consistent with the overall market results.

**Capital Structure (Leverage ratio) and Shareholders Wealth Maximization:  
Overall Market Analysis**

Key financial parameter (Share Price) was used to represent proxy for Shareholders Wealth Maximization. At overall market level, a total of 172 qualified firms was assessed.

**Table 5. Leverage Ratio and Share Price**

| S/N | YOY % Change | Correlation Coefficients [r] | Sample Size [n] | Critical Value (2 tailed) | t-test Results | Statistical Decision |
|-----|--------------|------------------------------|-----------------|---------------------------|----------------|----------------------|
| 1   | 2015-2016    | -0.08472                     | 172             | +/-1.96                   | -1.10862       | Accept Null (Ho)     |
| 2   | 2014-2015    | -0.00232                     | 172             | +/-1.96                   | -0.03028       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.05671                     | 172             | +/-1.96                   | -0.74061       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.00806                     | 172             | +/-1.96                   | -0.10514       | Accept Null (Ho)     |

**Table 5: Overall Results [yoy rate of percentage (%) change] - Share Price (Hypothesis 2)**

From Table 5 above, the illustrated results from this correlation analysis (via two-tailed statistical test) again were unspectacular but remarkably consistent. Measured by correlation coefficients ('r'), the correlation relationships between Leverage and Shareholders Wealth Maximization exist but statistically insignificant. Using Share Price proxy (Table 5), the results generally exhibited a negative relationship in the period of 1st October 2005 - 30th September 2010 (i.e. 5 years horizon). The 'r' values between less than -0.01 and -0.08 led to t-test results of between -0.03 and -1.11. These fell within the critical values of +/- 1.96 range, hence the null hypotheses were accepted. From share price proxy, the study reveals that there was no significant correlation relationship between Capital Structure (Leverage Ratio) and Shareholders Wealth Maximization. Based on these 4 pairs of correlation coefficients and their t-test results, results show that though unanimous negative correlations exist, there was generally no significant correlation relationship between Capital Structure (Leverage Ratio) and Shareholders Wealth Maximization.

**By Industry Sectors Analysis**

The results were consistent to overall market level with correlation between Leverage and Shareholders Wealth Maximization largely weak and insignificant.

Table 6. Capital Structure and Shareholders Wealth Maximization

| S/N   | YOY % Change | Correlation Coefficient [r] | Sample Size [n] | A                         | B              | Statistical Decision |
|---|--------------|-----------------------------|-----------------|---------------------------|----------------|----------------------|
|   |              |                             |                 | Critical Value (2 tailed) | t-test Results |                      |
| <i>Hypothesis 2A - Sector 1: Consumer [Share Price]</i>           |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.11790                    | 41              | +/-2.02                   | -0.74146       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.09571                    | 41              | +/-2.02                   | +0.60044       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.18163                    | 41              | +/-2.02                   | -1.15349       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.05102                    | 41              | +/-2.02                   | -0.31905       | Accept Null (Ho)     |
| <i>Hypothesis 2A - Sector 2: Financial Services [Share Price]</i> |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.19873                    | 40              | +/-2.02                   | -1.24997       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.08671                    | 40              | +/-2.02                   | +0.53656       | Accept Null (Ho)     |
| 3   | 2013-2014    | +0.06304                    | 40              | +/-2.02                   | +0.38937       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.12815                    | 40              | +/-2.02                   | -0.79651       | Accept Null (Ho)     |
| <i>Hypothesis 2A - Sector 3: Industrial [Share Price]</i>         |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | +0.00389                    | 57              | +/-2.02                   | +0.02885       | Accept Null (Ho)     |
| 2   | 2014-2015    | -0.08131                    | 57              | +/-2.02                   | -0.60498       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.09768                    | 57              | +/-2.02                   | -0.72791       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.02162                    | 57              | +/-2.02                   | +0.16040       | Accept Null (Ho)     |
| <i>Hypothesis 2A - Sector 4: Others [Share Price]</i>             |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.10846                    | 34              | +/-2.02                   | -0.61717       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.01572                    | 34              | +/-2.02                   | +0.08891       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.02424                    | 34              | +/-2.02                   | -0.13717       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.03585                    | 34              | +/-2.02                   | +0.20292       | Accept Null (Ho)     |

