EFFECTS OF CAPITAL STRUCTURES ON FIRMS' PERFORMANCE WITHIN DIFFERENT INDUSTRIES

Master thesis in Economics (Corporate Finance and Control)

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Abstract

This research investigates the relation between capital structure and firm performance using a sample of low-tech and high-tech firms from the U.S and all European union countries from 2010 to 2017. Most related researches have focused on specific countries, industries and indices, providing completely mixed results. Due to the unclear state, studying a sample of low and high-tech firms could be a step forward to having a deeper insight on the relationship between capital structure and firm performance. Using ROA, ROE and Tobin's Q as measures for firm performance, the results suggest a negative and significant relationship between total debt and all three measures, in both categories of industries. This result supports the pecking order theory which suggest that firms go for internally generated funds instead of relying on external funds. However, long term debt shows a positive relationship with ROA for the low tech, while with ROA and ROE for the high tech. The results therefore suggest that leverage affects both categories of industries in a very similar way, especially with total debt used as a measure for leverage levels. Furthermore, all control variables used in this research are found to have a significant effect on firm performance.

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1.Introduction

Capital structure decisions play a pivotal role in maximizing the performance of a firm and its value. Capital structure involves the decision regarding the combination of the various sources of funds a firm uses to finance its operations and capital investments (Frank and Goyal, 2009). These sources include the use of long-term debt finance and short-term debt finance, together referred to as debt financing, or the use of equity financing consisting of preferred stock and common stock.

The relationship of the capital structure decisions with firm performance has been highlighted by a number of theories mainly, the agency theory, information asymmetry theory, signaling theory, pecking order theory and the trade-off theory (Rafique, 2011; Fosu, 2013). A particular aspect to take into consideration is the agency problem that exists due to the fact that ownership and control of firms lies with different people for most of the firms. For that reason, managers tend not to apply maximum efforts and are more oriented towards maximizing personal gains or policies that suit their own interests and thus leading to possible firms' value depreciation and violation of shareholders' interests (Gill, 2011). Therefore, debt financing could potentially act as a moderator of such undesired behavior towards maximizing managers' gains. It reduces the free cash flows with the firm by paying fixed interest payments and forces managers to avoid negative investments and work in the interest of shareholders (Lemmon &Zender, 2010).

The asymmetric information theory which states that the firm managers (insiders) have more information about the firm compared to the outside investors compels the well-informed managers to try to send positive information to the market or ill-informed investors to increase the firm value. Through these signals, the signaling theory asserts that managers have incentives to use various tools to send information to the market about the differences that exist between them and weaker firms. One of the key tools to send such signals is the use of debt (Tharmila and Arulvel, 2013). The utilization of more debt by a firm may potential reveal that managers expect future positive outcomes meanwhile equity may signal a desire to share risk or negative future outcomes. It is often necessary that each individual firm orientate a special attention towards the main questions of the sum of capital structure and related cost of capital. Numerous finance researchers (Pouraghajan et al. 2012; Brealey, Myers and Allen, 2006; Abor, 2005) found that capital structure is fundamentally the best element between other elements which can influence the performance of firms.

The link of decision concerning capital structure with performance of firms as attested in several studies is mainly well-known through the Modigliani and Miller Theorem, (1958) and (1963). Substantial results show that managers of company most of the time use numerous amounts of debt and several amount of equity in funding their resources. For that reason, accurate selection of the blend of debt and equity is important for the leaders of every firm. Along with all the financial choices, capital structure is very complex given that for more than half century now a lot of studies and research have not reached on regarding the percentage of debt and equity in resources composition to enhance firm performance, reflecting the problematic state of capital structure decisions. Elsewhere, managers used different strategies to obtain better organizational performance, based on consumption of debt and equity size in funds (Gleason et al, 2000).

An optimum capital structure is a critical decision for any organization. Indeed, any capital structure decision is important for the need to maximize returns for various organizational constituencies, and seemingly this decision has an organizational ability to deal with its competitive environment especially amongst different industries. Thus, one of the most critical issues facing financial managers is the relationship between capital structure, which is the mix of debt and equity financing and stock prices. In order to throw more light on this, and overcome this loophole, the present study mainly focuses on how far capital structure affects firm's performance of different industries and how these impacts differ among firms of different categories of industries.

