The Determinants of Capital Structure: Evidence from Canada

by

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Abstract

Corporate capital structure is examined in this paper with a panel of 960 observations from 60 Canadian companies in a period from 2001 to 2016. The OLS regression analysis was applied to show the substantial influence of estimated variables, namely, profitability, tangibility, firm size and growth opportunity, on changes in book leverage and market leverage. The effects of financial economic crisis in 2008 were studied. By comparison between two segmented results (before 2008 and in/after 2008), growth opportunity became more substantial while firm size became irrelevant. The effect of heteroscedasticity to the research results is examined at the end by Robust Least Square method. The comparison confirmed that heteroscedasticity is not a serious problem for this research.

Keywords: Capital Structure; Regression Analysis; Canada; Book Leverage; Market Leverage

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Chapter 1. Introduction

Most of public traded companies have three sources of funding, the operating income, debts, and equity from shareholders. The operating income generated from business itself is usually considered to be the cheapest way to fund the growth of the company. However, not all the companies are lucky enough to gain the adequate cash. Actually as the old saying claims “you have to spend money to make money”, most of the companies need to raise some debts to support the operations. The debts are not only from financial activities, but also from vendors and suppliers during the operation, such as account payable in current liability. Most of those debts come with costs, most commonly, interests. Although interest expense does tax deductible, it still affects the company’s earnings performance. One advantage for public companies is that they can issue shares to raise capital without paying back to shareholders. However, equity funding still comes with cost, diluting original shareholders’ ownership. Furthermore, the future profits would be split with more shareholders. As a result, a balanced capital structure is of crucial importance to the company’s performance.

Canada is one of the well-developed counties with mature economic market. No research has been performed to examine Canadian public traded firms. The purpose of this paper is to investigate the correlations between the explanatory determinants of capital structure and dependent variable, financial leverages, with empirical studies of Canadian firms.

1.1. Literature Review

Many theoretical and empirical studies have been performed to find the intrinsic correlations between capital structure and the company's financial indicators, such as profitability, tangibility, tax, firm size and growth opportunity. The studies were usually performed by regions.

Early in 1988, Titman and Wessels (Sheridan Titman, 1988) examined 469 US firms with their data between 1974 and 1982. Long-term and short-term debts were investigated separately instead of aggregate total debt. Firm size had significant effects on long-term debts to book value of the company, but not the market-value based ratio. On the contrary, profitability attribute had high t-statistics in debt over market value, but not statistically significant in debt measures scaled by book value of equity. In this research, growth is claimed to be negatively related with long-term debt, but might be positive for short-term and convertible debt. This was due to the mitigation effect from agency problem.

Evidence from UK companies was evaluated by Ozkan (Ozkan, 2001) with unbalanced panel of 390 firms over the period of 1984 to 1996. Positive impact of size and negative effects of profitability, growth opportunities and tax were obtained through GMM estimation procedure.

Huang and Song (Guihai Huang, 2006) investigated 799 observations of public traded companies in China of 2000 or the average values between 1994 and 2000 and concluded that corporative leverage increased with firm size and tangibility and decreased with

profitability, growth opportunities and tax. However, a later study by Chen and Strange (Jian Chen, 2005) with 972 observations of year 2003 found that the firm size was only related to market value measures of capital structure and tax was not a factor in influencing debt ratio.

Handoo and Sharma (Anshu Handoo, 2014) studied 870 listed Indian firms between 2001 and 2010. Their research results showed that regardless of long-term or short term debts, profitability, tax and firm size had negative effects on the leverage while tangibility and grow opportunity were opposite.

Mugosa (Mugosa, 2015) examined the determinants on panel of 921 Western European companies based on the data between 2003 and 2010. The negative correlation was discovered between leverage ratio and tangibility, market to book, profitability and average stock return. Firm size had positive correlation with target leverage ratio.

