

CAPITAL UNIVERSITY OF SCIENCE AND  
TECHNOLOGY, ISLAMABAD



# Empirical Testing of Cyclicity of Debt Equity Ratio: A Case Study of Selected US Firms

by

Sahrish Akhtar

A MS Project submitted in partial fulfillment for the  
degree of Master of Science

in the

Faculty of Management & Social Sciences  
Department of Management Sciences

2019

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*This MS Final Project is dedicated to my parents, brothers and sister especially my Father Mr. Muhammad Akhtar Khan, who always support and encourage me in every step of my studies. I thank all the friends who help me and support me in completion of my work.*



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## *Acknowledgements*

I would like to express my special thanks to Allah Almighty who gave me the courage of completion of my Final MS Project. I also want to express my heartily thanks to the people who help me in this task.

I sincerely thanks to my supervisor Dr. Mazhr Iqbal (Faculty member of Management Sciences, CUST Islamabad) for his support and motivation during my work period. I really appreciate your mentorship and encouragement throughout my journey of project.

In the end, I would also thank to the fellow students of my graduate life who make my journey of study easy and always be there for kind support and help.

I would like to express my special thanks to Allah Almighty and then to my supervisor.

## *Abstract*

Most of the previous work has been done on firm-specific and country-specific determinants of the capital structure. The Financial Instability Hypothesis, propounded by Minsky, which emphasizes the cyclicity of debt/equity ratio which has been neglected. To fulfill the gap, of checking the cyclicity of debt/equity ratios, this study has been done. Hence, we have chosen the US firms for our analysis because US was the epicenter of global financial crisis of 2008 and its financial markets are well developed. We have taken the data, consisting 16 years, and is divided into two equal parts, before the crisis period (2000-2007) and after the crisis period (2009-2016).

The t-test analysis has been done on three levels on the selected data; aggregate level, industry level and inter-industry level. The results for aggregate data show that the FIH holds. The results for industry-wise analysis show that the FIH holds for 6 industries out of 9 industries and the inter-industry wise analysis give the 36 comparisons for 9 different industries, consisting different number of firms in each industry, show that the debt/equity ratio of 18 comparisons are statistically same and 18 comparisons are statistically different before and after the global financial crisis of 2008.

**Keywords: Debt/equity Ratio, Financial Crisis**

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# Chapter 1

## Introduction

This chapter is divided into six sections. Section one describes the theoretical background for this study. Section two explains the research gap of the study. Section three contains significance of the study. Sections four describe the main objectives of the study. In section five, research questions are explained and section six contains hypothesis for the study.

### 1.1 Theoretical Background

Over the years, capital structure choice has attracted significant consideration of academic researchers, firm managers and policy makers. Initially the debate was on the point whether capital structure matters for creation of value or not. In this regard, the mainstream view is that an increase in debt equity ratio adds to the firm-value at an initial stage. It continues until the optimal debt equity ratio is achieved. Any further increase in debt equity ratio reduces the firm-value, Levy and Sarnat (1990). Modigliani and Miller (1958) criticized this view due to the fact that the operating income of a firm remains unchanged whether its investment is financed totally by equity or by a mix of debt and equity. Therefore, in their view, the capital structure does not matter for the firm-value.

To illustrate this view point, it is assumed that financial markets of a country are fully developed. That is, an individual investor can lend and borrow any amount

at the same interest rate at which business firms can do. Accordingly, if the share price of a levered firm exceeds that of an otherwise identical firm financed totally by equity, then arbitragers can make money by selling short the high-priced shares of levered firm and buying on credit the low priced shares of unlevered firm and vice versa. Due to such a possibility of arbitrage, the value of outstanding shares of levered and unlevered firms becomes equal within a short time. Probably financial markets of any country are not, so far, as much developed as this view requires them to be; therefore the former view seems to be dominant in the real life, Modigliani and Miller (1958) and Levy and Sarnat (1990).

Later on, many researches focused on exploring possible determinants of debt equity ratio. Some of them have considered only internal or micro factors such as proportion of tangible assets, firm size, its profitability, its liquidity and its growth prospects, whereas some others have focused on external or macro factors such as market interest rate, inflation rate, monetary policy stance and GDP growth rate. Yet some others have considered both internal and external factors. To test the significance of the impact of possible factors, multi-variate analysis mostly using multiple regression equation has been used. As a result, some of these factors have been found having significant effect and others having insignificant effect on the debt equity ratio. The results are not conclusive; rather they are mixed.

Minsky (1986) innovated the financial instability hypothesis (FIH) which describes the debt financing process in a capitalist economy and relates it to business cycles in such an economy. Minsky defines three postures of debt financing; hedge, speculative and Ponzi. Every firm starts with hedge financing which means that even the conservative estimates of projected cash flows of the firm come out greater than the scheduled debt servicing payments. In such a case, the firm does not need additional borrowing to service its outstanding debt because the risk of defaulting on its scheduled debt payments is almost zero. However, after validation of a single or few consecutive hedge financing contracts, both borrowing firms and financing financial intermediaries reduce their margins of safety and become inclined to speculative financing.

In speculative financing, though the projected net present value of a debt-financed project is ensured to be positive but the borrowing firm may not generate sufficient funds in the short run to pay back its due debt servicing payments. Therefore, the borrowing firm might have to borrow additional funds for a short period to meet its debt obligations. If such financing contracts are validated consecutively, then both parties are tempted to go for Ponzi financing by reducing their margins of safety further.

In case of Ponzi financing, the debt-financed project usually does not generate regular cash flows to service the outstanding debt periodically, though its net present value is ensured to be positive mostly on the basis of capital gains towards the maturity of debt contract. As a result, the borrowing firm has to borrow additional funds continuously for the purpose of debt servicing payments until the ending period of underlying project. It is a financially fragile moment; any denial from further financing and any disappointment about realization of expected capital gains may result in financial difficulties of borrowing firm at the first place. At the second stage, any bankruptcy of a troubled firm generates a contagion effect and results in many other bankruptcies.

To put it differently, the FIH describes that business cycles are generated endogenously. It also implies that debt equity ratio of a firm, industry and of overall economy is a pro-cyclical variable. The FIH does not emphasize on the direction of causality; it could be either revenue of a firm or an industry or GDP of an economy that causes the debt equity ratio in the concerned entity or the other way round. Although the FIH has been much appreciated theoretically particularly after the global financial crisis of 2008, yet it has not been tested empirically using firm-level data. More emphasis has been given, so far, to the question of value-addition due to capital structure and to exploration of major determinants of debt equity ratio. Therefore, the main purpose of this study is to simply test the cyclicity of debt equity ratio.

The global financial crisis of 2008 delivers an interesting opportunity to test the cyclicity of debt/equity ratio of firms. Over the years, capital structure choice has attracted significant consideration of firm managers, investors and policy makers.

To find out how firms choose their funding, it is essential to consider the effect of tax policies, agency relations, and legal institutions on financing decisions. Several researchers have investigated possible determinants of capital structure both internal and external ones, some of which have significant effect while others do not. Also several empirical studies have been conducted to understand the influence of capital structure on firm value.

Two traditional methodologies have been developed to justify proportion of debt and equity of a firm. One is, the Trade-Off Theory discussed by Kraus & Berger (1973), Morellec (2003) and Myers (1977). This theory states that an increase in debt financing reduces tax burden but on the other hand, it adds to the bankruptcy risk of the firm. As long as, the benefit of tax deduction is believed to be more than the cost of bankruptcy, the debt/equity ratio is increased. After the optimal debt/equity ratio, any further increase in debt financial adds more to bankruptcy cost than reduction in tax payment. <sup>1</sup>

The other theory is called Pecking Order Theory. According to this theory, there are three main sources of financing; retained earnings, debt financing and equity financing. The cost of retained earnings is minimum because there is no contractual cost and no nuisance cost such as of equity financing. On the other hand, the cost of equity financing is considered to be the highest. According to this theory, a firm prefers to finance its new projects by retained earnings as long as it lasts. Then it goes for debt financing and finally it goes for equity financing (Myers & Majluf, 1984).

Some macroeconomic variables also affect the debt/equity decision of a firm. Among these macroeconomic variables, the most significant variables which affect the leverage ratio of a firm are Inflation and growth rate of GDP. Due to inflation debt/equity ratio increases because the cost of borrowing in real terms decreases. That is, the borrower has to pay a fixed amount in future which can buy less goods and services. <sup>2</sup>

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<sup>1</sup>See, for example, Antoniou, Guney & Paudyal (2008), Huang & Ritter (2009), ztekin & Flannery (2012) and ztekin (2015).

<sup>2</sup>See, for example, Kuhnhausen & Stieber (2014), Kksal, Orman & Oduncu (2013), Frank & Goyal (2009).

Recently, a study has been done to identify any possible role of financial crisis 2008 on the debt/equity ratio of firms selected from countries included in Gulf Cooperation Council (Zeitun, Temimi & Mimouni, 2017). The results show that the influence of this crisis has not been same for all the countries rather it varied from country to country. It also indicates that the pace of adjustment to re-achieve optimal capital ratio has been, on the average, gentle after the crisis due to a decrease in supply of debt. It means that firms had having problem to obtain debt because moneylenders became more careful in approving loan requests.

Many recent studies have been intended to understand the endogenous leverage process.<sup>3</sup> But the leverage before and after the financial crisis has not been considered in the framework of a worldwide relative setting including listed and non-listed firms (financial and non-financial). This study has been done to see the debt/equity patterns across companies and industries during the period of 2000-2016.

## 1.2 Research Gap

Previous studies mostly focused on possible determinants of debt equity ratio. Some of them have considered only internal or microeconomic factors such as tangible assets, firm size, firm profitability and the amount of liquid funds and its growth prospects, whereas some others have focused on external or macroeconomic factors such as market interest rate, inflation rate and GDP growth rate. But they have not considered the more basic question, what is the overall nature of debt/equity ratio, whether it is pro-cyclical, a-cyclical or counter cyclical and also whether the debt/equity ratio of different industries has been same or different. This is the gap which this research intends to fill, which has been ignored by previous researchers.

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<sup>3</sup>See, for example, Emmanuel (2012); Fostel & Geanakoplos (2008)

### 1.3 Significance of the Study

Researchers of the previous studies assumed that the firm managers are the persons who take the decisions about the debt/equity ratio of a firm whereas Minsky's theory, Financial Instability Hypothesis emphasizes that bank managers are the persons who grant the debt or who accept or reject debt financing requests of firm managers. Most of the contribution of work, in this regard, is on the firm specific factors, country specific factors and the impact of financial crisis on capital structure. Researchers have focused less on the comparison of capital structure of selected firms, before and after the Global Financial Crisis of 2008. So it is important to explore this area.

### 1.4 Research Objectives

- To explore whether the debt/equity ratio of all selected firms before the crisis had been greater than that after the crisis.
- To test whether the debt/equity ratio of various industries before the crisis had been greater than that after the crisis.
- To explore whether the pattern of debt/equity ratio of different industries has changed due to the global financial crisis of 2008 or not.

### 1.5 Research Questions

- Is the overall debt/equity ratio of US firms pro-cyclical?
- Is the debt/equity ratio of each industry pro-cyclical?
- Has the pattern of debt/equity ratio of different industries changed due to crisis? That is, if debt/equity ratio of industry "i" is greater than that of industry "j", before the crisis; does it remain greater after the crisis?

## 1.6 Hypotheses

### 1.6.1 For Aggregate Data

**Null hypothesis:** The overall leverage ratio of firms is same before and after the financial crisis.

$$H_0: \text{Overall } (d/e)^b_{(i,j)} = \text{Overall } (d/e)^a_{(i,j)}$$

**Alternative hypothesis:** The overall leverage ratio of firms is higher before the crisis and less after the crisis.

$$H_1: \text{Overall } (d/e)^b_{(i,j)} > \text{Overall } (d/e)^a_{(i,j)}$$

Where;

Subscript 'i' represents '*i*<sup>th</sup>' firm and subscript 'j' represents 'j<sup>th</sup>' year. The subscript 'i' varies from 1-50 and 'j' varies from 1-8.

Superscript 'b' represents the period before the financial crisis (2000-2007).

Superscript 'a' represents the period after the financial crisis (2009-2016).

### 1.6.2 For each industry

**Null hypothesis:** The leverage ratio of each industry is same before and after the crisis.

$$H_0: \text{Selected industry's } [(d/e)^b_{(i,j)} = (d/e)^a_{(i,j)}]$$

**Alternative hypothesis:** The leverage ratio of each industry is higher before the crisis and less after the crisis.

$$H_1: \text{Selected industry's } [(d/e)^b_{(i,j)} > (d/e)^a_{(i,j)}]$$

Where;

Subscript 'i' represents '*i*<sup>th</sup>' firm in a selected industry and subscript 'j' represents

' $j^{th}$ ' year. The subscript 'i' varies according to the number of firms in each industry that is not same for all industries.

Superscript 'b' represents the period before the financial crisis (2000-2007) for each selected industry.

Superscript 'a' represents the period after the financial crisis (2009-2016) for each selected industry.

### 1.6.3 For inter-industry comparison

**Null hypothesis:** The relationship between the debt/equity ratios of industry "i" and industry "j" remains unchanged before and after the crisis.

$$H_0: \text{Selected industries } [(d/e)^b_{(i)} - (d/e)^b_{(j)}] = [(d/e)^a_{(i)} - (d/e)^a_{(j)}]$$

**Alternative hypothesis:** The relationship between the debt/equity ratios of industry "i" and industry "j" does changed before and after the crisis.

$$H_1: \text{Selected industries } [(d/e)^b_{(i)} - (d/e)^b_{(j)}] \neq [(d/e)^a_{(i)} - (d/e)^a_{(j)}]$$

Where;

Subscript 'i' represents one selected industry and subscript 'j' represents another selected industry. The subscript 'i' and 'j' varies according to the number of industries; that is (9).

Superscript 'b' represents the period before the financial crisis (2000-2007) for every selected industry.

Superscript 'a' represents the period after the financial crisis (2009-2016) for every selected industry.

# Chapter 2

## Literature Review

### 2.1 Determinants of Capital Structure:

This chapter consists of two sections in it. Section one describes the determinants of capital structure. Section two explains the Minsky's Financial Instability Hypothesis.

### 2.2 Determinants of Capital Structure

A turning point in the debate about capital structure starts from (Modigliani, 1958, 1963) which structured the origin for current opinion on capital structure. It is generally observed as an entirely theoretical result as it ignores many crucial factors in the capital structure process like variations and uncertain situations that may take place in the way of financing a firm. They stated that, in a perfect market, how a firm is financed is irrelevant to its cost. This result presented the base with which to look at the actual reasons why capital structure is relevant, that is, a firm's cost is influenced by the capital structure it employs. Some additional reasons comprises of bankruptcy costs, taxes, information asymmetry and agency costs. Then this study can be prolonged to see that, is there in reality, any optimal capital structure exists, which maximizes the cost of any firm.

Most of the researchers <sup>1</sup> have found that a firm's capital structure is not merely influenced by firm-specific factors but also by country specific factors. Because of those country and firm- specific factors, the significant variables of capital structure differ from one market to another. The hypothetical and factual literature of capital structure highlighted the importance of the factors that are internally related to a firm in determining the ideal utilization of debt financing. Moreover it also includes the choice whether to borrow capital from financial intermediaries or from capital markets by issuing bonds, mostly depends on the firms-specific features (that is; growth prospects, proportion of tangible to non-tangible assets, profit rate, size and liquidity). <sup>2</sup>

Rajan & Zingales (1995) have studied determinants of capital structure by examining funding assessments in the major industrialized countries from 1987 to 1991. The study included Japan, UK (United Kingdom), Germany, USA, France, Canada and Italy. They have used regression model for their analysis. They have evaluated the effect of profitability, tangibility, Market to book ratio and size as independent variables on market and book value of leverages. They proved that tangibility is positively correlated with leverages in all the countries. The market to book ratio is negatively correlated and is always significant. Profitability has negative relation with leverages except in Germany and the size is positively related with leverages in all the countries except Germany.

Jensen & Meckling (1996) have evidenced that agency cost rises from the splitting-up of control and ownership of a firm. Additionally, they indicated that managers prefer loans to maximize their own utility rather than for maximizing the value of the firm. The agency cost also arises from the conflicts among debt providers and the equity investors. Those differences may arise in a condition where there is a chance of bankruptcy of organizations. In this situation, management of the organization has opportunities to take more risk. Because then, if the project is fruitful, shareholders will get all the progressive cash flows and in case the project is unproductive, all the losses transfers to debt holder. In the other situation there

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<sup>1</sup>See, for example, Demirg-Kunt and Maksimovic (1999), Booth, Demirg-Kunt and Maksimovic (2001), Claessens, Djankov and Nenova (2001), Bancel and Mittoo (2004)

<sup>2</sup>See, for example, Graham (2015), Harris (1991), Rajan & Zingales (1995), Titman (1988).

is a possibility where may arise the agency cost, where the market position of a company is good and there is a risky debt, in that situation, the management of company has option to not accept the project. Disputes could also rises, when the management takes benefits before the payment of debts. This type of disputes gives birth to a new theory that is recognized as pecking order theory.