In spite of the convincing facts of the incidence that capital structure has on company's performance, research into cross industry effects are still missing. Indeed, one can reasonably attest that the effect of capital structure on firm performance on specific industries varies since many researchers prove the difference in capital structure between industries (Bradley et al., 1984; Frank and Goyal, 2009). Similarly, there is a rising debate on the fact that firms within an industry are alike given that they experience identical challenges, risks, competition, profitability, technology, regulations, etc. that affect firm's financial decisions (Bradley et al., 1984; Harris and Raviv, 1991; Kovenock and Phillips, 1995 Morri and Cristanziani, 2009). Based on this reasoning that capital structure varies between different industries, therefore its effect on firm performance may as well vary among industries. Studies performed by authors such as Maksimovic and Zechner (1991); Kovenoch and Philips (1995); Mackey and Philips

(2005) and Ahmad, Abdullah & Roslan (2012) revealed that the use of debt or in general the firm's overall performance is also dependent and influenced by different industry types.

1.1. Research Question

In this light, an important question in finance is the extent to which financial behavior is affected by industrial-specific factors. Hence, this research aims to answer the questions:

Does capital structure have a significant differential impact on firm's performance in different industries?

In this line, the objective of this study aims at analyzing the impact of capital structure on firm's performance of different industries and to investigate if these impacts differ among firms of different categories of industries. More precise, two main industries categories are analyzed, that is firms from the low tech and those of the high-tech industries. In this regard, this study investigates the potential differential impact of capital structure on firm performance on two very distinct categories due to the natural structural differences.

1.2. Relevance of study

Empirical works has unearthed some stylized facts on capital structure choice impact on firm performance ever since the fundamental research of Modigliani & Miller, (1958) arguing that within a perfect market condition capital structure does not impact firm's value. This evidence is based most often on firms in a particular industry alone (Nawaz et al., 2015; Rafique, 2011; Singh, 2013) or usually on firms of a given stock exchange as a whole (Derayat, 2012; Tharmila and Arulvel, 2013) without clearly distinguishing outcome performance a firm may endure as a result of belonging to a given industry or category of industry, and it is not at all clear how these facts may comparatively relate to different industries. For the most part, the empirical capital structure literature investigates firms listed on stock markets in general, irrespective of the industry in which they fall in. Other researches focus on particular economic shocks, mostly towards the crisis. As such, these studies ignore the peculiarities of cross industrial performance differentiation, which will represent a majority of firms and account for representative performance analysis. It is in this regard then, that this research hence attempts to address this gap in our knowledge.

Also, on a theoretical part and given the absence of an accepted practical model on the optimal capital structure, studies of its impact on firm's performance is beneficial to all kind of financial settings because it will enlighten more the role that capital structure has in determining

performance. By carrying out a cross industrial and cross country analysis, the essence of this paper emerges from its being the first of its kind wherein a comparative study is carried out in analyzing the impact of capital structure on performance between two paralleling industries categories operating in different economic and regulatory environments. Another specific importance of this study goes to the economic stakeholder (institutions, entrepreneurs, consultants etc.) whom, through the results that will be portrayed here would able to formulate policies that might enhance investments opportunities of a particular sector, help firm managers to optimize their performance as well as the maximization of shareowners' profits by making calculated decision for investment.

1.3. Research Method

To be able to obtain an answer to the above-mentioned research question, this study will make use of a sample of US and European firms from two different categories of industries, that is the high tech and the low-tech industries. This choice is made because the literature offers mixed results concerning capital structure and firm performance, but also reveals the differential impact within industries. Due to the strong difference that exists between high-tech and low-tech firms, a differential impact of capital structure to the performance can be expected. The time frame of this study goes from 2010 to 2018, in order to avoid the possible influence of the most recent 2008 financial crisis.

Based on theories and the empirical results offered by the literature, hypotheses are developed. To test these hypotheses, this study effectuates Ordinary least squares regressions using panel data methodology, in line with previous studies.

1.4. Thesis Outline

This thesis is organized as follows. Chapter 2 examines the literature in terms of relevance of the topic both theoretically and empirically, the third chapter describes the methodology and the dataset used in attaining the results and testing the hypotheses as well as the empirical strategy and the descriptive statistics. The results from the regressions and their discussions are evaluated in chapter 4, while chapter 5 provides the general conclusion, via the limitations of this study and suggestions for future research. Finally, in the last parts of this thesis the literature references and the appendices are included.