In emerging Central and Eastern European (CEE) countries, Delcoure (Delcoure, 2007) found out that neither trade-off and pecking order, nor agency theories explained the capital structure choices in transitional economies based on empirical evidence. The determinants of firms' leverage followed "modified pecking order".

A summarized correlation of each determinant by countries is presented in Table 1.

1.2. Scope and Methodology

1.2.1. Data Selection

The database was obtained through S&P CapitalIQ platform. Top 60 companies (based on market capitalization) that are traded in Toronto Stock Exchange (TSX) were selected. Financial institutions, such as banks, were filtered out from list as they have relative less tangible assets, which would affect the examination of tangibility factor. The panel of data was traced back up to the year 2001. The time interval used to build the database was annual. Instead of fiscal year-end, calendar year-end data were selected to eliminate the timing difference. The companies which don't have the complete set of data were eliminated from the list and replaced by randomly selected companies.

The screening criteria were as followings:

- Actively and primarily traded in TSX in observation period
- Primary industry is NOT in financial service
- Type of securities are common shares and ranked by up-to-date market capitalization

1.2.2. Theoretical Review

Two types of financial leverages were used for comparison purpose, namely, book value based and market value based ratios, shown as follows:

$$Book\ Leverage = \frac{Total\ Debt}{Total\ Asset}$$

$$Market\ Leverage = \frac{Total\ Debt}{Total\ Debt + Market\ Value}$$

Many models were used to estimate the correlations between capital structure and variables. In general, the leverage, the proxy of capital structure, is expressed by a linear function of different variables. The equation can usually be written as following:

$$Leverage = \beta_0 + \sum_{i=1}^{n} \beta_i \times x_i + u$$

Where, n is the number of independent variables; x_i is the variable; β represents the correlation between leverage and the variable; β_0 is the constant and u is the disturbance.

In this research, both book leverage and market leverage were used to represent different models. With historical data, βi is examined through regression analysis by using eView software.

Many theoretical studies about capital structure have been developed over past decades with the hope of obtaining the determinants to achieve the optimal capital structure. After 2008's financial crisis, the significance of regulatory capital gained increasing interest in bank industry (Ben Ukaegbu, 2010). Since the financial institutions have been filtered out from our scope, only following economic capital determinants were used for independent variables:

Profitability

Based on pecking order theory (Stewart Myers, 1984), profitability has inverse relationship with debt ratios as firms prefer internal financing. Since the firm can generate adequate income internally, it's unnecessary to issue debts to support the growth. On the contrary, by using panel data of UK companies, Dess and Robertson (R. Dess, 2003) claimed the management team intends to provide a higher dividend, which is usually derived from the higher profitability, and to take more debt in order to signal good prospects to the investors. Thus a positive effect between profitability and leverage could exist.

In this study, profitability is measured by the equation:

$$Profitability = \frac{Earnings\ before\ depreciation\ and\ amortization}{Total\ Asset}$$

EBITDA is used as it's a good indicator of the cash which is generated for internal finance.

Tangibility

Other things being equal, more tangible assets provide the firm with more negotiation power when financing through creditors. Tangible assets serve as collaterals and make the finance less risky for investors outside of the firm. A number of studies (Sheridan Titman, 1988) (Jian Chen, 2005) (M.L. Lemmon, 2008) (RG Rajan, 1995) (L Booth, 2001) have shown the positive correlation between tangibility and leverage.

In this paper, tangibility is defined by equation:

$$Tangibility = \frac{Net\ Value\ of\ Property, Plant\ and\ Equipment}{Total\ Asset}$$

Net value of tangible asset (excluding depreciation and amortization) is chosen over gross value as it reflects the liquidation value of the assets.

Firm size

It is not surprising that larger firms are more likely to have higher leverage compared with smaller firms, as creditors are willing to grant debts to less volatile borrowers. Firm size is commonly considered to be the proxy for the probability of default and liquation of the firm with a doctrine of too big to fail. In the agency theory, management team in the larger firm tends to borrow more debts in order to achieve rapid growth for the shareholders' company. However it is the company and its owners who bear the risk of heavy lifted financial leverage.