**Table 6:** Sectors Analytic [yoy rate of percentage (%) change] - Consumer, Financial Services, Industrial and Others - Share Price (Hypothesis 2)

Out of total 16 pairs of correlation (yoy rate of percentage change over past 5-year data) from Table 6, all sectors' result pointed to acceptance of the null hypotheses at 5% of statistical significance. Table 6 summarized the analyzed results by 4 key sectors. All sectors registered weak (statistically insignificant) and mix correlation; with no unanimous positive or negative results throughout (i.e. a total of 9 negative and 7 positive 'r' for the period under review).

#### Capital Structure (Leverage Ratio) and Capital Market Perception: Overall Market Analysis

Two vital financial ratios (PER and PTB) were used to represent proxy

for capital market perception. At overall market level, a total 172 qualified firms was assessed.

**Table 7, Leverage Ratio and PER**

| S/N | YOY % Change | Correlation Coefficients [r] | Sample Size [n] | Critical Value (2 tailed) | t-test Results | Statistical Decision |
|-----|--------------|------------------------------|-----------------|---------------------------|----------------|----------------------|
| 1   | 2015-2016    | -0.01765                     | 172             | +/-1.96                   | -0.23018       | Accept Null (Ho)     |
| 2   | 2014-2015    | -0.02846                     | 172             | +/-1.96                   | -0.37133       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.05246                     | 172             | +/-1.96                   | -0.68499       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.05144                     | 172             | +/-1.96                   | +0.67162       | Accept Null (Ho)     |

**Table 7:** Overall Results [yoy rate of percentage (%) change] - PER (Hypothesis 3)

**Table 8. Leverage Ratio and PTB**

| S/N | YOY % Change | Correlation Coefficients [r] | Sample Size [n] | Critical Value (2 tailed) | t-test Results | Statistical Decision |
|-----|--------------|------------------------------|-----------------|---------------------------|----------------|----------------------|
| 1   | 2015-2016    | -0.01087                     | 172             | +/-1.96                   | -0.14176       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.09259                     | 172             | +/-1.96                   | +1.21238       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.06640                     | 172             | +/-1.96                   | -0.86771       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.01656                     | 172             | +/-1.96                   | +0.21595       | Accept Null (Ho)     |

**Table 8:** Overall Results [yoy rate of percentage (%) change] - PTB (Hypothesis 3)

Tables 7 and 8 above illustrated that the results from this correlation analysis and two-tailed statistical test were unspectacular but remarkably consistent. Using both PER and PTB as proxies, weak correlation relationships between Leverage and Capital Market Perception exist. Using only PER (Table 7), the results generally exhibited a mixed relationship for the period under review from 1st October 2005 - 30th September 2010 (i.e. 5 years horizon). The 'r' values between -0.05 to +0.05 led to t-test results of between -0.68 to +0.67. These fell within the critical values of +/- 1.96 range, hence the null hypotheses were accepted. From PER proxy, there was no significant correlation relationship between Capital Structure (Leverage Ratio) and Capital Market Perception. Using only PTB (Table 8), the results exhibited a mixed relationship on the yoy rates of change (%) in the same period under review (i.e. 5 years horizon). The 'r' values between less than -0.01 and +0.09 led to t-test results of between -0.87 to +1.21. These fell within the critical values of +/- 1.96 range, hence the null hypotheses were accepted. From PTB proxy, there was no significant correlation relationship between Capital Structure (Leverage Ratio) and Capital Market Perception. A cross-examination between these 2 proxies' 'r' values also indicated

generally a consistent and comparable correlation relationship with leverage. From the total 8 pairs of correlation coefficients and its t-test results, the study reveals that though a mixed (both positive and negative) correlation exists, there was generally no significant correlation relationship between Capital Structure (Leverage Ratio) and Capital Market Perception.

**By Industry Sectors Analysis**

The finding from overall market level was further supported by results from industry sectors analytic. The results were consistent with the overall market level and the correlation between Leverage and Capital Market Perception largely statistically insignificant.