Chen & Hammes (1997) have conducted their research, to find out the factors of capital structure, in seven countries United Kingdom, Canada, Sweden, Denmark, Germany, Italy, and United States of America. They applied regression model to find the effect of tangibility, profitability, size and market to book value, on the market capital ratio and book capital ratio and book debt ratio which they used as proxy for leverage. They have verified that tangibility, size, profitability, and market to book ratio have significant effect on the capital structure choices of the firms. Size and tangibility both are positively correlated to leverage whereas profitability is negatively related with leverages.

Researches done empirically on the 2008 crisis are scares and the studies on previous crisis are too many but their results are mixed. For example, Voutsinas & Werner (2011), they have studied the effect of the prices bubble burst of 1989 and the Asian crisis of 1997 on the debt/equity ratios of Japanese firms. Their result showed that variation in credit supply around a crisis negatively affects a company's optimal capital structure. Ariff, Taufiq & Shamsheer (2008), analyzed the effect of Asian crisis 1997 on the debt or equity decision of firms facing financial difficulty in Malaysia. They have used a model of dynamic capital adjustment. The study found that these firms adjusted gradually to achieve the optimal debt/equity ratio as compared to similar firms in developed countries. Deesomsak, Paudyal, & Pescetto (2004), have analyzed the effect of Asian crisis 1997 on capital structure of firms in the Asia-Pacific region. They showed that though the crisis has significantly affected the role of some of the capital structure factors but the effect was not uniform across countries. Hence, while there is clear evidence that the crisis have a significant effect on corporate leverage, the effect seems to vary widely across different countries.

Modigliani & Miller (1963) revised their theory “Capital Structure Irrelevance Principle” by just adding taxes in it and remaining the other assumptions same. They have confirmed that the usage of debt lead towards optimal capital structure which reduces the capital cost and so upturn the operative efficiency. Modigliani & Miller’s theorem holds true only under efficient market and it is impossible to acquire the 100% efficiency that’s why they developed another theory called trade-off theory.

Myers (1984) presented a new theory named as Trade-Off Theory of capital structure. This theory defines that the companies are usually financed by both equities and debts. Theory stretches the idea that how much debt finance or equity finance should be used by the companies to attain balance between the cost and benefits associated with different sources of capital structure. Moreover, the theory talks about the advantages and disadvantages of financing either by equity or by debt. According to this, the optimal capital structure can be attained at the level where benefits gained by debt financing i.e. tax benefits are equal to the debt retained costs like financial distress and bankruptcy. Firms may often experience a dispute of interests between the management of the firm, shareholders and debt holders because of the financial distress. Because of these differences, agency problem raise that gives birth to the agency costs.

Leverage might be affected by stock market development. As the trade-off theory suggests that the impact of conditions in stock market is uncertain. A developed stock market decreases agency costs between stakeholders, particularly between shareholders and bondholders. The reason is that more information is made available to all stakeholders. It means that shareholders can better control managers if they do not act in their best interest. Though, a developed stock market cuts down the cost of equity financing. Therefore, it motivates firm manager to use further equity financing. Demirg, Kunt, & Maksimovic (1996), find that a developed stock market positively affect the debt/ equity ratio of firms in developing countries and negatively affect the debt/equity ratio in developed countries.

In addition, Korajczyk and Levy (2003) worked and differentiate the capital structure of financially constrained and unconstrained firm's response to cyclical fluctuations. They found that financially constrained firms issue debt pro cyclically then less constrained firm issue debt counter cyclically. Their findings were similar to the Pecking Order and Trade-Off theory. Because the deviations from target leverage explain Trade-off theory and negative relationship between profitability and firm leverage explain Pecking Order theory.

In a financial crisis, financial difficulties of different industries are not same. Industries subject to cyclical fluctuations such as tourism, high-tech, logistics, manufacturing and real estate faced more difficulty to regain, after the crisis, the optimal debt/equity ratio. On the other hand, self-protective industry such as healthcare, agriculture, the food industry and education did not deviate much, around the crisis, from their optimal debt/equity ratio. <sup>3</sup>

Shleifer and Wishney (1992) found that firm debt capacity depend on current economic conditions. Firm can borrow more debt in boom even assuming a constant loss given default. If recovery rate is pro cyclical, the debt capacity of firm in a boom can be up to 40% greater than the debt capacity of that same firm in a contraction.

Shah & Hijazi (2004) tried to find out the determinants of capital structure of non-financial companies listed on KSE 100, ranging from the period of 1997-2001. That was the first study done in Pakistan to find the determinants of capital structure of non-financial firms. They have used the Balance Sheet Analysis of Joint Stock Companies, as the key source of data, which was published by State Bank of Pakistan. They have used pooled regression analysis to check the effect of profitability, growth, tangibility and size of the firm on the leverage ratio of the firm. The study has found that tangibility has positive relation with debt however this relation is not statistically significant. Profitability has slightest resistance. This theory describes the opposite relation of debt and profitability. According to this theory, businesses mostly desire to avail internal financing and when that is not available, debt is issued; keeping in mind that debt is economical and can

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<sup>3</sup>See, for example, Zeitun (2017)

be easily available. And when, if it is impossible to obtain debt, then as a last option, equity financing is used. Because issuing of equity for financing gives a wrong signal to the stock market.

Shah & Hihazi (2004) studied the determinants of capital structure of Stock exchange listed non-financial firms in Pakistan. The aim of this research was to find the determinants that force the financial managers to change the capital structure decisions. The study based on 4 years sample period and a sample of 445 non-financial firms taken into consideration. Variables of the study were tangibility, size, growth and profitability. The findings of the study shown that size, profitability, tangibility is positively related with leverage and growth is negative related to debt/equity ratio.

Gurcharan S (2010) analyzed the effect of country-specific determinants on leverage for some ASEAN countries. He found that the selected country effect of stock market and GDP growth rate have statistical significant relationship with leverage. Furthermore, he discussed that larger banking size has insignificant impact on leverage and stock market development as substitute source of funding. The real GDP growth rate has negative influence on leverage because of the high correlation amongst firms' growth and GDP growth rate. He further stated that due to a slight change in inflation rate in the selected countries, inflation has insignificant relation with leverage because inflation is negligible in reducing the cost of debt. Therefore, they didn't find any positive or negative relationship between inflation and leverage.

Christopher B. Barry, Steven C. Mann, Vassil T. Mihov, and Autumn (2008), found the strong evidence that the amount and number of debt issuance of the company depends on the interest rate. When interest rates decrease, companies tend to refinance past debt that is eligible for refinancing.

A rising form of research, Akbar, Rehman, & Ormrod (2013), Faulkender (2005), Judge A. (2012), Leavy (2009), Sufi (2009), Lemmon (2010), investigates that the impact of the supply of capital on the debt/equity ratio of a firm and finds that conditions of credit supply had a considerable influence on debt financing decision of incorporated firms. Specifically, financial crisis provide a normal trial to study

the effect of credit supply on debt financing decision of a firm. In between the crisis period, lending usually becomes rare and expensive, though a firm itself becomes careful about external borrowing.<sup>4</sup> These abnormal conditions are usually affected both demand for and supply of debt. In such period, banks face liquidity problems which limit their capability to lend. Similarly, bondholders unload their loan positions and invest in commodity and currency markets. Firms over such period, become more careful about debt financing option for new projects because of incorrect signals which credit market generates. Though, they need more debt to cope with the low internal cash flows on their ongoing projects during turmoil.

Velnamby & Niresh (2012) have been studied the relation between the profitability and capital structure of ten Srilankan listed banks and covered the data range of past 8 years (2002-2009). They have been used descriptive statistics and correlation analysis to analyze the relationship between profitability and capital structure. They concluded from the results of their analysis that there is a negative relationship exists between profitability and capital structure except for the relationship among debt to equity and return on equity. Additionally, their results have been suggested that almost 89% of total assets in the banking sector of Sri Lanka are characterized by debt, because the banks are extremely geared financial entities.

Zeitun (2017) studied the impact of macroeconomic variables on debt/equity ratio around the financial crisis. He concluded that growth rate of GDP continues to have positive impact on debt/equity ratio before the crisis but inflation has significant after the financial crisis of 2008. The reason is that inflation is normally low though uncertain after a financial crisis. On one side, as inflation decreases, the nominal short term interest rates also decrease, consequently, the demand for debt financing increases. On the other side, after a crisis, uncertainty about recovery and future prospects of a firm increase which lead to an increase in long term real interest rates. It increases the cost of debt financing. However, the climate of uncertainty leads to higher long-term interest rates. Hatzinikolaou, Katsimbris & Noulas (2002), argue that inflation uncertainty increases interest rate risk and

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<sup>4</sup>See, for example, Harrison & Widjaja (2014), Akbar, Rehman & Ormrod (2013), Ivashina & Scharfstein (2010), Vithessonthi & Tongurai (2015).

therefore leads to increasing cost of debt. It seems that these opposing effects of inflation after the crisis cancel each other. They concluded that after the crisis, microeconomic variables become more relevant than macroeconomic variables.

The policy implication of above studies is that the tax benefit to debt financing may be slashed, because deductibility of interest payment from taxable income of corporations induces more debt financing. Consequently, the risk of bankruptcy of overly indebted firms shoots up. Therefore, policy makers should try to take away tax benefit edge of debt financing so that equity financing becomes equally attractive regarding tax payments. Recently, Temimi, Zeitun, & Mimouni (2016), have shown that impact of tax reforms may not be for all industries in a country. It adds to the difficulty of reforming tax system. This study is maybe very useful for policy making.

Iqbal & Kume (2015) studied the impact of the financial crisis 2008 on firms in three selected countries namely; UK, France, and Germany. They found that debt/equity ratio increased during the crisis and decreased afterward to the level before the crisis. Further, they showed that the firms with low debt/equity ratio before the crisis had accumulated more debt after the crisis while the opposite is true for firms with high debt/equity ratio before the crisis. They found that decrease in credit supply had a significant bad impact on investment of incorporated firms. Duchin, Ozbas, & Sensoy (2010) surveyed firm managers from different continents such as North America, Europe and Asia. Their results showed that the decrease in credit supply left a long term negative impact on GDP growth rate.

Some countries in Gulf Corporation Council have got experienced more adverse effects of economic downturn than those in others. The debt/equity ratio in Saudi Arabia, for example, did not decrease significantly after the crisis. It suggests that companies with limited retained earnings had to borrow more. Since there was probably not any shortage of credit supply in the country being the major exporter of oil, therefore, such companies did not face any shortage of credit supply. This

can be attributed to the abundance of oil revenues in Saudi Arabia, which is one of the world biggest exporters of oil.<sup>5</sup>

Henderson et al. (2006) has been noted that negative relationship among the level of interest rates and both short term and long term debt issued, which is also consistent with Graham and Harvey (2001).

Hijazi & Tariq (2006) has defined the determining factors of the capital structure in the Cement Industry of Pakistan. They have taken 22 firms from the cement sector, which were listed at the KSE 100. The Basic Balance Sheet Analysis Joint Stock Companies, published by the State Bank of Pakistan, was taken as a source of data. They practiced pooled regression analysis model to prove the impact of debt firm on the size of the firms, sales growth, tangibility and profitability. The results presented by them, that the size of the firm and profitability is negatively correlated with each other while sales growth and asset's tangibility are positively correlated with each other.

Drobetz et al. (2007) has been stated that the speed of adjustment towards target leverage is faster in favorable macroeconomic conditions than in unfavorable conditions. This indicates that when interest rates are low and the risk of disruptions in the global financial systems are negligible; firms' speed of adjustment towards target leverage is faster.

Before the financial crisis 2008, debt/equity ratios and disclosure of off-balance sheet of commercial banks in US and other countries did not indicate their involvement in high levels of risk taking. Therefore, investment banks in the US and outsized investment banks in Europe consistently enlarged their debt/equity ratio, especially after the deregulation of banks in 2004 in the US. (Kalemli-Ozcan, Sorensen, & Yesiltas, 2012), found that after the financial crisis 2008, those banks which had more exposure to sub-prime mortgage assets experienced a significant decline in their assets. The restrictiveness of bank rules in different countries before the financial crisis 2008 did not show much effect on the debt/equity ratio of these countries. It means that financial rules were not applied in their true spirit.

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<sup>5</sup>See, for example, Zeitun (2017)

Thus, evidence from latest empirical studies across countries is sometimes differing. For example, Booth (2001) and Maurizio (2009) found that there is a negative relation between the leverage and the profitability. Conversely, Fraser et al. (2006) and Al-Ajmi et al. (2009) found that there is a positive relation among the leverage and the profitability. Stimulatingly, the third group of studies found a mixed association among these two variables, Bhaduri (2002), Chang et al (2009), Kouki and Ben (2012). The main difference between these studies is due to differences in taxes (trade-off theory), information asymmetry (pecking order theory), and agency problems (agency theory) across countries. Another study, recommends that any capital structure theory might work well in numerous situations than others. Since the theories could not be practical commonly to the numerous sets of capital structure determinants, used in the various studies.

### **2.3 Minsky's Financial Instability Hypothesis**

Minsky (1992), came up with the Financial Instability Hypothesis (FIH) that has both empirical and theoretical features. It confronts the classic precepts of Smith and Walras, who implied that the economy can be most excellently understood by assuming that it is frequently an equilibrium-seeking and sustaining system. The theoretical discussion of the FIH appears from the categorization of the economy as a capitalist economy with wide-ranging capital assets and a sophisticated financial system.

As it is well-known, Minsky described three financial postures, equivalent to different degrees of fragility. Hedge financing is the safest position, retaining an extensive margin of safety in the form of the spread between expected returns from assets and carried out cash outflows on liabilities. Speculative financing entails the eventual need to roll over principal and Ponzi financing requires lenders to be willing to capitalize interest due, besides rolling over principal, resulting in increasing values for debt.

Hyman Minsky's theory of financial crises is based on the concept of a growing economy. With the increase in growth, optimism also increases and the ways of

development about the accurate level of debt and risk begin to change. Values of financial assets increase and the overall level of speculation rises. Speculation is considered as attempting a bet on the upcoming trends and behavior of the market, Keynes (1936), and the overall method of financing assets whose price determines on the future growths, Minsky (1975).

Post Keynesian contributions have been prospering since 20 years or above, which work on the basis of Hyman Minsky's findings. But all these models are exceptionally sophisticated. These models use arithmetic simulations to get the accurate results. Hence a study suggests an initial and systematically a controllable model of debt and accumulation that stimulate numerous Minskyan ideas and thoughts as endogenous interest rate and financial fragility, Charles (2008).

# Chapter 3

## Methodology

This chapter describes three sections. Section one includes the model specification for the study. Sections two explain construction of variables and data description. And the third section contains the estimation technique for this study.

### 3.1 Model Specification

It consists of three levels of data analysis. At the first level, we did the analysis for all firms selected from different industries of US economy. Firstly, we have taken the aggregate data of 50 randomly selected US firms and apply paired t-test analysis on the debt/equity ratio of each firm separately, before and after the financial crisis of 2008. Then we have taken the average of debt/equity ratio of each firm before and after the crisis and again apply the paired t-test analysis on that data to check the accuracy. At the second level, we have taken the same data of each industry one by one and used the paired t-test analysis on it. In the third level, data have been taken as inter-industry level and used un-paired t-test analysis on it to check the cyclicity of debt/equity ratio of US firms.

### 3.1.1 For Aggregate data

$$t_{cal} = \frac{\bar{X}_b - \bar{X}_a}{\sqrt{SD_b/n_b + SD_a/n_a}} \quad \text{----- (i)}$$

Where;

$t_{cal}$  = Calculated value of t-statistics for aggregate data (all selected firms).  $\bar{X}_b$  = The average debt/equity ratio of all selected firms before the crisis. It is calculated as;

$$\sum_{i=1}^8 \sum_{j=1}^{50} X_{ij} / n_b$$

$\bar{X}_a$  = The average debt/equity ratio of all selected firms after the crisis. It is calculated as;

$$\sum_{i=1}^8 \sum_{j=1}^{50} X_{ij} / n_a$$

$SD_b$  = Standard deviation of individual debt/equity ratios of all selected firms before the financial crisis.

Where standard deviation is calculated as;

$$SD_b = \left[ \sum (X - \bar{X})^2 / n_b - 1 \right]^{1/2}$$

$SD_a$  = Standard deviation of individual debt/equity ratios of all selected firms after the financial crisis.

Where standard deviation is calculated as;

$$SD_a = \left[ \sum (X - \bar{X})^2 / n_a - 1 \right]^{1/2}$$

$n_b$  = Number of observations ( $50 * 8 = 400$ ) before the financial crisis considering all selected firms.

$n_a$  = Number of observations ( $50 \times 8 = 400$ ) after the financial crisis considering all selected firms.

The names of 50 selected US firms are given in table 3.1.

### 3.1.2 For Industry-wise data

$$t_{cal} = \frac{\bar{X}_i^b - \bar{X}_i^a}{\sqrt{SD_i^b/n_i^b + SD_i^a/n_i^a}} \text{ ----- (ii)}$$

Where;

$t_{cal}$  = Calculated value of t-statistics for each selected industry.

$\bar{X}_i^b$  = The average debt/equity ratio of all firms in a given industry before the crisis.

$\bar{X}_i^a$  = The average debt/equity ratio of all firms in a given industry after the crisis.

$SD_i^b$  = Standard deviation for industry "ith" before the financial crisis.