In this study, firm size is considered to be one of the variables and is used in the form:

$$Firm\ size = \ln(Total\ Asset)$$

Growth Opportunities

The theoretical studies suggested mixed conclusions about the correlation between growth opportunities and leverage ratio. In Trade-off Theory, a negative effect is understandable as higher growth potential usually comes with higher risk and volatility, which raises the hesitation among management team, especially if it's non-core business

for the firm. On the other hand, the Agency Theory presents another outcome. As the conflict interest between shareholders and management team, the firm operated by management team tends to take chance to pursue higher growth potential. Thus better growth opportunities result higher debts and leverage. Morri and Parri (Giacomo Morri, 2017) summarized the theoretical studies on REITs market of US and claimed the relationship between growth opportunities and leverage varies with different features in each markets.

Many indicators were chosen to be the proxy for growth opportunities, such as price to net-asset-value-per-share by Morri and Parri (Giacomo Morri, 2017) and market to book ratio by Booth (L Booth, 2001). In this study, market to book ratio is employed to measure growth opportunities.

$$Market - to - book = \frac{Market\ Cap + Total\ Debt + LVPS + DTTC}{Total\ Asset}$$

Where LVPS represents liquidating value of preferred stock and DTTC is deferred taxes and investment tax credit.

Based on previous researches, there are many other factors that might be important to evaluate the firm's capital structure. Special attentions have been given to risk or volatility, ownership structure, and tax in each market region. However, for the purpose of this paper, only above mentioned factors are examined with the hope to build up a generic framework that can be improved by future studies.

A summarized correlation between each variable and leverage are listed in Table 2.

Chapter 2. Results and Discussion

2.1. Descriptive Statistics of the Data

A total of 960 observations were collected and set up a set of panel data. With panel data, two dimensions are involved, cross-sectional dimension (selected company) and time-series dimension (calendar year-end data between 2001 and 2016). The Table 3 reports a summary of descriptive statistics of companies in this research.

In a glimpse of the statistics, book leverage is much lower than market leverage. Comparing their definitions, the denominator of book leverage is total asset, whereas, the market leverage is calculated by the sum of total debt and market cap. Rather than the book value of the company, market cap reflects the public shareholders' perception about the future value of the company. It appears that shareholders have lower expectations of the selected firms. This might be explained by the composition of the selected firms. As shown in Figure 1, over 30% of selected firms are in oil/gas and mining industry, in which the performance of the firm is heavily influenced by commodity price. For past a few years, oil price crisis and floundering mining market makes Canadian economy stagnant. Additionally, the subprime crisis originated in neighbor US made the equity finance even harder. As a result, firms have no choice but to borrow debts. The higher total debt results the higher market leverage. In Table 4, correlations change significantly comparing energy and non-energy companies. Both firm size and growth opportunity become less significant correlated with capital structure in energy industry, compared with the observation in non-energy industry. One explanation for this situation could be

that both management team and public investors could lend money to energy companies because of the importance of roles they play in Canada economy. However, it is worth noticing that all energy companies in our sample are in similar size, i.e., large market capitalization values. As such, it would be more convincible if more samples in this category could be studied. Since this is not the main topic of this paper, recommendation would be discussed in "future studies" section.

It's noticeable that two measures of leverage are highly correlated with each other, as shown in Table 5. The correlation between market leverage and book leverage is 0.85, which is very similar to the observation of Huang and Song (Guihai Huang, 2006) for Chinese public firms.

2.2. Regression Analysis and Empirical Results

OLS regression analysis was performed to determine the correlations between variables and capital structure.

Table 6 and Table 7 present the results for both measures of leverage. Generally the correlations discovered from this empirical analysis are similar to the observation of US firms. This can be explained by the similarity of both countries' economy and closed business relationship between two countries.