2. Literature review

2.1 Introduction: purpose of the review

This chapter begins with enlightening the existing theories related to the capital structure decision of firms. Understanding these capital structure related theories is of crucial importance since they are the foundations of the possible relationship between capital structure and firm performance. These main theories are the pecking order theory, trade-off theory and finally the market timing theory. Furthermore, empirical results on the effect of capital structure and firm performance will be analyzed. However, since not only capital structure is known to have an effect on firm performance, this section digs into other factors that are related to the performance of firms, such as firm's size, firm's age, and the level of assets tangibility.

2.2. Theoretical Framework

The pioneering work on capital structure theory emanates from Modigliani and Miller (1958). That theory provides the groundwork from which much other thinking later developed. Based on an arbitrage argument, Modigliani &Miller (1958) ascertained that with the existence of perfect capital market, the capital structure decisions would have no impact on the value of the firm. Arbitrage, they argued would ensure that an individual's exposure to risk would not change because home-made leverage was as good as corporate leverage. However, there was a reaction to Modigliani and Miller's irrelevance theory that questioned the applicability of arbitrage process and the assumptions they made of a risk-less world that are somehow unrealistic. The capital structure irrelevancy theory favors the neutrality of debts on firm performance no matter the amount of debts utilized.

In response to this and other criticisms, they modified their original hypothesis. Relaxing the assumption of zero taxation, they argued that levered firms will be more valued than unlevered firms due to the fact that debt is a tax-deductible expense. A firm's capital structure which is composed of debt and equity has proven to have an influence over performance. The theoretical background from which empirical studies are conducted is mainly drawn from the agency hypothesis, the capital structure irrelevance theory, the pecking order theory, and the trade-off theory.

2.2.1Pecking order theory

A pecking order framework is intended to explain variations in capital structure (Myers and Majluf 1984). The pecking order theory is characterized by the concept of information asymmetry prevailing among firm managers and shareholders (Frank & Goyal, 2009; Baker & Martin, 2011). Several scholars have nuanced the evidence within which there is an advance comprehension of firm activities by managers as compare to the external investors concerning the firm's future and prospects, hence manage efficiently for the good of all (Harrison & Wisnu Widjaja, 2014; Boadi et al., 2015). Specifically, this theory exhorts the fact that internal funds are preferably used by firms contrarily to external funds that comes as a compliment to insufficient retained earnings (Myers, 1984; Myers & Majluf, 1984). Besides, the issue of external equity by firms could be viewed as a potential loss of control by the owners of the firm, which could be costly to the firm as a whole.

The information asymmetry that exists between corporate managers and shareholders is minimized by issuing debt (Lemmon & Zender, 2010). Managers with positive expectations about the future, whose stocks are undervalued, will opt for debt rather than equity since they believe their company is worth more than the current value. Hence, by issuing debt, firms will use the excess free cash flow to settle interest payments, instead of repurchasing shares which may be costly in case stock prices appreciate. However, managers may issue equity when they are not able to obtain more debt even if they believe that their stocks are undervalued (Lemmon & Zender, 2010). As the requirement for external financing will increase, the firm will work down the pecking order, starting with debt issuance, and finally to equity as a last resort (Myers & Majluf,1984).

Nevertheless, the theory also lay emphasizes as concerns the choice of various finance opportunities in a situation where external funding is inevitable, as such investments should basically depend on lowest risks and relative costs (Myers, 1984; Boadi et al., 2015). Hence, for the pecking order theory performing companies that generate enormous earnings to be conserved are supposed to use minimal debts in their capital structure than the non-performing ones because they are capable of financing their investments with internal funds. As a result, the relationship between debt level and firm's performance could be foreseen as empirically supported by Booth et al., (2001) and Fama & French (2002). As such, firms will prefer to issue debt as the primary option, then potentially issue equity as a last resort (Myers, 1984). In this theory, profitable and high earning firms are identified as those using fewer debts because they finance their investments with internal funds (Boadi et al., 2015). This is the

reason why pecking order theory assumes a negative relation between financial leverage and firm performance.