$SD_i^a$  = Standard deviation for industry "ith" after the financial crisis.

$n_i^b$  = Number of observations (number of firms in "ith" industry \* 8 years) for industry i' before the financial crisis.

$n_i^a$  = Number of observations (number of firms in "ith" industry \* 8 years) for industry i' after the financial crisis.

The names of all industries along with their firms are given in table 3.2.

### 3.1.3 For Inter-Industry wise data

$$t_{cal} = \frac{(\bar{X}_1^b - \bar{X}_2^b) - \Delta}{[S(1/n_1 + 1/n_2)]^{1/2}}$$

$S_p$  is calculated as;

$$SD = \frac{(\mathbf{n}_1 - 1) S^2_1 + (\mathbf{n}_2 - 1) S^2_2}{\mathbf{n}_1 + \mathbf{n}_2 - 2}$$

Where;

$t_{cal}$  = Calculated value of t-statistics for selected industry.

$\bar{X}_1$  = The mean value of industry '1' before and after the crisis.

$\bar{X}_2$  = The mean value of industry '2' before and after the crisis.

$n_1$  = Number of observations (number of firms in the industry \* 8 years) for industry '1' before and after the financial crisis.

$n_2$  = Number of observations (number of firms in the industry \* 8 years) for industry '2' before and after the financial crisis.

$SD_2$  = Standard deviation for each selected industry before and after the financial crisis.

## 3.2 Construction of Variables and Data Description

In this study we have taken debt/equity ratio of selected U.S firms to check the cyclicity of debt/equity ratio before and after the global financial crisis of 2008.

Debt/equity ratio is defined as;

$$\text{Debt/Equity Ratio} = \text{Long term Debt/Shareholders' Equity}$$

Where;

Debt includes only long term debt (liabilities) and;

Equity contains shareholders' equity (total assets - total liabilities)

### 3.2.1 Data Description

Since US was the epicenter of the global financial crisis of 2008 and its financial markets are fully developed as assumed for the validity of FIH, therefore to test the hypothesis we have taken the data of U.S firms listed in the New York Stock Exchange. Though initially our intension was to analyze the data of all listed firms, yet to keep the work manageable within the limited time period of one semester for this study, we randomly selected 50 firms from 9 different industries. Since the data on debt/equity ratio is available until 2016, 8 years after the financial crisis, therefore to keep the symmetry, we have taken 8 years data before the crisis. That is our data period is 2000 - 2016, which is divided into two subsets. The data period from 2000 - 2007 is called before the crisis period and the data period from 2009 - 2016 is called after the crisis period. We have skipped the year 2008 as it was the year of global financial crisis.

## 3.3 Estimation Technique

### 3.3.1 T-test Method

To investigate the determinants of capital structure, previous researchers used the multivariate analysis such as; Ordinary Least Square Regression (OLS), to do the empirical study (Saeed Akbar, 2013). Some of them used the Panel Data Analysis, Fixed Effect Model, Random Effect (RM Model) and GMM Model (Ariff, 2008). They used different variables to investigate and compare the determinants of capital structure such as, tangibility of assets, profitability, firm size and market to book ratio (MTB), liquidity and leverage etc., (Antoniou, 2008).

Researchers of the previous studies assumed that the firm mangers are the persons who take the financial decisions about the debt/equity ratio of a firm whereas Minsky's theory, Financial Instability Hypothesis emphasizes that the bank managers are the persons who accept or reject the debt financing requests of firm managers.

To test the cyclicity of debt/equity ratio, data of 50 listed companies on NYSE ranging from 2000-2016 is used. The data is divided into two parts; 2000-2007

before the crisis and 2009-2016 after the crisis. If FIH is true, then the average debt/equity ratio before the crisis period must be greater than that after the crisis period. Therefore, t-test analysis is used to see whether pre-crisis debt/equity ratio is different from post-crisis debt/equity ratio.

In this study, we have tested the selected data on three levels. Paired t-test analysis assuming unequal variances has been used for the first and the second levels and unpaired t-test analysis has been used for the third one. At the first level, considering data for each year of each selected firm, that is, we have used ( $50 * 8 = 400$  observations) before and after the financial crisis of 2008.

At the second level, the data is arranged Industry-wise and the same method, paired t-test analysis assuming unequal variances, before and after the crisis, is repeated for 9 selected industries. Each industry consists of different number of firms in it. At the third level for Inter-industry wise data, unpaired t-test analysis has been used. We have taken 9 different industries, with different number of firms in each industry, and have compared the debt/equity ratios of each industry with the rest of industries, before and after the global financial crisis. Total 36 calculations have been done for inter-industry wise data analysis.

TABLE 3.1: List of 50 Chosen Firms of U.S

1. Abbott Labs	2. Alexander's Inc.
3. Allstate Corp.	4. Autoliv Inc.
5. Best Buy Co Inc.	6. Berkshire Hathaway Inc.
7. Boeing Co.	8. Bristol-Myers Squibb Co.
9. Caterpillar Inc.	10. Citigroup Inc.
11. CNA Financials	12. Coca-Cola Co.
13. Corning Inc.	14. Concha Y Toro
15. Coeur Mining Inc.	16. Continental Resources Inc.
17. Danaher Corp.	18. Devon Energy Corp.
19. Deere & Co.	20. Dollar General Corp.
21. Eaton Vance Corp.	22. Emerson Electric Co.
23. Entercom Communications Corp.	24. Esterline Technologies Corp.
25. Exxon Mobil Corp.	26. First Republic Bank
27. Federated Investors Inc.	28. Flowserve Corp.
29. FMC Corp.	30. Franklin Resources Inc.
31. Gatz Corp.	32. General Mills Inc.
33. Genuine Parts Co.	34. Gray Television Inc.
35. Goldman Sachs Group Inc.	36. Greenbrier Companies Inc.
37. Honeywell International Inc.	38. Johnson & Johnson
39. KB Home	40. Kohl's Corp.
41. Kodak Co.	42. Lockheed Martin Corp.
43. Merck & Co Inc.	44. MetLife
45. Newmont Mining Corp.	46. Procter & Gamble Co.
47. Time Warner	48. US Aerospace Inc.
49. Wisconsin Public Service Corp.	50. Yum! Brands

TABLE 3.2: Industry-Wise Firms

## Industry 1

Firms from Manufacturing and Aerospace &amp; Defense Corporation

Caterpillar Inc.	Danaher Corp.
Deere & Co.	Emerson Electric Co.
Johnson & Johnson	Esterline technologies corp.
FMC Corp.	Lockheed Martin Corp.
US Aerospace Inc.	

## Industry 2

Firms from Healthcare &amp; Pharmaceutical Industry

Abbott Labs	Berkshire Hathaway Inc.
Bristol-Myers Squibb Co.	Merck & Co. Inc.

## Industry 3

Firms from Banking, Financial Services and Insurance Industry

Citigroup Inc.	Franklin Resources Inc.
Goldman Sachs Group Inc.	CNA Financials
Eaton Vance Corp.	Federated Investors Inc.
First Republic Bank	Gatx Corp.
All State Corp.	MetLife

## Industry 4

Firms from Beverage and Restaurant Industry

Coca-Cola Co.	Honeywell International Inc.
Concha Y Toro	General Mills Inc.
YUMS! Brands	

## Industry 5

Firms from Mining, Energy &amp; Exploration Industry

Coeur Mining Inc.	Newmont Mining Corp.
Continental Resources Inc.	Devon Energy Corp.
Exxon Mobil Corp.	

## Industry 6

Firms from Technology, Telecommunication &amp; Broadcasting Industry

Corning Inc.	Kodak Co.
Entercom Communications Corp.	Gray Television Inc.
Time Warner	

Industry 7

Firms from Automobile and Travelling & Transport Industry

Autoliv Inc.	Genuine Parts Co.
Boeing Co.	Greenbrier Companies Inc.

Industry 8

Firms from Retail & Stores and Consumer Products Industry

Dollar General Corp.	Kohl's Corp.
Best Buy Co. Inc.	Procter & Gamble Co.

TABLE 3.3: Year-Wise Debt Equity Ratios of Selected Firms, Before the Crisis

<b>COMPANIES</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
ABBOTT LABS	2.86	4.37	3.95	3.77	1.78	7.49	7.90	15.73
ALEXANDER'S INC.	0.17	0.30	0.13	0.13	0.05	0.03	0.05	0.05
AUTOLIV INC.	0.60	0.60	0.54	0.52	0.77	0.59	0.88	0.92
BERKSHIRE HATHAWAY INC.	1.16	0.79	0.40	0.33	0.91	0.81	0.65	0.14
ALLSTATE CORP.	1.15	1.32	1.59	1.63	1.80	1.47	1.64	2.10
BEST BUY CO INC.	0.35	0.38	0.33	0.23	0.23	0.16	0.29	0.29
BOEING CO.	1.20	0.89	0.76	0.75	0.38	0.19	0.74	0.45
BRISTOL-MYERS SQUIBB CO.	0.15	0.06	0.06	0.20	0.18	0.17	0.05	0.26
CATERPILLAR INC.	0.49	0.65	0.48	0.42	0.17	0.04	0.09	0.20
CITIGROUP INC.	0.16	70.21	66.30	51.23	48.65	45.13	1.01	0.50
CNA FINANCIALS	15.62	15.47	16.38	16.72	17.20	18.80	21.96	25.39
COCA-COLA CO.	0.79	0.71	0.61	0.79	0.76	0.72	0.53	0.59
COEUR MINING INC.	0.44	0.54	0.14	0.38	0.58	0.19	0.02	5.04
CONCHA Y TORO	0.85	1.72	0.01	151.86	0.07	0.98	1.06	1.05
CONTINENTAL RESOURCES INC.	2.39	2.09	1.52	1.03	0.93	1.32	1.11	1.14
CORNING INC.	0.29	0.47	0.76	0.52	0.46	0.45	0.54	0.56
DANAHER CORP.	0.36	0.36	0.23	0.14	0.14	0.07	0.10	0.17
DEERE & CO.	1.86	1.65	1.75	1.59	1.29	1.29	1.19	1.18
DEVON ENERGY CORP.	0.78	0.83	0.81	0.78	0.80	0.78	0.78	0.43
DOLLAR GENERAL CORP.	0.99	1.44	1.45	1.31	0.50	0.47	0.56	0.56
EATON VANCE CORP.	0.36	0.43	0.42	0.53	0.74	0.80	1.04	1.04
EMERSON ELECTRIC CO.	0.80	0.75	0.66	0.50	0.41	0.73	0.60	0.53
ENTERCOM COMMUNICATIONS CORP.	0.65	0.51	1.27	1.05	1.13	0.93	0.76	0.81
ESTERLINE TECHNOLOGIES CORP.	0.001	0.04	2.85	0.65	0.57	0.55	0.31	0.07
EXXON MOBIL CORP.	1.33	0.95	0.92	0.56	0.64	0.75	1.04	1.19

FEDERATED INVESTORS INC.	0.86	0.63	0.28	0.14	0.19	3.30	4.74	5.32
FIRST REPUBLIC BANK	0.07	0.53	0.83	1.01	1.55	1.16	0.70	0.80
FLOWSERVE CORP.	1.11	0.87	1.30	1.02	0.94	0.95	1.15	1.44
FMC CORP.	13.42	11.07	11.27	13.69	23.41	21.88	30.97	31.12
FRANKLIN RESOURCES INC.	0.80	0.70	0.62	0.37	0.42	0.26	0.16	0.12
GATX CORP.	0.08	0.06	0.06	0.05	0.04	0.56	0.56	0.52
GENUINE PARTS CO.	1.13	1.98	1.72	1.86	2.09	1.26	1.48	1.50
GENERAL MILLS INC.	0.97	0.86	0.81	0.95	0.92	0.79	0.82	0.76
GOLDMAN SACHS GROUP INC.	2.78	2.125	1.32	18.05	16.07	18.22	15.56	19.30
GRAY TELEVISION INC.	0.34	0.24	0.57	0.62	0.39	0.62	0.44	0.70
GREENBRIER COMPANIES INC.	70.73	71.48	15.90	0.26	0.19	17.70	0.01	0.01
HONEYWELL INTERNATIONAL INC.	2.59	2.48	2.42	2.51	4.82	4.10	0.32	1.16
JOHNSON & JOHNSON	114.89	120.34	47.63	40.95	3.86	4.73	1.90	0.19
KB HOME	0.12	0.21	0.49	1.70	3.51	1.53	4.05	2.00
KODAK CO.	0.75	0.92	1.01	0.75	0.65	0.63	0.46	0.40
KOHL'S CORP.	2.74	2.04	1.29	0.84	0.49	0.09	115.65	129.42
LOCKHEED MARTIN CORP.	2.20	6.59	8.04	1.16	0.47	0.76	0.88	0.81
MERCK & CO INC.	0.50	0.41	0.36	0.25	0.14	0.48	0.30	0.17
METLIFE	0.84	1.17	1.44	1.22	1.11	1.40	2.00	1.90
NEWMONT MINING CORP.	0.50	0.34	0.48	0.56	0.47	0.16	0.54	0.41
PROCTER & GAMBLE CO.	1.96	2.07	2.30	2.48	2.19	2.00	1.72	1.47
TIME WARNER	1.88	1.59	1.31	1.03	1.09	0.97	0.80	2.12
US AEROSPACE INC.	0.03	0.04	0.03	0.01	0.27	0.06	0.05	0.09
WISCONSIN PUBLIC SERVICE CORP.	1.08	1.16	2.73	28.24	29.68	27.67	26.51	31.81
YUM! BRANDS	19.43	20.25	20.95	21.98	15.61	16.12	16.18	16.85

TABLE 3.4: Year-Wise Debt Equity Ratios of Selected Firms, After the Crisis

<b>COMPANIES</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
ABBOTT LABS	7.69	0.56	0.49	0.68	0.13	0.16	0.28	1.00
ALEXANDER'S INC.	4.10	3.66	3.71	3.21	3.15	2.96	2.98	2.98
ALLSTATE CORPORATION	0.35	0.31	0.32	0.29	0.3	0.25	0.28	0.34
AUTOLIV INC.	0.34	0.22	0.10	0.15	0.07	0.44	0.43	0.36
BERKSHIRE HATHAWAY INC.	0.92	0.90	0.89	0.83	0.67	0.71	0.33	0.36
BEST BUY CO. INC.	0.24	0.17	0.11	0.45	0.4	0.32	0.31	0.28
BOEING CO.	0.62	0.36	0.19	0.34	0.54	0.94	1.38	11.71
BRISTOL-MYERS SQUIBB CO.	0.57	0.21	0.22	0.39	0.49	0.46	0.46	0.35
CATERPILLAR INC.	0.46	34.24	0.57	0.49	0.37	0.23	0.20	1.74
CITIGROUP INC.	0.10	2.34	0.08	0.05	1.11	0.45	0.98	1.00
CNA FINANCIALS	1.10	0.68	0.66	0.82	1.00	1.96	5.09	2.30
COEUR MINING INC.	0.16	0.16	0.13	0.18	0.79	1.14	0.26	0.47
CONCHA Y TORO	0.07	0.01	0.35	0.40	0.41	0.44	0.35	0.28
CONTINENTAL RESOURCES INC.	0.51	0.77	0.54	1.12	1.19	1.21	1.52	1.52
COCA-COLA CO.	0.57	0.54	0.53	0.52	0.49	0.51	1.11	1.29
CORNING INC.	0.52	0.63	0.33	0.32	0.26	0.20	0.24	0.23
DANAHER CORP.	0.25	0.20	0.30	0.28	0.15	0.15	0.51	0.42
DEERE & CO.	0.90	0.89	0.85	0.86	0.80	2.69	3.53	3.64
DEVON ENERGY CORP.	0.47	0.20	0.28	0.40	0.39	0.46	1.72	1.71
DOLLAR GENERAL CORP.	1.45	1.00	0.81	0.56	0.56	0.51	0.46	0.55
EATON VANCE CORP.	1.44	1.22	1.04	0.73	1.27	1.11	1.57	0.82
EMERSON ELECTRIC CO.	0.72	0.38	0.42	0.37	0.38	0.35	0.53	0.54
ENTERCOM COMMUNICATIONS CORP.	6.12	2.92	2.43	2.12	1.72	1.45	1.26	1.27
ESTERLINE TECHNOLOGIES CORP.	0.42	0.42	0.65	0.52	0.36	0.32	0.43	0.53
EXXON MOBIL CORP.	0.10	0.08	0.06	0.05	0.04	0.07	0.12	0.17
FEDERATED INVESTORS INC.	0.22	0.74	0.59	0.56	0.35	0.36	0.3	0.28

FIRST REPUBLIC BANK	0.90	0.32	0.93	1.13	1.59	1.47	0.94	1.16
FLOWERVE CORP.	0.30	0.23	0.20	0.46	0.60	0.57	0.94	0.90
FMC CORP.	0.55	0.44	0.63	0.61	0.76	0.75	1.09	0.92
FRANKLIN RESOURCES INC.	0.16	0.95	0.80	1.11	0.96	0.78	0.18	0.17
GATX CORP.	2.37	2.75	3.12	2.65	2.75	3.2	3.28	3.17
GENERAL MILLS INC.	1.00	0.88	0.88	0.91	0.92	0.93	1.43	1.77
GENUINE PARTS CO.	0.19	0.09	0.18	0.08	0.15	0.15	0.08	0.17
GRAY TELEVISION INC.	8.37	6.35	6.73	5.79	4.84	5.72	2.88	3.56
GREENBRIER COMPANIES INC.	2.54	1.74	1.19	0.99	0.87	0.87	0.45	0.35
GOLDMAN SACHS GROUP INC.	2.9	2.48	3.13	2.87	2.61	2.59	2.65	2.78
HONEYWELL INTERNATIONAL INC.	0.71	0.54	0.64	0.49	0.39	0.34	0.30	0.63
JOHNSON & JOHNSON	0.16	0.16	0.23	0.18	0.18	0.22	0.18	0.32
KB HOME	2.57	2.81	3.58	4.57	4.01	1.61	1.55	1.53
KODAK CO.	0.62	0.87	0.96	1.10	1.07	1.01	1.14	1.09
KOHL'S CORP.	0.30	0.26	0.21	0.64	0.74	0.79	0.78	0.83
LOCKHEED MARTIN CORP.	1.22	1.35	6.45	157.90	1.25	1.81	4.61	9.45
MERCK & CO. INC.	0.93	1.82	1.84	2.13	1.53	1.76	0.54	0.61
METLIFE	0.50	0.74	0.45	0.35	0.35	0.27	0.31	0.29
NEWMONT MINING CORP.	0.43	0.31	0.28	0.46	0.60	0.63	0.54	0.38
PROCTER & GAMBLE CO.	0.33	0.35	0.33	0.34	0.29	0.29	0.30	0.34
TIME WARNER	0.46	0.50	0.65	0.64	0.67	0.87	1.00	0.92
US AEROSPACE INC.	0.01	0.02	0.20	0.23	0.27	0.27	0.22	0.29
WISCONSIN PUBLIC SERVICE CORP.	0.10	10.36	6.13	5.88	4.13	5.08	7.23	6.77
YUM! BRANDS	3.13	1.85	1.64	1.36	1.35	1.99	3.35	3.35

# Chapter 4

## Estimation Results and Discussion

This chapter consists of three sections in it. Section one contains the results of t-test analysis for aggregate data. Second section describes the results for industry level data analysis and the third section explains the results of inter-industry level data analysis.