In hypothesis tests, null hypothesis was default assumed no correlations between variables and leverages. At 5% level, all variables (p-value$\leq$0.05) are statistically significant to the leverage. The null hypothesis was rejected. In book leverage model, profitability and tangibility are extremely significant, p-value$\leq$0.001. In market leverage

model, profitability, firm size and market-to-book ratio are extremely significant, while tangibility is only statistically significant. R-squared is only around 0.1 to 0.12, meaning only approximately 11% data were captured. The percentage is acceptable.

Profitability is negative correlated with both measures. However, the effect to book leverage is much smaller than that to market leverage. This finding is consistent with the signaling theory in reality. The firm's profitability usually has a huge effect on the perception of public shareholders. People tend to invest into companies that are profitable. Furthermore, more profits usually lead to higher dividends, although it might not be always the case. This attracts the public, which, in turn, helps firm to raise fund through stock market or re-finance through financial institutions.

Both leverages are positive correlated with tangibility and firm size. However, the effect that firm size to book leverage is negligible. This indicates that when the equity owner invests into the company firm size is not a significant influencer. Tangibility has higher influence on book leverage than market leverage as the property plant & equipment is an important component of total asset and can be used as collaterals for debt borrowing.

Market-to-book ratio as the proxy of growth opportunity is found to be negatively correlated with market leverage but positive with book leverage. This conflict might be in result of different point views between internal management team and outside investors. The company with brighter growth opportunities attracts more investors as those investors bet on their future value of the firm. Thus better future opportunities lead to higher market cap, consequently lowering the market leverage. On the other hand, the internal management team considers future growth opportunities in a different way. They

tend to borrow more money in order to seize the opportunity and generate more returns to the shareholders and creditors. Therefore, better growth opportunities lead to higher book leverage.

2.3. The Effect of Financial Economic Crisis

To evaluate the financial crisis effect on capital structure, data were separated into two set, before 2008 and in/after 2008. The same OLS method was used to obtain the regression results, shown in Table 8 – 11.

The significance changed with segmented data as shown in Table 1. In book leverage model, both profitability and tangibility stay extremely significant to the leverage. However, comparing the results before and after 2008, the influence from profitability and firm size was decreased after the crisis, i.e., 1% change in variable leads to less percentage change in leverage. Firm size became insignificant or non-correlated with leverage, while growth opportunity adversely became extremely significant. It might reflect the fact that investors realized the myth “too big to fail” was not reliable. The investors were more rational to evaluate the potential of the firm before investing into it.

Similar observations occurred with market leverage. The effect of tangibility to market leverage is fairly consistent before or after the crisis compared with dramatic decrease to book leverage. The phenomenon might be explained by the investment hesitation of investors after 2008. The firm experienced hard time to raise money in the market or creditors. Consequently, the firm had to fund internally through its profit. After the crisis,

investors seemed to put more weights on firm's growth opportunities when making decision. The firms with brighter future were easier to borrow money from creditors.

2.4. Robustness Analysis

The Ordinary Least Square method is constrained with its assumptions. Outliers have huge influence in the regression results generated by OLS. In reality, the firms are different from each other, especially the diversification in their intrinsic business model and variances in the features of different industries. Heteroscedasticity becomes a strong suspicion when using these 60 cross-sectional firms.

To testify the validity of the models and see the effect of heteroscedasticity, Robust Least Square method was applied to re-generate the results with whole data set for both book leverage and market leverage models. MM-Estimation was chosen in the calculation. The outputs are shown in Table 13 and Table 14. The results are fairly consistent with the outputs from OLS methods. Therefore, heteroscedasticity is not a serious problem for the estimation in both models.

Chapter 3. Conclusions

In this paper, the determinants of capital structure are analyzed based on sample of 60 Canadian companies listed on TSX in period of 2001 and 2016. Two models, namely, book leverage and market leverage, were examined with four independent variables, i.e., profitability, tangibility, firm size and growth opportunity.