**Table 9. Capital Structure and Capital Market Perception**

| S/N   | YOY % Change | Correlation Coefficient [r] | Sample Size [n] | A B                       |                | Statistical Decision |
|---|--------------|-----------------------------|-----------------|---------------------------|----------------|----------------------|
|   |              |                             |                 | Critical Value (2 tailed) | t-test Results |                      |
| <i>Hypothesis 3A - Sector 1: Consumer [PER]</i>           |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.03067                    | 41              | +/-2.02                   | -0.19160       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.09174                    | 41              | +/-2.02                   | +0.57536       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.12699                    | 41              | +/-2.02                   | -0.79950       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.04526                    | 41              | +/-2.02                   | -0.28292       | Accept Null (Ho)     |
| <i>Hypothesis 3A - Sector 2: Financial Services [PER]</i> |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | +0.08847                    | 40              | +/-2.02                   | +0.54748       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.07092                    | 40              | +/-2.02                   | +0.43836       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.15263                    | 40              | +/-2.02                   | -0.95199       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.12021                    | 40              | +/-2.02                   | +0.74646       | Accept Null (Ho)     |
| <i>Hypothesis 3A - Sector 3: Industrial [PER]</i>         |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.09318                    | 57              | +/-2.02                   | -0.69403       | Accept Null (Ho)     |
| 2   | 2014-2015    | -0.05278                    | 57              | +/-2.02                   | -0.39197       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.13521                    | 57              | +/-2.02                   | -1.01205       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.05398                    | 57              | +/-2.02                   | -0.40090       | Accept Null (Ho)     |
| <i>Hypothesis 3A - Sector 4: Others [PER]</i>             |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.12248                    | 34              | +/-2.02                   | -0.69809       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.00142                    | 34              | +/-2.02                   | +0.00805       | Accept Null (Ho)     |
| 3   | 2013-2014    | +0.04303                    | 34              | +/-2.02                   | +0.24366       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.93415                    | 34              | +/-2.02                   | +14.80659      | Reject Null (Ho)     |

**Table 9:** Sectors Analytic [yoy rate of percentage (%) change] - Consumer, Financial Services, Industrial and Others - PER (Hypothesis 3)

Table 10. Capital Structure and Capital Market Perception

| S/N   | YOY % Change | Correlation Coefficient [r] | Sample Size [n] | A                         | B              | Statistical Decision |
|---|--------------|-----------------------------|-----------------|---------------------------|----------------|----------------------|
|   |              |                             |                 | Critical Value (2 tailed) | t-test Results |                      |
| <i>Hypothesis 3B - Sector 1: Consumer [PTB]</i>           |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.00574                    | 41              | +/-2.02                   | -0.03582       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.08962                    | 41              | +/-2.02                   | +0.56194       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.07921                    | 41              | +/-2.02                   | -0.49620       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.08011                    | 41              | +/-2.02                   | -0.50191       | Accept Null (Ho)     |
| <i>Hypothesis 3B - Sector 2: Financial Services [PTB]</i> |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.02627                    | 40              | +/-2.02                   | -0.16203       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.22362                    | 40              | +/-2.02                   | +1.41433       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.06572                    | 40              | +/-2.02                   | -0.40602       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.01003                    | 40              | +/-2.02                   | -0.06181       | Accept Null (Ho)     |
| <i>Hypothesis 3B - Sector 3: Industrial [PTB]</i>         |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.09433                    | 57              | +/-2.02                   | -0.70270       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.01241                    | 57              | +/-2.02                   | +0.09206       | Accept Null (Ho)     |
| 3   | 2013-2014    | -0.12066                    | 57              | +/-2.02                   | -0.90139       | Accept Null (Ho)     |
| 4   | 2012-2013    | -0.10989                    | 57              | +/-2.02                   | -0.81997       | Accept Null (Ho)     |
| <i>Hypothesis 3B - Sector 4: Others [PTB]</i>             |              |                             |                 |                           |                |                      |
|   |              |                             |                 | A                         | B              |                      |
| 1   | 2015-2016    | -0.02573                    | 34              | +/-2.02                   | -0.14563       | Accept Null (Ho)     |
| 2   | 2014-2015    | +0.44601                    | 34              | +/-2.02                   | +2.81891       | Reject Null (Ho)     |
| 3   | 2013-2014    | -0.05197                    | 34              | +/-2.02                   | -0.29441       | Accept Null (Ho)     |
| 4   | 2012-2013    | +0.86361                    | 34              | +/-2.02                   | +9.69001       | Reject Null (Ho)     |