### 4.1 Results of T-Test Analysis for Aggregate Data

For aggregate data analysis, paired t-test analysis is used and the results are as follows;

TABLE 4.1: Results for Aggregate Data

	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Mean	5.579489759	1.663300917
Variance	288.9384694	66.61731087
Observations	400	400
Hypothesized Mean Difference	0	
t Stat	4.153744217	
$P(T \leq t)$ one-tail	1.88E-05	

In the above table, t-test analysis has been done assuming the unequal variances before and after the crisis for aggregate data of 50 firms of US. Table shows the

analysis on whole data of 50 companies, considering debt/equity ratio separately (before crisis  $50 \times 8 = 400$  & after crisis  $50 \times 8 = 400$  observations).

The first row of the table shows that the average debt/equity ratio of all firms before the crisis is 5.579489759 and after the crisis it is 1.663300917, which means that as expected in accordance with FIH, the debt/equity ratio is higher before and less after the financial crisis of 2008.

Since p-value is 0.0000188421 (less than even 1%) which shows that the difference in debt/equity ratio before and after the crisis is statistically highly significant. It means that the difference is real and it is not simply due to chance. So we will reject the null hypothesis that the overall leverage ratio is same before and after the crisis and accept the alternative hypothesis that the overall leverage ratio of firms is higher before the crisis and less after the crisis.

## To Sum Up

It means that the Minsky's FIH holds strongly for the US economy. That is, the debt/equity ratio of incorporated firms and GDP of the economy move in the same directions. The underlying reason seems to be the financing process described earlier. That is, initially hedge financing posture is adopted but after validation of consecutive hedge financing contracts, both borrowing firms and lending institutions relax their margins of safety and go deep into debt. Such an indebted situation is prone to the crisis which starts either with tightening of monetary policy or with bankruptcy of one or few highly indebted corporations which, in turn, generates contagion effect and causes further bankruptcies and economic downturn.

## 4.2 Results of t-Test for Industry-Wise Data

For industry-level data analysis, paired t-test analysis is used and the results of 9 industries are discussed as below in table 4.2 to table 4.10.

### 4.2.1 Results of T-test for Industry 1

TABLE 4.2: Industry 1: Manufacturing and Aerospace &amp; Defense Corporation

	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Caterpillar Inc.	0.32	4.79
Danaher Corp.	0.2	0.28
Deere & Co.	1.47	1.77
Emerson Electric Co.	0.62	0.46
Johnson & Johnson	41.81	0.2
Esterline Technologies Corp.	0.63	0.46
FMC Corp.	19.6	0.72
Lockheed Martin Corp.	2.61	23.01
US Aerospace Inc.	0.07	0.19
	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Mean	7.483222436	3.541693846
Variance	441.6580711	357.9190154
Observations	72	72
Hypothesized Mean Difference	0	
t Stat	1.18277125	
$P(T \leq t)$ one-tail	<b>0.119452285</b>	

The above results of Manufacturing and Aerospace & Defense Industry show that the mean debt/equity ratio of firms before the crisis is 7.483222436 and after the crisis it is 3.541693846. Apparently it is in line with FIH that the debt/equity ratio of the above industry is greater before the financial crisis and less after the crisis.

However, the p-value for this industry is 0.119452285 which is greater than 0.01 (1% a), 0.05 (5% a) and 0.10 (10% a). Therefore, we do not reject the null hypothesis. It means that the leverage ratio of the industry is same before and after the crisis. Rather we reject the alternative hypothesis that is the leverage ratio of the industry is higher before the crisis and less after the crisis.

According to FIH, the debt/equity ratio of firms in the Manufacturing and Aerospace & Defense Industry, should be greater before the financial crisis and less after the crisis but it is clear from the above mentioned data that the debt/equity ratio of few firms, such as; Johnson & Johnson, Esterline Technologies Corporation and

FMC Corporation, is higher before the crisis and for other firms it is less, so FIH does not hold for this particular industry as a whole.

## 4.2.2 Results of T-test for Industry 2

TABLE 4.3: Industry 2: Healthcare & Pharmaceutical Industry

	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Abbott Labs	5.98	1.37
Berkshire Hathaway Inc.	0.65	0.7
Bristol-Myers Squibb Co.	0.14	0.39
Merck & Co Inc.	0.33	1.39
	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Mean	1.774992989	0.966247441
Variance	10.66948003	1.784068802
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	1.296403897	
$P(T \leq t)$ one-tail	<b>0.101043031</b>	

The results of **Healthcare & Pharmaceutical Industry** show that the mean debt/equity ratio of firms before the crisis is **1.774992989** and after the crisis it is **0.966247441**, which means that the mean for the firms of this industry is high before and less after the financial crisis of 2008. Apparently, it confirms FIH.

However, the p-value for this industry is **0.101043031** which is greater than **0.01** (1%  $\alpha$ ), **0.05** (5%  $\alpha$ ) and even **0.10** (10%  $\alpha$ ), so we do not reject the null hypothesis. It means that the leverage ratio of the industry is same before and after the crisis and reject the alternative hypothesis which means that the leverage ratio of the industry is higher before the crisis and less after the crisis.

The debt/equity ratio of firms in the **Healthcare & Pharmaceutical Industry** should be greater before the financial crisis and less after the financial crisis but the debt/equity ratio of selected firms under this industry, such as; Berkshire Hathaway Inc., Bristol-Myers Squibb Co. and Merck & Co Inc. does not follow the same pattern, so FIH does not hold for this industry too.

### 4.2.3 Results of T-test for Industry 3

TABLE 4.4: Industry 3: Banking, Financial Services and Insurance Industry

	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Citigroup Inc.	35.4	0.76
Franklin Resources Inc.	0.43	0.64
Goldman Sachs Group Inc.	11.68	2.75
CNA Financials	18.44	1.7
Eaton Vance Corp.	0.67	1.15
Federated Investors Inc.	1.93	0.43
	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Mean	7.259489341	1.210776592
Variance	210.1529577	1.130124219
Observations	80	80
Hypothesized Mean Difference	0	
t Stat	3.721993347	
$P(T \leq t)$ one-tail	<b>0.000183032</b>	

The analysis of **Banking, Financial Services and Insurance Industry** give results that the mean debt/equity ratio of firms before the crisis is **7.259489341** and after the crisis it is **1.210776592**, it show that the mean debt/equity ratio of the firms of this industry is higher before and less after the financial crisis. By looking at this, we can say that the debt/equity ratio of the firms of the above mentioned industry is more before the financial crisis and less after the crisis.

Whereas, the p-value for this industry is **0.000183032** which is less than **0.01** ( $1\% \alpha$ ), so we reject the null hypothesis that is the leverage ratio of the industry is same before and after the crisis. Here we accept the alternative hypothesis that the leverage ratio of the industry is higher before the crisis and less after the crisis.

As per FIH, the debt/equity ratio of firms in the **Banking, Financial Services and Insurance Industry** must be higher before and less after the financial crisis. Most of the selected firms of this industry such as; Citigroup Incorporation, Goldman Sachs Group Incorporation, CNA Financials, Federated Investors Incorporation, Allstate Corporation and MetLife, show that the debt/equity ratio is higher before the crisis and few firms have less debt/equity ratio before the financial crisis. So, for this industry, as a whole, FIH holds.

#### 4.2.4 Results of T-test for Industry 4

TABLE 4.5: Industry 4: Beverage and Restaurant Industry

	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Coca-Cola Co.	0.69	0.69
Honeywell International Inc.	2.55	0.51
Concha Y Toro	19.7	0.29
Yum! Brands	18.42	2.25
General Mills Inc.	0.86	1.09
	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Mean	8.443335822	0.96599059
Variance	591.0924141	0.68008065
Observations	40	40
Hypothesized Mean Difference	0	
t Stat	1.944016921	
$P(T \leq t)$ one-tail	<b>0.029566482</b>	

The results of analysis of **Beverage and Restaurant Industry** show that the mean debt/equity ratio of firms before the crisis is **8.443335822** and after the crisis it is **0.96599059**, which show that the mean of the firms of this industry is less after and high before the crisis. By see this; we can say that the debt/equity ratio of the firms of the above industry is more before the financial crisis and less after the crisis.

The p-value for this industry is **0.029566482** which is greater than **0.01** (1%  $\alpha$ ), but less than **0.05** (5%  $\alpha$ ), so we reject the null hypothesis at 5% but accept it at 1% that is the leverage ratio of the industry is same before and after the crisis and reject the alternative hypothesis that the leverage ratio of the industry is higher before the crisis and less after the crisis at 1% but accept it on 5

FIH holds for the **Beverage and Restaurant Industry** because the debt/equity ratio of the firms under this industry is higher before the crisis and lesser after the financial crisis.

## 4.2.5 Results of T-test for Industry 5

TABLE 4.6: Industry 5: Mining, Energy &amp; Exploration Industry

	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Coeur Mining Inc.	0.92	0.41
Newmont Mining Corp.	0.43	0.45
Continental Resources Inc.	1.44	1.05
Devon Energy Corp.	0.75	0.7
Exxon Mobil Corp.	0.92	0.09
	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Mean	0.892820558	0.5405
Variance	0.685153589	0.2335587
Observations	40	40
Hypothesized Mean Difference	0	
t Stat	2.324760475	
$P(T \leq t)$ one-tail	<b>0.011660398</b>	

The above results of **Mining, Energy & Exploration Industry** show that the mean debt/equity ratio of firms before the crisis is **0.892820558** and after the crisis it is **0.5405**. It is clear that the mean for the firms of this industry is less after and high before the crisis. So we can say that the debt/equity ratio of the above industry is more before the financial crisis and less after the crisis.

However, p-value for this industry is **0.011660398** which is greater than **0.01** (1%  $\alpha$ ), but less than **0.05** (5%  $\alpha$ ), so we accept the null hypothesis at 1% but reject it at 5%. It means that the leverage ratio of the industry is same before and after the crisis and reject the alternative hypothesis which means that the leverage ratio of the industry is higher before the crisis and less after the crisis respectively.

FIH holds for the **Mining, Energy & Exploration Industry** because the debt/equity ratio of firms under the above mentioned industry follows the same pattern as FIH states, that is, the debt/equity ratio of particular industry should be higher before the financial crisis and less after the crisis.

## 4.2.6 Results of T-test for Industry 6

TABLE 4.7: Industry 6: Technology, Telecommunication & Broadcasting Industry

	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Corning Inc.	0.51	0.34
Kodak Co.	0.7	0.98
Entercom Communications Corp.	0.89	2.41
Gray Television Inc.	0.49	5.53
Time Warner	1.35	0.71
	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Mean	0.78653758	1.9956785
Variance	0.16972082	4.7437275
Observations	40	40
Hypothesized Mean Difference	0	
t Stat	-3.4499573	
$P(T \leq t)$ one-tail	<b>0.00064469</b>	

The above results of **Technology, Telecommunication & Broadcasting Industry** show that the mean debt/equity ratio of firms before the crisis is **0.78653758** and after the crisis it is **1.9956785** and it is clear that the mean for the firms of this industry is less before and high after the financial crisis. So we can say that the debt/equity ratio of the above industry is more after the financial crisis and less before the crisis.

The p-value for this industry is **0.00064469** which is less than **0.01** (1%  $\alpha$ ), so we reject the null hypothesis that the leverage ratio of the industry is same before and after the crisis and accept the alternative hypothesis that the leverage ratio of the industry is higher before the crisis and less after the crisis.

The debt/equity ratio for the firms in the **Technology, Telecommunication & Broadcasting Industry** would be greater before the financial crisis and less after the financial crisis, according to the FIH, but the debt/equity ratio of selected firms under this industry, does not follow the same pattern. Most of them have less debt/equity ratio before the crisis and few have higher debt/equity ratio after the crisis such as; Kodak Corporation, Entercom Communications Corporation and Gray Television Incorporation, so FIH does not hold for this industry.

### 4.2.7 Results of T-test for Industry 7

TABLE 4.8: Automobile and Travelling &amp; Transport Industry

	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Autoliv Inc.	0.68	0.26
Genuine Parts Co.	1.63	0.14
Boeing Co.	0.67	2.01
Greenbrier Companies Inc.	22.04	1.13
	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Mean	6.2524949	0.884022603
Variance	305.08521	4.208307069
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	1.7267931	
$P(T \leq t)$ one-tail	<b>0.0469241</b>	

The results of **Automobile and Travelling & Transport Industry** show that the mean debt/equity ratio of firms before the crisis is **6.2524949** and after the crisis it is **0.884022603**. So, it is clear that the mean for the firms of this industry is high before and less after the financial crisis of 2008. So we can say that the debt/equity ratio of the firms of the above mentioned industry is more before the financial crisis and less after the crisis.

The p-value for this industry is **0.0469241** which is greater than **0.01** (1%  $\alpha$ ), but less than **0.05** (5%  $\alpha$ ), so we accept the null hypothesis at 1% and reject it at 5%, that the leverage ratio of the industry is same before and after the crisis and reject the alternative hypothesis that the leverage ratio of the industry is higher before the crisis and less after the crisis at 1% and accept it at 5

According to the FIH, the debt/equity ratio of firms in the **Automobile and Travelling & Transport Industry** should be higher before the crisis and less after the financial crisis. So, FIH holds for this industry as it is showing the same pattern.

### 4.2.8 Results of T-test for Industry 8

TABLE 4.9: Industry 7: Automobile and Travelling & Transport Industry

	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Dollar General Corp.	0.91	0.74
Kohl's Corp.	31.57	0.57
Best Buy Co Inc.	0.28	0.29
Procter & Gamble Co.	2.02	0.32
	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Mean	8.696125628	0.478125
Variance	895.4746381	0.0804093
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	1.553441905	
$P(T \leq t)$ one-tail	<b>0.065234253</b>	

The analysis of **Retail & Stores and Consumer Products Industry** give the results that the mean debt/equity ratio of firms before the crisis is **8.696125628** and after the crisis it is **0.478125**, from this it is clear that the mean of the firms of this industry is high before and less after the financial crisis. By looking at this analysis, we can say that the debt/equity ratio of the firms of the above mentioned industry is more before the financial crisis and less after the crisis.

The p-value for this industry is **0.065234253** which is greater than **0.01** (1%  $\alpha$ ) and **0.05** (5%  $\alpha$ ) as well, so we accept the null hypothesis at 1% and 5%. It means that the leverage ratio of the industry is same before and after the crisis. While we reject the alternative hypothesis which means that the leverage ratio of the industry is higher before the crisis and less after the crisis.

FIH holds for the **Retail & Stores and Consumer Products Industry** because the debt/equity ratio of the firms under this particular industry is higher before the crisis and less after the financial crisis, as FIH states.

## 4.2.9 Results of T-test for Industry 9

TABLE 4.10: Industry 9: Real Estate and Services Industry

	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Alexander's Inc.	0.11	3.34
Kb Home	1.7	2.78
Flowserve Corp.	1.1	0.53
Wisconsin Public Service Corp.	18.61	5.71
	<i>D/E Ratio(b)</i>	<i>D/E Ratio(a)</i>
Mean	5.380667199	3.08940242
Variance	106.1463668	5.81139564
Observations	32	32
Hypothesized Mean Difference	0	
Df	34	
t Stat	1.224963541	
$P(T \leq t)$ one-tail	<b>0.114504004</b>	

The above results of **Real Estate and Services Industry** shows that the mean debt/equity ratio of firms before the crisis is **5.380667199** and after the crisis it is **3.08940242**, which means that the mean for the firms of this industry is less before and high after the financial crisis. So we can say that the debt/equity ratio of the above industry is more after the financial crisis and less before the crisis.