By applying OLS method, the regression analysis shows profitability is negatively correlated with both leverages, whereas tangibility and firm size are positively correlated. Growth opportunity, expressed in a proxy of market-to-book ratio, has a mixed effect on capital structure. These results are consistent with previous empirical and theoretical studies.

The effect of financial economic crisis on capital structure was then investigated by segmenting data into two periods, before 2008 and in/after 2008. Firm size became insignificant relevant when investors made investment decisions. On the contrary, growth opportunity was emphasized when determining the capital structure.

Robust Lease Square method was applied to testify the effect of heteroscedasticity. The comparison indicates that heteroscedasticity is not a serious problem for this analysis.

3.1. Limitation and Future Studies

It’s worth noticing that the lack of sufficient sample size, i.e., number of companies, might be the limitation of this research. In addition, there are many other independent

variables that might have influence in capital structure and were not included in this paper. In future, more data should be collected and more variables should be tested.

In empirical review, the correlations between determinants and capital structure are different from country to country. However, the intrinsic reasons of this observation have not been discussed in this paper. More comparisons should be performed in macro and micro level among countries.

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Appendix A: Tables

Table 1 The Correlation Between Determinants and Leverages Based on Empirical Studies by Different Countries

		USA	UK	China	India	Western Europe	Central & Eastern Europe
Independent Variables	Profitability	N	N/P	N	N	N	N
	Tangibility	P	P	P	P	N	P
	Growth Opportunities	P/N	N	N	P	N	N
	Firm Size	P	P	P	N	P	P

P - Positive correlation; N - Negative correlation

Table 2 The Correlation Between Determinants and Leverages Based on Theoretical Studies

		Leverage Ratio
Independent Variables	Profitability	P/N
	Tangibility	P
	Growth Opportunities	P/N
	Firm Size	P/N

Table 3 Descriptive Statistics of Data Selected

	BOOK_LEV	MARKET_LE	PROFITABIL	TANGIBILITY	FIRM_SIZE	MB
Mean	0.290461	0.412470	0.084237	0.546840	8.694328	0.724010
Median	0.280052	0.404558	0.081779	0.551329	8.749292	0.718160
Maximum	0.765926	2.758416	0.413851	0.983765	11.39304	3.733779
Minimum	0.000000	0.000000	-0.416031	0.000000	1.956446	0.140629
Std. Dev.	0.155717	0.229387	0.064476	0.245089	1.316689	0.184188
Skewness	0.208076	1.411430	0.234240	-0.170177	-0.645648	8.840319
Kurtosis	2.520552	15.32296	10.57341	2.021925	4.134781	144.9153
Jarque-Bera	16.12210	6392.959	2303.038	42.89884	118.2068	818102.3
Probability	0.000316	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	278.8424	395.9714	80.86728	524.9664	8346.555	695.0494
Sum Sq. Dev.	23.25352	50.46120	3.986762	57.60597	1662.589	32.53433
Observations	960	960	960	960	960	960

Table 4 Correlations Difference Between Energy and Non-Enegy Companies

	Book Leverage		Market Leverage	
Variables	**Energy**	**Non-Energy**	**Energy**	**Non-Energy**
Profitability	Extremely significant	Extremely significant	Extremely significant	Extremely significant
Tangibility	Extremely significant	Extremely significant	Extremely significant	Extremely significant
Firm Size	Insignificant	Extremely significant	Insignificant	Extremely significant
Growth Opportunity	Insignificant	Extremely significant	Statistically significant	Extremely significant