**Table 10:** Sectors Analytic [yoy rate of percentage (%) change] - Consumer, Financial Services, Industrial and Others – PTB (Hypothesis 3)

Out of the 32 pairs of correlation from Table 9 and 10 above, 29 pairs pointed to acceptance of null hypotheses while only 3 pairs rejected the null hypotheses. One point to note was that these 3 rejected pairs came from 'Others' sector. The risk of Type 1 and 2 error was potentially higher than 'Others' sector (compared to the rest of the sectors) due to its relatively smaller sample size (n). This also implied potentially a weaker Power of Test (i.e. 1-Type 2 error). However, these rejection results were not material in the wake of holistic analysis.

Tables 9 analyzed PER results on 4 key sectors. Apart from Industrial consumer sector which pointed to unanimously weak negatively correlation,

the rest of the sectors (Consumer, Financial and Others) generally registered weak and mix (both positive and negative) correlation coefficients.

**Table 10 analyzed PTB results on 4 key sectors.** All sectors (i.e. Consumer, Financial, and Industrial) recorded a mixed (both positive and negative) correlation coefficients which were statistically insignificant at 5% of significance. Except for 'Others' sector which reported inconclusive findings, most results were consistent with the overall market result.

## **Conclusion**

This paper analyzed and examined 172 TWSE listed firms. The prime objective is to ascertain firms' possible relationships between leverage and their respective financial performance indicators. Data collected for the period under review were extracted from 1st October 2011 - 30th September 2016 (i.e. 5 full financial years). From these, 4 sets of year on year rate of change (%) were calibrated to ascertain the correlation, statistical strength and sign, as well as significance between these relationships.

The first research question was whether or not capital structure possesses a significant correlation with firms' profitability measurement. Findings registered generally no significant statistical relationship exists between firms' Leverage and Profitability. Using both ROA and ROE as profitability proxies have derived consistent results, hence the acceptance of the null hypothesis. At the overall market, as well as sector analytic, results were generally consistent with the acceptance of the null hypothesis. A cross-examination between ROA and ROE results further reinforced this consistency. This study did not support various earlier studies outlined from respective domains that encompass 'Cash Flow Hypothesis'; 'Agency Cost Theory' and 'Trade-off Theory'.

The second research question probed into the vital issue whether capital structure possesses a significant correlation with firm shareholders' wealth maximization. Using the share price as a proxy for the latter, research results again listed no significant statistical relationship exists between Leverage and Shareholders Wealth Maximization. The study did not support various post-MMI studies that highlight the relevance of leverage on shareholder's wealth maximization (i.e. research studies from 'Optimal Structure Theory' and proponents of 'Pecking Order Theory'). However, the findings of the study are consistent with 'MM1 original proposition'; i.e. there is no statistically significant relationship between firms' capital structure and the value of firms.

The third research question explored whether capital structure possesses a significant correlation with firms' capital market perception. Using both PER and PTB as proxies for the latter, results are generally stable and consistently pointed to the acceptance of the null hypothesis. Both overall markets, as well as sector analytic registered similar results. A cross-examination between PER and PTB further reinforce the evidenced findings of the study. This did not support 'Market Timing Hypothesis' but is consistent with 'Transaction Cost Theory'. The latter emphasizes leverage decision does convey vital signaling impact, as well as pragmatic management of transaction cost (particularly on listed firms) As a result, findings seem to reconcile with this deliberate gradual and prudence change in firms' leverage profile.

The findings of the study also supported Cai and Ghosh (2003) studies [highlighted by Myers (2001)], they deploy empirical evidence to claim the existence of 'stickiness' (inelastic) optimal capital structure of a firm. The thrust of this study pivots on the notion that optimal capital structure usually lies within a planned range of values, instead of an absolute value. A firm shall only adjust this leverage ratio when it is out of the acceptable range. Myers (2001) also supports this dynamic capital structure existence, in response to ever-changing capital market environment.

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