However, p-value for this industry is **0.114504004** which is greater than **0.01** (1%  $\alpha$ ) and **0.05** (5%  $\alpha$ ), so we accept the null hypothesis that the leverage ratio of the industry is same before and after the crisis and reject the alternative hypothesis that the leverage ratio of the industry is higher before the crisis and less after the crisis.

### To Sum Up:

We conclude that, FIH holds for 6 industries out of 9 selected industries. Almost 4 non-financial industries show that their debt/equity ratios are not pro-cyclical and the results of remaining 5 industries show that the debt/equity ratios for those industries are pro-cyclical. We accept our null hypothesis for the industries with the pro-cyclical debt/equity ratio at 1%  $\alpha$ , 5% and 10%  $\alpha$  respectively.

Out of 6 industries for which FIH holds, for two industries (Banking, Financial Services and Insurance Industry and Technology, Telecommunication & Broadcasting Industry) it holds at 1% significance level, for three industries (Beverage

and Restaurant Industry, Mining, Energy & Exploration Industry and Automobile and Travelling & Transport Industry) it holds at 5% and for only one industry (Retail & Stores and Consumer Products Industry) it holds at 10% significance level. Whereas, FIH does not hold for three industries (Manufacturing and Aerospace & Defense Corporation, Healthcare & Pharmaceutical Industry and Real Estate and Services Industry), as shown in table 4.11.

As below in table 4.11, show the mean debt/equity ratios of all 9 industries and the stars (\*) indicates that we are accepting our null hypothesis at 1%, 5% and 10% significance level respectively. And the industries without any star mark show that we are rejecting our null hypothesis and accept the alternative hypothesis for those industries.

TABLE 4.11: Summary Table for Industry-Wise Results

Firms	Mean(b)	Mean(a)	t-Stat	P-value
Manufacturing and Aerospace & Defense Corporation	7.483222436	3.5416938	1.18277125	0.119452285
Healthcare & Pharmaceutical Industry	1.774992989	0.9662474	1.2964039	0.101043031
Banking, Financial Services and Insurance Industry	7.259489341	1.2107766	3.72199335	*** 0.000183032
Beverage and Restaurant Industry	8.443335822	0.9659906	1.94401692	** 0.029566482
Mining, Energy & Exploration Industry	0.892820558	0.5405	2.32476048	** 0.011660398
Technology, Telecommunication & Broadcasting Industry	0.78653758	1.9956785	-3.4499573	*** 0.00064469
Automobile and Travelling & Transport Industry	6.2524949	0.8840226	1.7267931	** 0.0469241
Retail & Stores and Consumer Products Industry	8.696125628	0.478125	1.55344191	* 0.065234253
Real Estate and Services Industry	5.380667199	3.0894024	1.22496354	0.114504004

Note:

\*\*\* indicates that null hypothesis is rejected at  $\alpha = 1\%$ .

\*\* indicates that null hypothesis is rejected at  $\alpha = 5\%$ .

\* indicates that null hypothesis is rejected at  $\alpha = 10\%$ .

### 4.3 Results of t-Test for Inter-Industry Wise Data

For inter-industry comparison, total 36 comparisons ( ${}^9C_2 = 36$ ) have been done as highlighted by “x” in table 4.12.

TABLE 4.12: Number of Inter-Industry Comparisons

Industries	Comparisons								
	Industry 1	Industry 2	Industry 3	Industry 4	Industry 5	Industry 6	Industry 7	Industry 8	Industry 9
Industry 1		x	x	x	x	x	x	x	x
Industry 2			x	x	x	x	x	x	x
Industry 3				x	x	x	x	x	x
Industry 4					x	x	x	x	x
Industry 5						x	x	x	x
Industry 6							x	x	x
Industry 7								x	x
Industry 8									x
Industry 9									

#### 4.3.1 Comparisons of Industry 1 with Every Other Industry

Comparison of industry 1 with industry 2 is given in table 4.13, industry 1 and industry 3 in table 4.14, industry 1 and industry 4 in table 4.15, industry 1 and industry 5 in table 4.16, industry 1 and industry 6 in table 4.17, industry 1 and industry 7 in table 4.18, industry 1 industry 8 in table 4.19 and industry 1 and industry 9 in table 4.20. For comparison, we consider  $P(T \leq t)$  one-tail, when the mean values for both selected industries are same or closer to each other while we consider  $P(T \leq t)$  two-tail, when there is a difference in mean values of both industries.

TABLE 4.13: Results of comparison between Industry 1 and Industry 2

<b>Manufacturing and Aerospace &amp; Defense Corporation</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.483222436	1.774992989
Variance	441.6580711	10.66948003
Observations	72	32
Hypothesized Mean Difference	0	
t Stat	2.244559646	
$P(T \leq t)$ one tail	0.013815088	
t Critical one tail	1.664624645	
$P(T \leq t)$ two tail	<b>0.027630176</b>	
t Critical two tail	1.990847036	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	3.541693846	0.966247441
Variance	357.9190154	1.784068802
Observations	72	32
Hypothesized Mean Difference	0	
t Stat	1.148694579	
$P(T \leq t)$ one tail	0.127215982	
t Critical one tail	1.665996224	
$P(T \leq t)$ two tail	<b>0.254431964</b>	
t Critical two tail	1.992997097	

As the above comparison between industry 1 and industry 2, in table 4.13, shows that these industries are apparently same but statistically different from each other. As the mean value of Industry 1' is greater than the mean value of Industry 2' before the crisis and is same for after the crisis, though there is a decrease shown in the mean values of both compared industries but the pattern is remaining same for both industries, which means that these industries are apparently same and there is no change as the debt/equity ratio of these industries follows the same pattern before and after the financial crisis.

The p-value for selected industries is 0.027630176, before the crisis, which is less than **0.05**( $\alpha$ ). As the results are statistically significant, so it is clear that the debt/equity ratio of one industry is statistically different from other and we will reject our null hypothesis for the comparison of **Manufacturing and Aerospace & Defense Corporation and Healthcare & Pharmaceutical Industry**, before the crisis and accept the alternative hypothesis. This means that firms in

Industry 1' are more levered than the firms in Industry 2' before the crisis. The p-value is **0.25443196**, after the crisis, which is greater than **0.05**( $\alpha$ ) and even **0.10**( $\alpha$ ). It indicates the non-significant results and shows that these industries are statistically same after the crisis. So we will accept the null hypothesis and reject the alternative hypothesis after the financial crisis.

TABLE 4.14: Results of comparison between Industry 1 and Industry 3

<b>Manufacturing and Aerospace &amp; Defense Corporation &amp; Banking, Financial Services and Insurance Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.48322244	7.25948934
Variance	441.658071	210.152958
Observations	72	80
Hypothesized Mean Difference	0	
t Stat	0.07558787	
$P(T \leq t)$ one tail	0.4699344	
t Critical one tail	1.65723497	
$P(T \leq t)$ two tail	<b>0.9398688</b>	
t Critical two tail	1.97928009	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	3.54169385	1.210776592
Variance	357.919015	1.130124219
Observations	72	80
Hypothesized Mean Difference	0	
t Stat	1.04396159	
$P(T \leq t)$ one tail	0.15002233	
t Critical one tail	1.66659966	
$P(T \leq t)$ two tail	<b>0.30004466</b>	
t Critical two tail	1.99394334	

Comparison of **Manufacturing and Aerospace & Defense Corporation and Banking, Financial Services and Insurance Industry** tells us that the mean value of Industry 1' and the mean value of Industry 2' are almost same before the crisis but the mean value of Industry 1' is higher than the mean value of Industry 2' after the crisis. Though there is a decrease shown in the mean values of both compared industries but it is shown that the debt/equity ratio of Industry 2' has been more affected by financial crisis. But the pattern is remaining same for both industries. It means that these industries are apparently same and there is no

change so the debt/equity ratio of selected industries follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.4699344**, before the crisis, which is more than **0.05**( $\alpha$ ) and even **0.10**( $\alpha$ ). As the results are statistically non-significant so it is clear that the debt/equity ratio of one industry is not different from other and we will accept the null hypothesis for the comparison of **Manufacturing and Aerospace & Defense Corporation and Banking, Financial Services and Insurance Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' are equally levered as the firms in Industry 2' before the financial crisis. And the p-value is **0.30004466**, after the crisis, which is also greater than **0.05**( $\alpha$ ). It indicates the non-significant results which means these industries are statistically same and we will accept the null hypothesis and reject the alternative hypothesis for these industries, after the financial crisis too.

TABLE 4.15: Results of comparison between Industry 1 and Industry 4

<b>Manufacturing and Aerospace &amp; Defense Corporation &amp; Beverage and Restaurant Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.483222436	8.443335822
Variance	441.6580711	591.0924141
Observations	72	40
Hypothesized Mean Difference	0	
t Stat	-0.209957043	
$P(T \leq t)$ one tail	0.417151264	
t Critical one tail	1.666599659	
$P(T \leq t)$ two tail	<b>0.834302528</b>	
t Critical two tail	1.993943341	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	3.541693846	0.965990586
Variance	357.9190154	0.680080648
Observations	72	40
Hypothesized Mean Difference	0	
t Stat	1.153262779	
$P(T \leq t)$ one tail	0.126335137	
t Critical one tail	1.666599659	
$P(T \leq t)$ two tail	<b>0.252670274</b>	
t Critical two tail	1.993943341	

By comparing the two industries, before and after the financial crisis, it is shown that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while it is greater for Industry 1' and less for Industry 2' after the crisis. From these results, it is clear that the mean value of both compared industries does not follow the same pattern which means these industries are apparently different and there is a change occurred due to the financial crisis or financial crisis affect the debt/equity ratio of the firms of both industries differently.

The p-value for selected industries is **0.834302528**, before the crisis, which is greater than **0.05**( $\alpha$ ). As the results are statistically non-significant, so we cannot say that one industry is different from other and we will accept the null hypothesis for the comparison of **Manufacturing and Aerospace & Defense Corporation and Beverage and Restaurant Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.252670274**, after the crisis, which is also greater than **0.01**( $\alpha$ ) and even **0.05**( $\alpha$ ). It indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.16: Results of comparison between Industry 1 and Industry 5

<b>Manufacturing and Aerospace &amp; Defense Corporation &amp; Mining, Energy &amp; Exploration Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	3.541693846	0.5405
Variance	357.9190154	0.233558718
Observations	72	40
Hypothesized Mean Difference	0	
t Stat	1.345280979	
$P(T \leq t)$ one tail	0.091407784	
t Critical one tail	1.666599659	
$P(T \leq t)$ two tail	<b>0.182815568</b>	
t Critical two tail	1.993943341	

<i>After the Crisis</i>	<b><i>D/E Ratio(a)</i></b> <b>(Industry 1)</b>	<b><i>D/E Ratio(a)</i></b> <b>(Industry 2)</b>
Mean	7.483222436	0.892820558
Variance	441.6580711	0.685153589
Observations	72	40
Hypothesized Mean Difference	0	
t Stat	2.657232458	
$P(T \leq t)$ one tail	0.004862488	
t Critical one tail	1.666599659	
$P(T \leq t)$ two tail	<b>0.009724977</b>	
t Critical two tail	1.993943341	

Comparison of two industries, **Manufacturing and Aerospace & Defense Corporation and Mining, Energy & Exploration Industry**, before and after the financial crisis, show that the mean value of Industry 1' is greater than Industry 2' before the crisis and is same for after the crisis, though there is a decrease shown in the mean values of both compared industries but the pattern is remaining same for both industries, which means that there is no change as the debt/equity ratio of these industries follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.009724977**, before the crisis, which is less than **0.05**( $\alpha$ ). As the results are statistically significant, so it is clear that one industry is different from other and we will reject our null hypothesis for the comparison of **Manufacturing and Aerospace & Defense Corporation and Mining, Energy & Exploration Industry**, before the crisis and accept the alternative hypothesis. This means that firms in Industry 1' are more levered than the firms in Industry 2' before the crisis. The p-value is **0.182815568**, after the crisis, which is greater than **0.05**( $\alpha$ ) and it shows the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.17: Results of comparison between Industry 1 and Industry 6

<b>Manufacturing and Aerospace &amp; Defense Corporation &amp; Technology, Telecommunication &amp; Broadcasting Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.48322244	0.78653758
Variance	441.658071	0.16972082
Observations	72	40
Hypothesized Mean Difference	0	
t Stat	2.70291802	
$P(T \leq t)$ one tail	0.0042967	
t Critical one tail	1.66659966	
$P(T \leq t)$ two tail	<b>0.00859339</b>	
t Critical two tail	1.99394334	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	3.541693846	1.995678505
Variance	357.9190154	4.743727514
Observations	72	40
Hypothesized Mean Difference	0	
t Stat	0.685280078	
$P(T \leq t)$ one tail	0.247654157	
t Critical one tail	1.665706893	
$P(T \leq t)$ two tail	<b>0.495308313</b>	
t Critical two tail	1.992543466	

As the above comparison of two industries, before and after the financial crisis, show that the mean value of Industry 1' is much greater than Industry 2' before the crisis and is also greater after the crisis, although there is a decrease shown in the mean value of Industry 1' while there is a slight increase in the mean value of Industry 2' so the pattern of debt/equity ratio is not remaining same for both industries, which means that financial crisis affect the debt/equity ratio of the firms of both industries differently and it is not following the same pattern before and after the financial crisis.

P-value for selected industries is **0.00859339**, before the crisis, which is less than **0.05**( $\alpha$ ). The results are statistically significant, so it is clear that one industry is different from other and we will reject our null hypothesis for the comparison of **Manufacturing and Aerospace & Defense Corporation and Technology,**

**Telecommunication & Broadcasting Industry**, before the crisis and accept the alternative hypothesis. This means that firms in Industry 1' are more levered than the firms in Industry 2' before the crisis. The p-value is **0.495308313**, after the crisis, which is greater than **0.05**( $\alpha$ ), which indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis

TABLE 4.18: Results of comparison between Industry 1 and Industry 7

<b>Manufacturing and Aerospace &amp; Defense Corporation &amp; Automobile and Travelling &amp; Transport Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.483222436	6.252494886
Variance	441.6580711	305.0852145
Observations	72	32
Hypothesized Mean Difference	0	
t Stat	0.310924116	
$P(T \leq t)$ one tail	0.378384661	
t Critical one tail	1.666599659	
$P(T \leq t)$ two tail	<b>0.756769322</b>	
t Critical two tail	1.993943341	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	3.541693846	0.884022603
Variance	357.9190154	4.208307069
Observations	72	32
Hypothesized Mean Difference	0	
t Stat	1.176535933	
$P(T \leq t)$ one tail	0.121550761	
t Critical one tail	1.665425374	
$P(T \leq t)$ two tail	<b>0.243101522</b>	
t Critical two tail	1.992102124	

By comparing the two industries, before and after the financial crisis, show that the mean value of Industry 1' is greater than Industry 2' before the crisis and is same for after the crisis, though there is a decrease shown in the mean values of both compared industries but the pattern is remaining same for both industries, which means that there is no change as the debt/equity ratio of these industries follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.756769322**, before the crisis, which is much greater than **0.05**( $\alpha$ ). So, as the results are statistically non-significant, so we cannot say that one industry is different from other and we will accept the null hypothesis for the comparison of **Manufacturing and Aerospace & Defense Corporation and Automobile and Travelling & Transport Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis, while the p-value is 0.243101522, after the crisis, which is greater than 0.05( $\alpha$ ) and it indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.19: Results of comparison between Industry 1 and Industry 8

<b>Manufacturing and Aerospace &amp; Defense Corporation &amp; Retail &amp; Stores and Consumer Products Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.48322244	8.696125628
Variance	441.658071	895.4746381
Observations	72	32
Hypothesized Mean Difference	0	
t Stat	-0.207652	
$P(T \leq t)$ one tail	0.4182188	
t Critical one tail	1.67942739	
$P(T \leq t)$ two tail	<b>0.8364376</b>	
t Critical two tail	2.01410336	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	3.541693846	0.478125
Variance	357.9190154	0.080409274
Observations	72	32
Hypothesized Mean Difference	0	
t Stat	1.373699597	
$P(T \leq t)$ one tail	0.086928419	
t Critical one tail	1.666599659	
$P(T \leq t)$ two tail	<b>0.173856839</b>	
t Critical two tail	1.993943341	

By comparing the two industries, before and after the financial crisis, it is shown that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while it is greater for Industry 1' and less for Industry 2' after the crisis.

From these results, it is clear that the mean value of both compared industries does not follow the same pattern which means that there is a change occurred due to the financial crisis and financial crisis affect the debt/equity ratio of the firms of both industries differently.

P-value for selected industries is **0.8364376**, before the crisis, which is greater than **0.05**( $\alpha$ ). The results are statistically non-significant, so we cannot say that one industry is different from other and we will accept the null hypothesis for the comparison of **Manufacturing and Aerospace & Defense Corporation and Retail & Stores and Consumer Products Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.173856839**, after the crisis, which is also greater than **0.05**( $\alpha$ ). So, it indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis.