Table 5 Correlation Analysis Among Variables

	BOOK_LEV	MARKET_LE	PROFITABIL	TANGIBILITY	FIRM_SIZE	MB
BOOK_LEV	1.000000	0.853073	-0.205807	0.272518	0.117514	0.106910
MARKET_LE	0.853073	1.000000	-0.220085	0.100365	0.222707	-0.177945
PROFITABIL	-0.205807	-0.220085	1.000000	-0.107359	-0.045850	-0.070540
TANGIBILITY	0.272518	0.100365	-0.107359	1.000000	0.197404	0.205416
FIRM_SIZE	0.117514	0.222707	-0.045850	0.197404	1.000000	-0.254470
MB	0.106910	-0.177945	-0.070540	0.205416	-0.254470	1.000000

Table 6 Results of Book Leverage Regression Analysis Using OLS

Dependent Variable: BOOK LEVERAGE
Method: Panel Least Squares
Date: 11/26/17 Time: 13:48
Sample: 2001 2016
Periods included: 16
Cross-sections included: 60
Total panel (balanced) observations: 960

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.119534	0.043205	2.766670	0.0058
PROFITABILITY	-0.418029	0.074161	-5.636778	0.0000
TANGIBILITY	0.141732	0.020570	6.890105	0.0000
FIRM SIZE	0.009861	0.003866	2.550758	0.0109
MB	0.059259	0.027707	2.138782	0.0327

R-squared	0.113708	Mean dependent var	0.290461
Adjusted R-squared	0.109996	S.D. dependent var	0.155717
S.E. of regression	0.146903	Akaike info criterion	-0.992891
Sum squared resid	20.60942	Schwarz criterion	-0.967543
Log likelihood	481.5879	Hannan-Quinn criter.	-0.983238
F-statistic	30.63069	Durbin-Watson stat	0.161522
Prob(F-statistic)	0.000000		

Table 7 Results of Market Leverage Regression Analysis Using OLS

Dependent Variable: MARKET LEVERAGE
Method: Panel Least Squares
Date: 11/26/17 Time: 13:31
Sample: 2001 2016
Periods included: 16
Cross-sections included: 60
Total panel (balanced) observations: 960

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.357781	0.063405	5.642741	0.0000
PROFITABILITY	-0.769624	0.108835	-7.071476	0.0000
TANGIBILITY	0.076822	0.030188	2.544779	0.0111
FIRM SIZE	0.026662	0.005673	4.699610	0.0000
MB	-0.213113	0.040661	-5.241177	0.0000

R-squared	0.120381	Mean dependent var	0.412470
Adjusted R-squared	0.116697	S.D. dependent var	0.229387
S.E. of regression	0.215588	Akaike info criterion	-0.225702
Sum squared resid	44.38662	Schwarz criterion	-0.200353
Log likelihood	113.3367	Hannan-Quinn criter.	-0.216048
F-statistic	32.67440	Durbin-Watson stat	0.184181
Prob(F-statistic)	0.000000		

Table 8 Results of Book Leverage Regression Analysis Using OLS With Data Before 2008

Dependent Variable: BOOK LEVERAGE
Method: Panel Least Squares
Date: 11/26/17 Time: 13:48
Sample: 2001 2007
Periods included: 7
Cross-sections included: 60
Total panel (balanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.103906	0.054339	1.912195	0.0565
PROFITABILITY	-0.648792	0.113118	-5.735522	0.0000
TANGIBILITY	0.174417	0.031182	5.593587	0.0000
FIRM SIZE	0.017303	0.005420	3.192169	0.0015
MB	0.007489	0.030515	0.245424	0.8062

R-squared	0.162631	Mean dependent var	0.287915
Adjusted R-squared	0.154559	S.D. dependent var	0.156908
S.E. of regression	0.144274	Akaike info criterion	-1.022378
Sum squared resid	8.638163	Schwarz criterion	-0.974280
Log likelihood	219.6994	Hannan-Quinn criter.	-1.003368
F-statistic	20.14991	Durbin-Watson stat	0.202316
Prob(F-statistic)	0.000000		

Table 9 Results of Book Leverage Regression Analysis Using OLS With Data After 2008

Dependent Variable: BOOK LEVERAGE
Method: Panel Least Squares
Date: 11/26/17 Time: 13:49
Sample: 2008 2016
Periods included: 9
Cross-sections included: 60
Total panel (balanced) observations: 540

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001754	0.081541	0.021508	0.9828
PROFITABILITY	-0.352257	0.100544	-3.503514	0.0005
TANGIBILITY	0.103832	0.028809	3.604153	0.0003
FIRM SIZE	0.008689	0.006411	1.355181	0.1759
MB	0.257342	0.065372	3.936548	0.0001

R-squared	0.112549	Mean dependent var	0.292441
Adjusted R-squared	0.105914	S.D. dependent var	0.154900
S.E. of regression	0.146468	Akaike info criterion	-0.994805
Sum squared resid	11.47727	Schwarz criterion	-0.955069
Log likelihood	273.5974	Hannan-Quinn criter.	-0.979264
F-statistic	16.96260	Durbin-Watson stat	0.126919
Prob(F-statistic)	0.000000		

Table 10 Results of Market Leverage Regression Analysis Using OLS With Data Before 2008

Dependent Variable: MARKET LEVERAGE
Method: Panel Least Squares
Date: 11/26/17 Time: 13:50
Sample: 2001 2007
Periods included: 7
Cross-sections included: 60
Total panel (balanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.207325	0.070127	2.956415	0.0033
PROFITABILITY	-0.976882	0.145985	-6.691644	0.0000
TANGIBILITY	0.101048	0.040241	2.511041	0.0124
FIRM SIZE	0.040188	0.006995	5.745055	0.0000
MB	-0.136372	0.039381	-3.462876	0.0006

R-squared	0.191050	Mean dependent var	0.401076
Adjusted R-squared	0.183253	S.D. dependent var	0.206025
S.E. of regression	0.186193	Akaike info criterion	-0.512232
Sum squared resid	14.38716	Schwarz criterion	-0.464134
Log likelihood	112.5687	Hannan-Quinn criter.	-0.493221
F-statistic	24.50275	Durbin-Watson stat	0.212804
Prob(F-statistic)	0.000000		

Table 11 Results of Market Leverage Regression Analysis Using OLS With Data After 2008

Dependent Variable: MARKET LEVERAGE
Method: Panel Least Squares
Date: 11/26/17 Time: 13:47
Sample: 2008 2016
Periods included: 9
Cross-sections included: 60
Total panel (balanced) observations: 540

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.737863	0.128960	5.721623	0.0000
PROFITABILITY	-0.587182	0.159015	-3.692617	0.0002
TANGIBILITY	0.116572	0.045563	2.558484	0.0108
FIRM SIZE	0.010494	0.010140	1.034942	0.3012
MB	-0.603305	0.103390	-5.835254	0.0000

R-squared	0.118825	Mean dependent var	0.421333
Adjusted R-squared	0.112237	S.D. dependent var	0.245853
S.E. of regression	0.231646	Akaike info criterion	-0.077997
Sum squared resid	28.70802	Schwarz criterion	-0.038260
Log likelihood	26.05917	Hannan-Quinn criter.	-0.062456
F-statistic	18.03603	Durbin-Watson stat	0.167825
Prob(F-statistic)	0.000000		

Table 12 Significance Changes in Correlations with Segmented Data at 0.05 Level

	Book Leverage			Market Leverage		
Variables	**2001-2016**	**Before 2008**	**Since 2008**	**2001-2016**	**Before 2008**	**Since 2008**
Profitability	Extremely	Extremely	Extremely	Extremely	Extremely	Extremely
Tangibility	Extremely	Extremely	Extremely	Statistically	Statistically	Statistically
Firm Size	Statistically	Robust	Insignificant	Extremely	Extremely	Insignificant
Growth Opportunity	Statistically	Insignificant	Extremely	Extremely	Extremely	Extremely