Comparison between **Manufacturing and Aerospace & Defense Corporation and Retail & Stores and Consumer Products Industry**, before and after the financial crisis, shows that the mean value of Industry 1' is greater than Industry 2' before the crisis and is same for after the crisis, though the mean value is decreasing for both compared industries after the crisis but the pattern is remaining same for both industries, which means that there is no change and the debt/equity ratio of selected industries follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.49559352**, before the crisis, which is much greater than **0.05**( $\alpha$ ). As the results are statistically non-significant, so it means that one industry is not different from other and we will accept our null hypothesis for the comparison of **Manufacturing and Aerospace & Defense Corporation and Retail & Stores and Consumer Products Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.84259843**, after the crisis, which is also greater than **0.05**( $\alpha$ ) and it also indicates

TABLE 4.20: Results of comparison between Industry 1 and Industry 9

<b>Manufacturing and Aerospace &amp; Defense Corporation &amp; Retail &amp; Stores and Consumer Products Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.48322244	5.3806672
Variance	441.658071	106.146367
Observations	72	32
Hypothesized Mean Difference	0	
t Stat	0.68391735	
$P(T \leq t)$ one tail	0.24779676	
t Critical one tail	1.66008063	
$P(T \leq t)$ two tail	<b>0.49559352</b>	
t Critical two tail	1.98373095	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	3.541693846	3.089402422
Variance	357.9190154	5.811395641
Observations	72	32
Hypothesized Mean Difference	0	
T Stat	0.199251122	
$P(T \leq t)$ one tail	0.421299215	
t Critical one tail	1.665151354	
$P(T \leq t)$ two tail	<b>0.84259843</b>	
t Critical two tail	1.991672579	

the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis.

### 4.3.2 Comparisons of Industry 2 with Every Other Industry

Comparison of industry 2 with industry 3 presented in table 4.21, industry 2 and industry 4 in table 4.22, industry 2 and industry 5 in table 4.23, industry 2 and industry 6 in table 4.24, industry 2 and industry 7 in table 4.25, industry 2 and industry 8 in table 4.26 and industry 2 and industry 9 in table 4.27.

TABLE 4.21: Results of comparison between Industry 2 and Industry 3

<b>Healthcare &amp; Pharmaceutical Industry &amp; Banking, Financial Services and Insurance Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	1.77499299	7.259489341
Variance	10.66948	210.1529577
Observations	32	80
Hypothesized Mean Difference	0	
t Stat	-3.1876193	
$P(T \leq t)$ one tail	0.00096834	
t Critical one tail	1.66088144	
$P(T \leq t)$ two tail	<b>0.00193668</b>	
t Critical two tail	1.98498431	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.966247441	1.210776592
Variance	1.784068802	1.130124219
Observations	32	80
Hypothesized Mean Difference	0	
t Stat	-0.925035123	
$P(T \leq t)$ one tail	0.179787524	
t Critical one tail	1.677224196	
$P(T \leq t)$ two tail	<b>0.359575049</b>	
t Critical two tail	2.010634758	

As the above comparison of two industries, before and after the financial crisis, it is shown that the mean value of Industry 1' is much less than the mean value of Industry 2' before the crisis and it is also less for Industry 1' and greater for Industry 2' after the crisis. Although the mean value is decreasing for both compared industries after the crisis but the pattern is remaining same for both industries, which means that there is no change occurs due to the financial crisis and the debt/equity ratio of selected industries follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.00193668**, before the crisis, which is less than **0.05**( $\alpha$ ). The results are statistically significant, so it is clear that one industry is different from other and we will reject our null hypothesis for the comparison

of **Healthcare & Pharmaceutical Industry and Banking, Financial Services and Insurance Industry**, before the crisis and accept the alternative hypothesis. This means that firms in Industry 1' are more levered than the firms in Industry 2' before the crisis. The p-value is **0.359575049**, after the crisis, which is greater than **0.05**( $\alpha$ ), which indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.22: Results of comparison between Industry 2 and Industry 4

<b>Healthcare &amp; Pharmaceutical Industry &amp; Beverage and Restaurant Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	1.77499299	8.443335822
Variance	10.66948	591.0924141
Observations	32	40
Hypothesized Mean Difference	0	
t Stat	-1.7154386	
$P(T \leq t)$ one tail	0.04690709	
t Critical one tail	1.682878	
$P(T \leq t)$ two tail	<b>0.09381418</b>	
t Critical two tail	2.01954097	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.966247441	0.965990586
Variance	1.784068802	0.680080648
Observations	32	40
Hypothesized Mean Difference	0	
t Stat	0.000952267	
$P(T \leq t)$ one tail	0.499622034	
t Critical one tail	1.676550893	
$P(T \leq t)$ two tail	<b>0.999244068</b>	
t Critical two tail	2.009575237	

By comparing the both industries, before and after the financial crisis, it is clear that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while the mean value is same for both the industries after the crisis. From these results, we can say that although the mean value is decreasing for both compared industries after the crisis but the decreasing pattern remains same for both the industries, which means that there is no change occurs due to

the financial crisis and the debt/equity ratio of selected industries follows the same pattern before and after the financial crisis.

P-value for selected industries is 0.09381418, before the crisis, which is slightly greater than  $0.05(\alpha)$ , so the results are statistically non-significant and we cannot say that one industry is different from other and we will accept the null hypothesis for the comparison of **Healthcare & Pharmaceutical Industry** and **Beverage and Restaurant Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.499622034**, after the crisis, which is greater than **0.05**( $\alpha$ ). It indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.23: Results of comparison between Industry 2 and Industry 5

<b>Healthcare &amp; Pharmaceutical Industry &amp; Mining, Energy &amp; Exploration Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	1.774992989	0.892820558
Variance	10.66948003	0.685153589
Observations	32	40
Hypothesized Mean Difference	0	
t Stat	1.489973141	
$P(T \leq t)$ one tail	0.072725221	
t Critical one tail	1.690924255	
$P(T \leq t)$ two tail	<b>0.145450441</b>	
t Critical two tail	2.032244509	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.966247441	0.5405
Variance	1.784068802	0.23355872
Observations	32	40
Hypothesized Mean Difference	0	
t Stat	1.715509006	
$P(T \leq t)$ one tail	0.047198199	
t Critical one tail	1.68595446	
$P(T \leq t)$ two tail	<b>0.094396398</b>	
t Critical two tail	2.024394164	

As the above comparison of selected industries, before and after the financial crisis, show that the mean value of Industry 1' is greater than Industry 2' before the crisis and is same for after the crisis, though there is a decrease trend shown in the mean values of both compared industries but the pattern is remaining same for both the industries, which means that there is no change as the debt/equity ratio of selected industries follows the same pattern before and after the financial crisis.

P-value for selected industries is **0.145450441**, before the crisis, which is greater than  $0.05(\alpha)$ , so the results are statistically non-significant and we cannot say that one industry is different from other and we will accept the null hypothesis for the comparison of **Healthcare & Pharmaceutical Industry** and **Mining, Energy & Exploration Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is 0.094396398, after the crisis, which is also greater than **0.05**( $\alpha$ ) which indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.24: Results of comparison between Industry 2 and Industry 6

<b>Healthcare &amp; Pharmaceutical Industry &amp; Mining, Energy &amp; Exploration Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	1.774992989	0.892820558
Variance	10.66948003	0.685153589
Observations	32	40
Hypothesized Mean Difference	0	
t Stat	1.489973141	
P(T <sub>i</sub> =t) one tail	0.072725221	
t Critical one tail	1.690924255	
P(T <sub>i</sub> =t) two tail	<b>0.145450441</b>	
t Critical two tail	2.032244509	

<i>After the Crisis</i>	<i>D/E Ratio(a)</i> <b>(Industry 1)</b>	<i>D/E Ratio(a)</i> <b>(Industry 2)</b>
Mean	0.966247441	1.995678505
Variance	1.784068802	4.743727514
Observations	32	40
Hypothesized Mean Difference	0	
t Stat	-2.46542673	
$P(T \leq t)$ one tail	0.008146587	
t Critical one tail	1.668270514	
$P(T \leq t)$ two tail	<b>0.016293174</b>	
t Critical two tail	1.996564419	

Above comparison of two industries, before and after the financial crisis show that the mean value of Industry 1' is greater than the mean value of Industry 2' before the crisis and it is less for Industry 1' and greater for Industry 2' after the crisis. The mean value is decreasing for both compared industries after the crisis but the pattern is not remaining same for both the industries, which means that there is a difference occurred due to the financial crisis and the debt/equity ratio of selected industries is not following the same pattern before and after the financial crisis.

P-value for selected industries is **0.098635073**, before the crisis, which is greater than **0.05**( $\alpha$ ), so the results are statistically non-significant and we cannot say that one industry is different from other and we will accept the null hypothesis for the comparison of **Healthcare & Pharmaceutical Industry** and **Technology, Telecommunication & Broadcasting Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.016293174**, after the crisis, which is less than **0.05**( $\alpha$ ) which indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.25: Results of comparison between Industry 2 and Industry 7

<b>Healthcare &amp; Pharmaceutical Industry &amp; Automobile and Travelling &amp; Transport Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	1.774992989	6.252494886
Variance	10.66948003	305.0852145
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	-1.425397063	
$P(T \leq t)$ one tail	0.081716575	
t Critical one tail	1.692360309	
$P(T \leq t)$ two tail	<b>0.163433149</b>	
t Critical two tail	2.034515297	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.966247441	0.884022603
Variance	1.784068802	4.208307069
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	0.19001089	
$P(T \leq t)$ one tail	0.425013243	
t Critical one tail	1.674116237	
$P(T \leq t)$ two tail	<b>0.850026486</b>	
t Critical two tail	2.005745995	

By comparing the both industries, before and after the financial crisis, it is clear that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while the mean value of Industry 1' is slightly greater than mean value of Industry 2' after the crisis. Though the mean value is decreasing for both the industries after the crisis but the pattern is not remaining same for the compared industries, which means that there is a difference occurred due to the financial crisis and the debt/equity ratio of selected industries does not follow the same pattern before and after the financial crisis.

P-value for selected industries is **0.163433149**, before the crisis, which is greater than **0.05**( $\alpha$ ). So the results are statistically non-significant and we cannot say that one industry is different from other and we will accept the null hypothesis for the comparison of **Healthcare & Pharmaceutical Industry** and **Automobile**

**and Travelling & Transport Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.850026486**, after the crisis, which is also greater than **0.05**( $\alpha$ ). That indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.26: Results of comparison between Industry 2 and Industry 8

<b>Healthcare &amp; Pharmaceutical Industry &amp; Retail &amp; Stores and Consumer Products Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	1.77499299	8.69613
Variance	10.66948	895.475
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	-1.3006293	
$P(T \leq t)$ one tail	0.10133718	
t Critical one tail	1.69388875	
$P(T \leq t)$ two tail	<b>0.20267437</b>	
t Critical two tail	2.03693334	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.966247441	0.478125
Variance	1.784068802	0.080409274
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	2.022204735	
$P(T \leq t)$ one tail	0.025539781	
t Critical one tail	1.690924255	
$P(T \leq t)$ two tail	<b>0.051079562</b>	
t Critical two tail	2.032244509	

By comparing the both industries, before and after the financial crisis, it is clear that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while the mean value of Industry 1' is greater than mean value of Industry 2' after the crisis. Although there is a decreasing trend in the mean values for both the industries after the crisis but the pattern is not remaining same for the compared industries, which means that there is a difference occurred

due to the financial crisis and the debt/equity ratio of selected industries does not follow the same pattern before and after the financial crisis.

The p-value for the industries is **0.20267437**, before the crisis, which is greater than **0.05**( $\alpha$ ). So the results are statistically non-significant and we cannot say that one industry is different from other and we will accept the null hypothesis for the comparison of **Healthcare & Pharmaceutical Industry** and **Retail & Stores and Consumer Products Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.051079562**, after the crisis, which is almost same as **0.05**( $\alpha$ ). That indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.27: Results of comparison between Industry 2 and Industry 9

<b>Healthcare &amp; Pharmaceutical Industry &amp; Real Estate and Services Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	1.774992989	5.380667199
Variance	10.66948003	106.1463668
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	-1.887168123	
$P(T \leq t)$ one tail	0.03350098	
t Critical one tail	1.68709362	
$P(T \leq t)$ two tail	<b>0.067001959</b>	
t Critical two tail	2.026192463	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.966247441	3.089402422
Variance	1.784068802	5.811395641
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	-4.35792266	
$P(T \leq t)$ one tail	3.45E-05	
t Critical one tail	1.677224196	
$P(T \leq t)$ two tail	<b>6.89E-05</b>	
t Critical two tail	2.010634758	

The above comparison of two industries, before and after the financial crisis, it is shown that the mean value of Industry '1' is much less than the mean value of Industry 2' before the crisis and it is also less for Industry '1' and greater for Industry 2' after the crisis. Although the mean value is decreasing for both compared industries after the crisis but the pattern is remaining same for both industries, which means that there is no change occurs due to the financial crisis and the debt/equity ratio of selected industries follows the same pattern before and after the financial crisis.

The p-value for both industries is **0.067001959**, before the crisis, which is greater than **0.05**( $\alpha$ ). The results are statistically non-significant and we cannot say that one industry is different from the other industry. We will accept the null hypothesis for the comparison of **Healthcare & Pharmaceutical Industry** and **Real Estate and Services Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.0000689182**, after the crisis, which is much less than **0.05**( $\alpha$ ). That indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

### 4.3.3 Comparisons of Industry 3 with Every Other Industry

Comparison of industry 3 with industry 4 presented in table 4.28, industry 3 and industry 5 in table 4.29, industry 3 and industry 6 in table 4.30, industry 3 and industry 7 in table 4.31, industry 3 and industry 8 in table 4.32 and industry 3 and industry 9 in table 4.33.

TABLE 4.28: Results of comparison between Industry 3 and Industry 4

<b>Banking, Financial Services and Insurance Industry &amp; Beverage and Restaurant Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.259489341	8.443335822
Variance	210.1529577	591.0924141
Observations	80	40
Hypothesized Mean Difference	0	
t Stat	0.283771043	
$P(T \leq t)$ one tail	0.388845737	
t Critical one tail	1.674116237	
$P(T \leq t)$ two tail	<b>0.777691474</b>	
t Critical two tail	2.005745995	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	1.210776592	0.96599059
Variance	1.130124219	0.68008065
Observations	80	40
Hypothesized Mean Difference	0	
t Stat	1.387416988	
$P(T \leq t)$ one tail	0.084230817	
t Critical one tail	1.660551217	
$P(T \leq t)$ two tail	<b>0.168461634</b>	
t Critical two tail	1.984467455	

After comparing the two industries, before and after the financial crisis, we got the results which shows that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while the mean value of Industry 1' is greater than mean value of Industry 2' after the crisis. Although there is a decrease shown in the mean values for both the industries after the crisis but the pattern is not remaining same for the both compared industries, which means that there is a difference occurred due to the financial crisis and the debt/equity ratio of selected industries does not follow the same pattern before and after the financial crisis.

P-value for the industries is **0.777691474**, before the crisis, which is greater than **0.05( $\alpha$ )**. The results are statistically non-significant and we cannot say that one industry is different from the other industry. We will accept the null hypothesis for the comparison of **Banking, Financial Services and Insurance Industry** and

**Beverage and Restaurant Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.168461634**, after the crisis, which is greater than **0.05**( $\alpha$ ), which indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.29: Results of comparison between Industry 3 and Industry 5

<b>Banking, Financial Services and Insurance Industry &amp; Mining, Energy &amp; Exploration Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.259489341	0.892820558
Variance	210.1529577	0.685153589
Observations	80	40
Hypothesized Mean Difference	0	
t Stat	3.915418422	
$P(T \leq t)$ one tail	9.44E-05	
t Critical one tail	1.664124579	
$P(T \leq t)$ two tail	<b>0.000188764</b>	
t Critical two tail	1.990063421	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	1.21077659	0.5405
Variance	1.13012422	0.233558718
Observations	80	40
Hypothesized Mean Difference	0	
t Stat	4.74366195	
$P(T \leq t)$ one tail	2.99E-06	
t Critical one tail	1.65798166	
$P(T \leq t)$ two tail	<b>5.98E-06</b>	
t Critical two tail	1.9804476	

As the above comparison of two industries, before and after the financial crisis, show that the mean value of Industry 1' is greater than Industry 2' before the crisis and is same for after the crisis, though there is a decrease shown in the mean values for both the compared industries but the pattern is remaining same for both industries, which means that there is no change occurred due to the financial crisis and these industries follows the same pattern before and after the financial crisis.