0.01≤p-value≤0.05	Statistically significant	p-value≤0.001	Extremely significant
0.001≤p-value<0.01	Robust significant	p-value>0.05	Insignificant

Table 13 Regression Analysis for Book Leverage Using Robust Least Square Method

Dependent Variable: BOOK LEVERAGE
Method: Robust Least Squares
Date: 11/28/17 Time: 22:41
Sample: 2001 2016
Included observations: 960
Method: MM-estimation
S settings: tuning=1.547645, breakdown=0.5, trials=200, subsmpl=5, refine=2, compare=5
M settings: weight=Bisquare, tuning=4.684
Random number generator: rng=kn, seed=1791621629
Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.123479	0.044074	-2.801614	0.0051
PROFITABILITY	-0.625238	0.075653	-8.264515	0.0000
TANGIBILITY	0.083325	0.020984	3.970853	0.0001
FIRM SIZE	0.017582	0.003944	4.458288	0.0000
MB	0.382780	0.028265	13.54278	0.0000

Robust Statistics

R-squared	0.129579	Adjusted R-squared	0.125933
Rw-squared	0.225478	Adjust Rw-squared	0.225478
Akaike info criterion	991.1613	Schwarz criterion	1016.370
Deviance	17.26988	Scale	0.132612
Rn-squared statistic	348.4386	Prob(Rn-squared stat.)	0.000000

Non-robust Statistics

Mean dependent var	0.290461	S.D. dependent var	0.155717
S.E. of regression	0.158368	Sum squared resid	23.95184

Table 14 Regression Analysis for Market Leverage Using Robust Least Square Method

Dependent Variable: MARKET LEVERAGE
Method: Robust Least Squares
Date: 11/28/17 Time: 22:41
Sample: 2001 2016
Included observations: 960
Method: MM-estimation
S settings: tuning=1.547645, breakdown=0.5, trials=200, subsmpl=5, refine=2, compare=5
M settings: weight=Bisquare, tuning=4.684
Random number generator: rng=kn, seed=1771833121
Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.321699	0.062379	5.157182	0.0000
PROFITABILITY	-0.858965	0.107073	-8.022260	0.0000
TANGIBILITY	0.106499	0.029699	3.585913	0.0003
FIRM SIZE	0.025066	0.005581	4.491048	0.0000
MB	-0.155686	0.040003	-3.891850	0.0001

Robust Statistics

R-squared	0.107853	Adjusted R-squared	0.104116
Rw-squared	0.156928	Adjust Rw-squared	0.156928
Akaike info criterion	936.3469	Schwarz criterion	961.6541
Deviance	33.68553	Scale	0.190593
Rn-squared statistic	137.0411	Prob(Rn-squared stat.)	0.000000

Non-robust Statistics

Mean dependent var	0.412470	S.D. dependent var	0.229387
S.E. of regression	0.216183	Sum squared resid	44.63199

Appendix B: Pictures

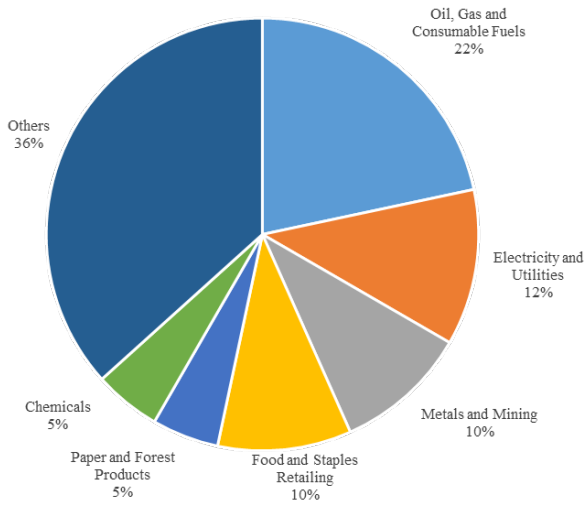

Figure 1 Industrial Segments From Selected Data