P-value for selected industries is **0.000188764**, before the crisis, which is much less than **0.05**( $\alpha$ ). As the results are statistically significant, so it is clear that one industry is different from other and we will reject our null hypothesis for the comparison of **Banking, Financial Services and Insurance Industry** and **Mining, Energy & Exploration Industry**, before the crisis and accept the alternative hypothesis. This means that firms in Industry 1' are more levered than the firms in Industry 2' before the crisis. The p-value is **0.0000059797**, after the crisis, which is much less than **0.05**( $\alpha$ ). It indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.30: Results of comparison between Industry 3 and Industry 6

<b>Banking, Financial Services and Insurance Industry &amp; Technology, Telecommunication &amp; Broadcasting Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.259489341	0.786537584
Variance	210.1529577	0.169720822
Observations	80	40
Hypothesized Mean Difference	0	
t Stat	3.990516901	
$P(T \leq t)$ one tail	7.32E-05	
t Critical one tail	1.664371409	
$P(T \leq t)$ two tail	<b>0.000146494</b>	
t Critical two tail	1.99045021	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	1.210776592	1.995678505
Variance	1.130124219	4.743727514
Observations	80	40
Hypothesized Mean Difference	0	
t Stat	-2.154505593	
$P(T \leq t)$ one tail	0.018071838	
t Critical one tail	1.676550893	
$P(T \leq t)$ two tail	<b>0.036143675</b>	
t Critical two tail	2.009575237	

By the above comparison of the selected industries, before and after the financial crisis, show that the mean value of Industry 1' is greater than Industry 2' before the crisis but it is less for Industry 1'and greater for Industry 2' after the crisis.

However, there is a decrease shown in the mean values of both compared industries but the pattern for them is remaining same for both industries, which means that there is a change occurred due to the crisis as these industries does not follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.000146494**, before the crisis, which is less than **0.05**( $\alpha$ ). As per the results are statistically significant, so it is clear that one industry is different from other and we will reject our null hypothesis for the comparison of **Banking, Financial Services and Technology, Telecommunication & Broadcasting Industry**, before the crisis and accept the alternative hypothesis. This means that firms in Industry 1' are more levered than the firms in Industry 2' before the crisis. The p-value is **0.036143675**, after the crisis, which is less than **0.05**( $\alpha$ ) which shows the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

After comparing the two industries, before and after the financial crisis, we got the results which shows that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while the mean value of Industry 1' is greater than mean value of Industry 2' after the crisis. Although there is a decrease shown in the mean values for both the industries after the crisis but the pattern is not remaining same for the both compared industries, which means that there is a difference occurred due to the financial crisis and the debt/equity ratio of selected industries does not follow the same pattern before and after the financial crisis.

The p-value for selected industries is **0.796562443**, before the crisis, which is greater than **0.05**( $\alpha$ ). Results are statistically non-significant, so it is clear that one industry is not different from other industry and we will accept our null hypothesis for the comparison of **Banking, Financial Services and Retail & Stores and Consumer Products Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' as levered as the firms in Industry 2' before the crisis. The p-value is **0.000000130419**, after the crisis, which is much less than **0.05**( $\alpha$ ) which shows the significant results and we will reject the null

TABLE 4.31: Results of comparison between Industry 3 and Industry 8

<b>Banking, Financial Services and Insurance Industry &amp; Retail &amp; Stores and Consumer Products Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.259489341	8.696125628
Variance	210.1529577	895.4746381
Observations	80	32
Hypothesized Mean Difference	0	
t Stat	-0.25966395	
$P(T \leq t)$ one tail	0.398281221	
t Critical one tail	1.68709362	
$P(T \leq t)$ two tail	<b>0.796562443</b>	
t Critical two tail	2.026192463	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	1.210776592	0.478125
Variance	1.130124219	0.080409274
Observations	80	32
Hypothesized Mean Difference	0	
t Stat	5.679752563	
$P(T \leq t)$ one tail	6.52E-08	
t Critical one tail	1.66008063	
$P(T \leq t)$ two tail	<b>1.30E-07</b>	
t Critical two tail	1.983731003	

hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.32: Results of comparison between Industry 3 and Industry 9

<b>Banking, Financial Services and Insurance Industry &amp; Real Estate and Services Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	7.25948934	5.380667199
Variance	210.152958	106.1463668
Observations	80	32
Hypothesized Mean Difference	0	
t Stat	0.77063155	
$P(T \leq t)$ one tail	0.22159766	
t Critical one tail	1.66412458	
$P(T \leq t)$ two tail	<b>0.44319531</b>	
t Critical two tail	1.99006342	

<i>After the Crisis</i>	<b><i>D/E Ratio(<math>\alpha</math>)</i></b> <b>(Industry 1)</b>	<b><i>D/E Ratio(<math>\alpha</math>)</i></b> <b>(Industry 2)</b>
Mean	1.21077659	3.089402422
Variance	1.13012422	5.811395641
Observations	80	32
Hypothesized Mean Difference	0	
t Stat	-4.24628005	
$P(T \leq t)$ one tail	7.30E-05	
t Critical one tail	1.68829771	
$P(T \leq t)$ two tail	<b>0.00014604</b>	
t Critical two tail	2.028094	

The above comparison of the selected industries, before and after the financial crisis, show that the mean value of Industry 1' is greater than Industry 2' before the crisis but it is less for Industry 1' and greater for Industry 2' after the crisis. However, there is a decrease shown in the mean values of both compared industries but the pattern for them is remaining same for both industries, which means that there is a change occurred due to the crisis as these industries does not follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.44319531**, before the crisis, which is greater than **0.05( $\alpha$ )**. So as the results are statistically non-significant, so it is clear that one Industry 1' is same as Industry 2' and we will accept our null hypothesis for the comparison of **Banking, Financial Services and Retail & Stores and Consumer Products Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' as levered as Industry 2' before the crisis. The p-value is **0.00014604**, after the crisis, which is less than **0.05( $\alpha$ )** and it indicates the significant results, so we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

#### 4.3.4 Comparisons of Industry 4 with Every Other Industry

Comparison of industry 4 with industry 5 presented in table 4.34, industry 4 and industry 6 in table 4.35, industry 4 and industry 7 in table 4.36, industry 4 and

industry 8 in table 4.37 and industry 4 and industry 9 in table 4.38.

TABLE 4.33: Results of comparison between Industry 4 and Industry 5

<b>Beverage and Restaurant Industry &amp; Mining, Energy &amp; Exploration Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	8.44333582	0.892820558
Variance	591.092414	0.685153589
Observations	40	40
Hypothesized Mean Difference	0	
t Stat	1.96303181	
$P(T \leq t)$ one tail	0.02840141	
t Critical one tail	1.68487512	
$P(T \leq t)$ two tail	<b>0.05680281</b>	
t Critical two tail	2.02269092	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.965990586	0.5405
Variance	0.680080648	0.233558718
Observations	40	40
Hypothesized Mean Difference	0	
t Stat	2.815351013	
$P(T \leq t)$ one tail	0.003247813	
t Critical one tail	1.669402222	
$P(T \leq t)$ two tail	<b>0.006495626</b>	
t Critical two tail	1.998340543	

As the above comparison of two industries, before and after the financial crisis, show that the mean value of Industry 1' is greater than Industry 2' before the crisis and is same for after the crisis, though there is a decrease shown in the mean values of both compared industries but the pattern is remaining same for both industries, which means that there is no change as these industries follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.05680281**, before the crisis, which is almost equal to the **0.05**( $\alpha$ ), so the results are statistically significant, so it is clear that one industry is different from other and we will reject our null hypothesis for the comparison of **Beverage and Restaurant Industry and Mining, Energy & Exploration Industry**, before the crisis and accept the alternative hypothesis.

This means that firms in Industry 1' are more levered than the firms in Industry 2' before the crisis. The p-value is **0.006495626**, after the crisis, which is much less than **0.05**( $\alpha$ ) which shows the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.34: Results of comparison between Industry 4 and Industry 7

<b>Beverage and Restaurant Industry &amp; Technology, Telecommunication &amp; Broadcasting Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	8.443335822	0.786537584
Variance	591.0924141	0.169720822
Observations	40	40
Hypothesized Mean Difference	0	
t Stat	1.991531433	
$P(T \leq t)$ one tail	0.026729552	
t Critical one tail	1.684875122	
$P(T \leq t)$ two tail	<b>0.053459104</b>	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.965990586	0.884022603
Variance	0.680080648	4.208307069
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	0.212698312	
$P(T \leq t)$ one tail	0.416335076	
t Critical one tail	1.684875122	
$P(T \leq t)$ two tail	<b>0.832670152</b>	
t Critical two tail	2.02269092	

The above comparison of two industries, before and after the financial crisis, show that the mean value of Industry 1' is greater than Industry 2' before the crisis and is same for after the crisis, though there is a decrease shown in the mean values of both compared industries but the pattern is remaining same for both industries, which means that there is no change as these industries follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.658193197**, before the crisis, which is more than **0.05**( $\alpha$ ). As the results are statistically non-significant so it is clear that one industry is not different from other and we will accept the null hypothesis for the comparison of **Beverage and Restaurant Industry** and **Automobile and Travelling & Transport Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' are equally levered as the firms in Industry 2' before the financial crisis. And the p-value is 0.832670152, after the crisis, which is also greater than **0.05**( $\alpha$ ). It indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis too.

TABLE 4.35: Results of comparison between Industry 4 and Industry 8

<b>Beverage and Restaurant Industry &amp; Retail &amp; Stores and Consumer Products Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	8.443335822	8.696125628
Variance	591.0924141	895.4746381
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-0.038657715	
$P(T \leq t)$ one tail	0.484646899	
t Critical one tail	1.671093032	
$P(T \leq t)$ two tail	<b>0.969293798</b>	
t Critical two tail	2.000995378	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.965990586	0.478125
Variance	0.680080648	0.080409274
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	3.492352437	
$P(T \leq t)$ one tail	0.00050553	
t Critical one tail	1.675905025	
$P(T \leq t)$ two tail	<b>0.001011059</b>	
t Critical two tail	2.008559112	

By comparison of the two industries, before and after the financial crisis show that the mean value of Industry 1' is slight less than the mean value of Industry 2' before the crisis while the mean value of Industry 1' is greater than mean value

of Industry 2' after the crisis. Although there is a decrease shown in the mean values for both the industries after the crisis but the pattern is not remaining same for the both compared industries, which means that there is a difference occurred due to the financial crisis and the debt/equity ratio of selected industries does not follow the same pattern before and after the financial crisis.

The p-value for selected industries is **0.484646899**, before the crisis, which is greater than **0.05**( $\alpha$ ). As the results are statistically non-significant, so it is clear that one industry is not different from other industry and we will accept our null hypothesis for the comparison of **Beverage and Restaurant Industry** and **Retail & Stores and Consumer Products Industry**, before the crisis and accept the alternative hypothesis. This means that firms in Industry 1' as levered as the Industry 2' before the crisis. The p-value is **0.001011059**, after the crisis, which is less than **0.05**( $\alpha$ ) which indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.36: Results of comparison between Industry 4 and Industry 9

<b>Beverage and Restaurant Industry &amp; Real Estate and Services Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	0.965990586	3.089402422
Variance	0.680080648	5.811395641
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-4.764701769	
$P(T \leq t)$ one tail	1.46E-05	
t Critical one tail	1.68709362	
$P(T \leq t)$ two tail	<b>2.91E-05</b>	
t Critical two tail	2.026192463	

<i>After the Crisis</i>	<i>D/E Ratio(a)</i> <b>(Industry 1)</b>	<i>D/E Ratio(a)</i> <b>(Industry 2)</b>
Mean	8.443335822	5.380667199
Variance	591.0924141	106.1463668
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	0.719992718	
$P(T \leq t)$ one tail	0.237289097	
t Critical one tail	1.673033965	
$P(T \leq t)$ two tail	<b>0.474578195</b>	
t Critical two tail	2.004044783	

Above comparison of two industries, before and after the financial crisis show that the mean value of Industry 1' is greater than the mean value of Industry 2' before the crisis and it is less for Industry 1' and greater for Industry 2' after the crisis. The mean value is decreasing for both compared industries after the crisis but the pattern is not remaining same for both the industries, which means that there is a difference occurred due to the financial crisis and the debt/equity ratio of selected industries is not following the same pattern before and after the financial crisis.

P-value for selected industries is **0.474578195**, before the crisis, which is greater than **0.05**( $\alpha$ ). As the results are statistically non-significant, so it is clear that one industry is not different from other industry and we will accept our null hypothesis for the comparison of **Beverage and Restaurant Industry** and **Real Estate and Services Industry**, before the crisis and accept the alternative hypothesis. This means that firms in Industry 1' as levered as the Industry 2' before the crisis. The p-value is 0.0000291154, after the crisis, which is less than **0.05**( $\alpha$ ) which indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

#### 4.3.5 Comparisons of Industry 5 with Every Other Industry

Comparison of industry 5 with industry 6 presented in table 4.39, industry 5 and industry 7 in table 4.40, industry 5 and industry 8 in table 4.41, industry 5 and industry 9 in table 4.42.

TABLE 4.37: Results of comparison between Industry 5 and Industry 6

<b>Mining, Energy &amp; Exploration Industry &amp; Technology, Telecommunication &amp; Broadcasting Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	0.892820558	0.786537584
Variance	0.685153589	0.169720822
Observations	40	40
Hypothesized Mean Difference	0	
t Stat	0.727013599	
$P(T \leq t)$ one tail	0.235096539	
t Critical one tail	1.672028888	
$P(T \leq t)$ two tail	<b>0.470193078</b>	
t Critical two tail	2.002465459	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.5405	1.995678505
Variance	0.23355872	4.743727514
Observations	40	40
Hypothesized Mean Difference	0	
t Stat	-4.12524701	
$P(T \leq t)$ one tail	8.32E-05	
t Critical one tail	1.6810707	
$P(T \leq t)$ two tail	<b>0.00016641</b>	
t Critical two tail	2.0166922	

Comparing the two industries, before and after the financial crisis, we can see that the mean value of Industry 1' is greater than the mean value of Industry 2' before the crisis and it is less for Industry 1' and greater for Industry 2' after the crisis. The mean value is decreasing for both compared industries after the crisis but the pattern is not remaining same for both the industries, which means that there is a difference occurred due to the financial crisis and the debt/equity ratio of selected industries is not following the same pattern before and after the financial crisis.

The p-value for both industries is **0.470193078**, before the crisis, which is greater than **0.05**( $\alpha$ ). As the results are statistically non-significant, so it is clear that one industry is not different from other industry and we will accept our null hypothesis for the comparison of **Mining, Energy & Exploration Industry** and **Technology, Telecommunication & Broadcast Industry**, before the crisis

and accept the alternative hypothesis. This means that firms in Industry 1' as levered as the Industry 2' before the crisis. The p-value is **0.00016641**, after the crisis, which is less than **0.05( $\alpha$ )**. It indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.38: Results of comparison between Industry 5 and Industry 7

<b>Mining, Energy &amp; Exploration Industry &amp; Automobile and Travelling &amp; Transport Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	0.89282056	6.252494886
Variance	0.68515359	305.0852145
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-1.7342553	
$P(T \leq t)$ one tail	0.04640412	
t Critical one tail	1.69551878	
$P(T \leq t)$ two tail	<b>0.09280825</b>	
t Critical two tail	2.03951345	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.5405	0.884022603
Variance	0.233558718	4.208307069
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-0.926922142	
$P(T \leq t)$ one tail	0.180250209	
t Critical one tail	1.690924255	
$P(T \leq t)$ two tail	<b>0.360500418</b>	
t Critical two tail	2.032244509	

After comparing the two industries, before and after the financial crisis, it is clear that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while it is greater for Industry 1' and less for Industry 2' after the crisis. From these results, it is clear that the mean value of both compared industries does not follow the same pattern which means that there is a change occurred due to the financial crisis or financial crisis affect the debt/equity ratio of the firms of both industries differently.

P-value for these industries is **0.09280825**, before the crisis, which is more than  $0.05(\alpha)$ . As the results are statistically non-significant so it is clear that one industry is not different from other and we will accept the null hypothesis for the comparison of **Mining, Energy & Exploration Industry and Automobile and Travelling & Transport Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' are equally levered as the firms in Industry 2' before the financial crisis. And the p-value is **0.360500418**, after the crisis, which is also greater than  $0.05(\alpha)$ . It indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis too.

TABLE 4.39: Results of comparison between Industry 5 and Industry 8

<b>Mining, Energy &amp; Exploration Industry &amp; Retail &amp; Stores and Consumer Products Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	0.892820558	8.696125628
Variance	0.685153589	895.4746381
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-1.474667314	
$P(T \leq t)$ one tail	0.075193182	
t Critical one tail	1.695518783	
$P(T \leq t)$ two tail	<b>0.150386365</b>	
t Critical two tail	2.039513446	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.5405	0.478125
Variance	0.233558718	0.080409274
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	0.682529794	
$P(T \leq t)$ one tail	0.248664652	
t Critical one tail	1.668635976	
$P(T \leq t)$ two tail	<b>0.497329304</b>	
t Critical two tail	1.997137908	

After the comparison of the two industries, before and after the financial crisis, it is clear that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while it is slightly greater for Industry 1' and less for Industry

2' after the crisis. From these results, it is clear that the mean value of both compared industries does not follow the same pattern which means that there is a change occurred because of the financial crisis and financial crisis affect the debt/equity ratio of the firms of both industries differently.

The p-value of both industries is **0.150386365**, before the crisis, which is greater than **0.05**( $\alpha$ ). The results are statistically non-significant, so it is clear that one industry is not different from other and we will accept the null hypothesis for the comparison of *Mining, Energy & Exploration Industry* and **Retail & Stores and Consumer Products Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' are equally levered as the firms in Industry 2' before the financial crisis. And the p-value is **0.248664652**, after the crisis, which is also greater than **0.05**( $\alpha$ ). It shows the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis too.

TABLE 4.40: Results of comparison between Industry 5 and Industry 9

<b>Mining, Energy &amp; Exploration Industry &amp; Real Estate and Services Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	0.89282056	5.380667199
Variance	0.68515359	106.1463668
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-2.4577743	
$P(T \leq t)$ one tail	0.00988591	
t Critical one tail	1.69551878	
$P(T \leq t)$ two tail	<b>0.01977183</b>	
t Critical two tail	2.03951345	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.5405	3.089402422
Variance	0.233558718	5.811395641
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-5.887300249	
$P(T \leq t)$ one tail	6.72E-07	
t Critical one tail	1.692360309	
$P(T \leq t)$ two tail	<b>1.34E-06</b>	
t Critical two tail	2.034515297	

As the above comparison of two industries, before and after the financial crisis, show that the mean value of Industry 1' is less than Industry 2' before the crisis and is same for after the crisis, though there is a decrease shown in the mean values of both compared industries but the pattern is remaining same for both industries, which means that there is no change as these industries follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.01977183**, before the crisis, which is less than **0.05**( $\alpha$ ). As the results are statistically significant, so it is clear that one industry is different from other and we will reject our null hypothesis for the comparison of **Mining, Energy & Exploration Industry** and **Real Estate and Services Industry**, before the crisis and accept the alternative hypothesis. This means that firms in Industry 1' are more levered than the firms in Industry 2' before the crisis. The p-value is **0.0000034423**, after the crisis, which is also greater than **0.05**( $\alpha$ ) which indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis, on the basis of these results.

#### **4.3.6 Comparisons of Industry 6 with Every Other Industry**

Comparison of industry 6 with industry 7 presented in table 4.43, industry 6 and industry 8 in table 4.44 and industry 6 and industry 9 in table 4.45.

By the comparison of the two industries, before and after the financial crisis, it is clear that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while it is greater for Industry 1' and less for Industry 2' after the crisis. From the above results, it is clear that the mean value of both compared industries does not follow the same pattern which means that there is a change occurred because of the financial crisis and financial crisis affect the debt/equity ratio of the firms of both industries differently.

P-value for selected industries is **0.0865903**, before the crisis, which is greater than **0.05**( $\alpha$ ), so the results are statistically non-significant and we cannot say

TABLE 4.41: Results of comparison between Industry 6 and Industry 7

<b>Technology, Telecommunication &amp; Broadcasting Industry &amp; Automobile and Travelling &amp; Transport Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	0.78653758	6.252494886
Variance	0.16972082	305.0852145
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-1.7698401	
$P(T \leq t)$ one tail	0.04329515	
t Critical one tail	1.69551878	
$P(T \leq t)$ two tail	<b>0.0865903</b>	
t Critical two tail	2.03951345	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	1.99567851	0.884022603
Variance	4.74372751	4.208307069
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	2.22285491	
$P(T \leq t)$ one tail	0.01477676	
t Critical one tail	1.66757228	
$P(T \leq t)$ two tail	<b>0.02955351</b>	
t Critical two tail	1.99546893	

that one industry is different from other and we will accept the null hypothesis for the comparison of **Technology, Telecommunication & Broadcasting Industry** and **Automobile and Travelling & Transport Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.02955351**, after the crisis, which is less than **0.05**( $\alpha$ ) which indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

The comparing of two industries, before and after the financial crisis shows that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while it is greater for Industry 1' and less for Industry 2' after the crisis. From this, it is clear that the mean value of both compared industries does not

TABLE 4.42: Results of comparison between Industry 6 and Industry 8

<b>Technology, Telecommunication &amp; Broadcasting Industry &amp; Retail &amp; Stores and Consumer Products Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	0.78653758	8.69612563
Variance	0.16972082	895.474638
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-1.4950967	
$P(T \leq t)$ one tail	0.07250022	
t Critical one tail	1.69551878	
$P(T \leq t)$ two tail	<b>0.14500044</b>	
t Critical two tail	2.03951345	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	1.995678505	0.478125
Variance	4.743727514	0.080409274
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	4.360750329	
$P(T \leq t)$ one tail	4.26E-05	
t Critical one tail	1.682878002	
$P(T \leq t)$ two tail	<b>8.52E-05</b>	
t Critical two tail	2.01954097	

follow the same pattern which means that there is a change occurred due to the financial crisis and the financial crisis affect differently, the debt/equity ratio of the firms of both industries.

P-value for selected industries is **0.14500044**, before the crisis, which is greater than **0.05**( $\alpha$ ), so the results are statistically non-significant and we cannot say that one industry is different from other and we will accept the null hypothesis for the comparison of **Technology, Telecommunication & Broadcasting Industry** and **Retail & Stores and Consumer Products Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.0000851937**, after the crisis, which is less than **0.05**( $\alpha$ ) which indicates the significant results and we will reject the null hypothesis and accept the alternative

hypothesis for selected industries, after the financial crisis.

TABLE 4.43: Results of comparison between Industry 6 and Industry 9

<b>Technology, Telecommunication &amp; Broadcasting Industry &amp; Real Estate and Services Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	0.786537584	5.380667199
Variance	0.169720822	106.1463668
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-2.52085625	
$P(T \leq t)$ one tail	0.008532843	
t Critical one tail	1.695518783	
$P(T \leq t)$ two tail	<b>0.017065685</b>	
t Critical two tail	2.039513446	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	1.995678505	3.089402422
Variance	4.743727514	5.811395641
Observations	40	32
Hypothesized Mean Difference	0	
t Stat	-1.996194571	
$P(T \leq t)$ one tail	0.025119559	
t Critical one tail	1.669402222	
$P(T \leq t)$ two tail	<b>0.050239117</b>	
t Critical two tail	1.998340543	

The above comparison of two industries, before and after the financial crisis, show that the mean value of Industry 1' is less than Industry 2' before the crisis and is same for after the crisis, though there is a decrease shown in the mean values of both compared industries but the pattern is remaining same for both industries, which means that there is no change as these industries follows the same pattern before and after the financial crisis.

The p-value for selected industries is **0.017065685**, before the crisis, which is less than **0.05**( $\alpha$ ). As the results are statistically significant, so it is clear that one industry is different from other and we will reject our null hypothesis for the comparison of **Technology, Telecommunication & Broadcasting Industry** and

**Real Estate and Services Industry**, before the crisis and accept the alternative hypothesis. This means that firms in Industry 1' are more levered than the firms in Industry 2' before the crisis. The p-value is **0.051079562**, after the crisis, which is almost same as **0.05**( $\alpha$ ). That indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

### 4.3.7 Comparisons of Industry 7 with Every Other Industry

Comparison of industry 7 with industry 8 presented in table 4.46 and industry 7 and industry 9 in table 4.47

TABLE 4.44: Results of comparison between Industry 7 and Industry 8

<b>Automobile and Travelling &amp; Transport Industry &amp; Retail &amp; Stores and Consumer Products Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	6.252494886	8.696125628
Variance	305.0852145	895.4746381
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	-0.398950176	
$P(T \leq t)$ one tail	0.345814371	
t Critical one tail	1.675905025	
$P(T \leq t)$ two tail	<b>0.691628743</b>	
t Critical two tail	2.008559112	
<i>After the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	0.884022603	0.478125
Variance	4.208307069	0.080409274
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	1.108735145	
$P(T \leq t)$ one tail	0.137904045	
t Critical one tail	1.693888748	
$P(T \leq t)$ two tail	<b>0.27580809</b>	
t Critical two tail	2.036933343	

By comparing the two industries, before and after the financial crisis, it is clear that the mean value of Industry 1' is less than the mean value of Industry 2' before the crisis while it is greater for Industry 1' and less for Industry 2' after the crisis. From this, it is clear that the mean value of both compared industries does not follow the same pattern which means that there is a change occurred due to the financial crisis and the financial crisis affect differently, the debt/equity ratio of the firms of both industries.

The p-value for selected industries is **0.691628743**, before the crisis, which is more than **0.05**( $\alpha$ ). As the results are statistically non-significant so it is clear that one industry is not different from other and we will accept the null hypothesis for the comparison of **Automobile and Travelling & Transport Industry** and **Retail & Stores and Consumer Products Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' are equally levered as the firms in Industry 2' before the financial crisis. And the p-value is **0.27580809**, after the crisis, which is also greater than **0.05**( $\alpha$ ). It indicates the non-significant results and we will accept the null hypothesis and reject the alternative hypothesis for selected industries, after the financial crisis too.

TABLE 4.45: Results of comparison between Industry 7 and Industry 9

<b>Automobile and Travelling &amp; Transport Industry &amp; Real Estate and Services Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	6.25249489	5.380667199
Variance	305.085215	106.1463668
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	0.24319935	
$P(T \leq t)$ one tail	0.40442298	
t Critical one tail	1.67590503	
$P(T \leq t)$ two tail	<b>0.80884597</b>	
t Critical two tail	2.00855911	

<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.884022603	3.089402422
Variance	4.208307069	5.811395641
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	-3.941222626	
$P(T \leq t)$ one tail	0.000107155	
t Critical one tail	1.670648865	
$P(T \leq t)$ two tail	<b>0.00021431</b>	
t Critical two tail	2.000297822	

Comparing the two industries, before and after the financial crisis, we can see that the mean value of Industry 1' is greater than the mean value of Industry 2' before the crisis and it is less for Industry 1' and greater for Industry 2' after the crisis. The mean value is decreasing for both compared industries after the crisis but the pattern is not remaining same for both the industries, which means that there is a difference occurred due to the financial crisis and the debt/equity ratio of selected industries is not following the same pattern before and after the financial crisis.

P-value for selected industries is **0.80884597**, before the crisis, which is greater than **0.05**( $\alpha$ ), so the results are statistically non-significant and we cannot say that one industry is different from other and we will accept the null hypothesis for the comparison of **Automobile and Travelling & Transport Industry** and **Real Estate and Services Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.00021431**, after the crisis, which is less than **0.05**( $\alpha$ ) which indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

#### 4.3.8 Comparisons of Industry 8 with Every Other Industry

Comparison of industry 8 with industry 9 is presented in table 4.48

TABLE 4.46: Results of comparison between industry 8 and Industry 9

<b>Retail &amp; Stores and Consumer Products Industry &amp; Real Estate and Services Industry</b>		
<i>Before the Crisis</i>	<b>D/E Ratio(b) (Industry 1)</b>	<b>D/E Ratio(b) (Industry 2)</b>
Mean	8.69612563	5.380667199
Variance	895.474638	106.1463668
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	0.59260712	
$P(T \leq t)$ one tail	0.27847721	
t Critical one tail	1.68595446	
$P(T \leq t)$ two tail	<b>0.55695443</b>	
t Critical two tail	2.02439416	
<i>After the Crisis</i>	<b>D/E Ratio(a) (Industry 1)</b>	<b>D/E Ratio(a) (Industry 2)</b>
Mean	0.478125	3.089402422
Variance	0.080409274	5.811395641
Observations	32	32
Hypothesized Mean Difference	0	
t Stat	-6.085605891	
$P(T \leq t)$ one tail	4.24E-07	
t Critical one tail	1.693888748	
$P(T \leq t)$ two tail	<b>8.47E-07</b>	
t Critical two tail	2.036933343	

After comparing the two industries, before and after the financial crisis, we can see that the mean value of Industry 1' is greater than the mean value of Industry 2' before the crisis and it is less for Industry 1' and greater for Industry 2' after the crisis. The mean value is decreasing for both compared industries after the crisis but the pattern is not remaining same for both the industries, which means that there is a difference occurred due to the financial crisis and the debt/equity ratio of selected industries is not following the same pattern before and after the financial crisis.

P-value for both industries is **0.55695443**, before the crisis, which is greater than **0.05**( $\alpha$ ). The results are statistically non-significant and we cannot say that one industry is different from the other industry. We will accept the null hypothesis for the comparison of **Retail & Stores and Consumer Products Industry** and

**Real Estate and Services Industry**, before the crisis and reject the alternative hypothesis. This means that firms in Industry 1' and Industry 2' have same leverage patterns before the crisis. The p-value is **0.000000847398**, after the crisis, which is much less than **0.05**( $\alpha$ ). That indicates the significant results and we will reject the null hypothesis and accept the alternative hypothesis for selected industries, after the financial crisis.

TABLE 4.47: Summary Table for Inter-Industry Comparison

Two Industries	Before Crisis	After Crisis	Change
Industry 1-Industry 2	Different	Same	Yes
Industry 1-Industry 3	Same	Same	No
Industry 1-Industry 4	Same	Same	No
Industry 1-Industry 5	Same	Different	Yes
Industry 1-Industry 6	Different	Same	Yes
Industry 1-Industry 7	Same	Same	Yes
Industry 1-Industry 8	Same	Same	No
Industry 1-Industry 9	Same	Same	No
Industry 2-Industry 3	Different	Same	Yes
Industry 2-Industry 4	Different	Same	Yes
Industry 2-Industry 5	Same	Different	Yes
Industry 2-Industry 6	Different	Different	No
Industry 2-Industry 7	Same	Same	Yes
Industry 2-Industry 8	Same	Different	Yes
Industry 2-Industry 9	Different	Different	No
Industry 3-Industry 4	Same	Same	No
Industry 3-Industry 5	Different	Different	No
Industry 3-Industry 6	Different	Different	No
Industry 3-Industry 7	Same	Same	No
Industry 3-Industry 8	Same	Different	Yes
Industry 3-Industry 9	Same	Different	Yes
Industry 4-Industry 5	Different	Different	No
Industry 4-Industry 6	Different	Different	No
Industry 5-Industry 6	Same	Different	Yes
Industry 5-Industry 7	Different	Same	Yes
Industry 5-Industry 8	Same	Same	No
Industry 5-Industry 9	Different	Different	No

Two Industries	Before Crisis	After Crisis	Change
Industry 6-Industry 7	Different	Different	No
Industry 6-Industry 8	Same	Different	Yes
Industry 6-Industry 9	Different	Different	No
Industry 7-Industry 8	Same	Same	No
Industry 7-Industry 9	Same	Different	Yes
Industry 8-Industry 9	Same	Different	Yes

### To Sum Up:

We have mixed results of inter-industry comparisons which show that some industries showed the change in their debt/equity ratios before and after the financial crisis of 2008 and some show no change in the debt/equity ratio before and after the crisis. Out of 36 comparisons, 18 calculations show the difference in the debt/equity ratios before and after the global financial crisis and 18 comparisons show that there is no changes occur in debt/equity ratios due to the financial crisis. For inter-industry level comparison, we consider  $P(T \leq t)$  one-tail, when the mean values for both selected industries are same or closer to each other while we consider  $P(T \leq t)$  two-tail, when there is a difference in mean values of both industries.

# Chapter 5

## Conclusion and Implementations

The main purpose of this study has been to test the cyclical nature of debt/equity ratio of some selected US firms. For this purpose, we have used the data of 50 selected United States' firms which were listed in New York Stock Exchange. There are two reasons behind the selection of US firms; one is that the US had been the epicenter of the global financial crisis of 2008. The other reason is that the US financial system is highly developed which matches with financing process described by Minsky, to describe his FIH. We divided the data into two periods of 2000-2007 and 2009-2016, using T-test analysis for comparison. We apply the T-test analysis on aggregate data (all the companies separately), industry wise data and inter-industry wise data and compare the debt/equity ratio before and after the financial crisis to check the cyclical nature of debt/equity ratios.

### 5.1 Findings

- On the basis of above mentioned data and results, we conclude that FIH holds while considering all the selected firms together. That is, the overall debt/equity ratio in the economy of US is pro-cyclical. It means that the financing process described in FIH applies. Firms move from hedge to ponzi finance in the expansion phase of an economy.

- Our industry-wise analysis shows that FIH holds for 6 industries out of 9 selected industries. Almost 4 non-financial industries show that their debt/equity ratios are not pro-cyclical and the results of remaining 5 industries show that the debt/equity ratios for those industries are pro-cyclical. Out of 6 industries for which FIH holds, for two industries (Banking, Financial Services and Insurance Industry and Technology, Telecommunication & Broadcasting Industry) it holds at 1% significance level, for three industries (Beverage and Restaurant Industry, Mining, Energy & Exploration Industry and Automobile and Travelling & Transport Industry) it holds at 5% and for only one industry (Retail & Stores and Consumer Products Industry) it holds at 10% significance level. Whereas, FIH does not hold for three industries (Manufacturing and Aerospace & Defense Corporation, Healthcare & Pharmaceutical Industry and Real Estate and Services Industry).
- The global financial crisis of 2008 is found to have had a significant but diverse impact on debt/equity ratio of firms across the industries. Inter-industry comparisons show that some industries showed the change in their debt/equity ratios before and after the financial crisis of 2008 and some show no change in the debt/equity ratio before and after the crisis. Out of 36 comparisons, 18 calculations show the difference in the debt/equity ratios before and after the global financial crisis and 18 comparisons show that there is no changes occur in debt/equity ratios due to the financial crisis.

## 5.2 Policy Implication

An important implication of this study is that while investigating main determinants of debt/equity ratio in multivariate analysis, it may be advisable to segregate industries into two groups, one for which FIH holds and the other for which it does not hold. Also to get the better results, a researcher should not mix data of those industries whose debt pattern changed after the financial crisis of 2008.

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