2.2.2. Trade-off theory

The study of Modigliani and Miller (1968) ascertain that debt financing has benefits of tax shield as it encourages the deduction of interest expenses from the firm pre-tax income. It is through this that the trade-off theory stipulates that optimal capital structure can be determined by balancing the benefits and cost associated with debt financing. Hence, it may reduce the agency cost, threatening the firm of liquidation which can cause personal losses such as reduction in salaries, loss of reputation, perquisites among others, as a result this motivates managers to work efficiently and generate enough cash flow to pay interest payment (Grossman & Hart, 1982; Williams, 1987). Therefore, according to this theory firms that are more profitable have greater income to shield and thus are expected to indebt more to take tax advantages. Consequently, a positive link is to be attained between debt level and firm's profitability (i.e. performance).

Studies by Myers (1984) and Cornett and Travlos (1989) argued that even though firms can benefit from tax discount through an increment of their debt level, each firm is supposed to move toward their own optimal capital structure, which can mean either going in for more or less debt. Moreover, the negative incidences of leverage on the performance of firms are recognized by the trade-off theory. Thus, the payment of interest negatively affects firms' liquidity and financial performance, which increases the financial risk in terms of bankruptcy and insolvency (Myers, 1984; MacKay and Phillips, 2005; Brealey et al., 2008; Ross et al., 2013). More so, the advantages of debt financing are equally allowed for by the trade-off theory given that firm managers try to conciliate trade-off between debt benefits and debt costs. Elsewhere, the tax advantages should increase the firm performance (Margaritis & Psillaki, 2010). Although bankruptcy costs exist, some studies conclude that they are much smaller in relation to the tax savings. In this regards, the trade-off theory assumes a positive relationship between leverage and firm performance, further confirmed by many researchers like Berger and Bonaccorsi di Patti (2006) and Fosu (2013).

2.2.3. Market timing theory

In a bit to criticize and challenge both pecking order and trade-off theory, Baker and Wurgler (2002) have developed lately the market timing theory. It suggests that companies issue new shares whenever they believe that the stock prices are overvalued and repurchase these shares

or issue debt whenever the stock prices are undervalued or when the market is characterized with low interest rates (Graham & Harvey, 2001; Baker & Wurgler, 2002). Consequently, the resulting fluctuations that arise in the market have an influence on firms' choice of capital structure. The market timing theory equally supposes that economic actors are irrational (Baker & Wurgler, 2002). Hence, they supplied evidences that equity market timing has a predominant effect on the firm leverage. Indeed, a market timing measure is defined by weighted average of external capital needs over the past few years where the weights used are market to book values of the firms. They discovered that changes in leverage are strongly and positively related to their respective market timing measure, hence it was concluded that the capital structure of a firm is the cumulative outcome of the past attempts to time the equity market. Several literary backups support market timing theory in a supposition that manager of companies wait for the optimal or best market condition, that stocks' position ameliorate in the market before any new issuance, and also before issuing new stocks firms first of all optimize their performance (Jahanzeb et al, 2013). Indeed, based on the market conditions the market timing theory assumes that the relation between leverage and firm performance alters following the economic environment.

Though the above theories are often criticized, they remain among those that are often used due to the aforementioned reviews. On the whole, the agency theory focuses on the conflict of interest between managers, shareholders and creditors concerning financing decisions. Brealey, Myers and Allen (2006) suggests that the trade-off theory and the pecking order theory highlight the hierarchical and preferential use of some sources of financing starting from funds internally generated. From these various standpoints, it is useful to highlight some of the major empirical studies on the link between financial leverage and firm financial performance. However, based on previous studies, a relationship exists between a firm's financial performance and some important characteristics such as the firm's size, age and assets tangibility. The following section discusses these in detail.

2.3. The relationship between Firm size and Firm performance

Firm size has always been considered as a potential determinant of financial performance for most firms. It is not uncommon to witness the desire for firms to grow bigger in order to successfully achieve their financial objectives. One possible explanation for this desire to grow can be viewed from an economies of scale perspective, where firms believe that they can decrease their overall cost of production by increasing their amounts of production. However,

the literature shows some mixed results regarding the relationship between firm size and firm performance. Although firm size can lead to better performance due to the economies of scale they achieve (Penrose,1959), it is can also be the case that a firm's performance decreases with size due to the inefficiencies created by the correlation between the firm's size and market power (Leibenstein, 1976)

Indeed, firm's size and firm's financial performance has been empirically proven to have a positive relationship. Deesomak et al., (2004) illustrate how larger firms have fewer volatile cash flows, easier access to credit market and increased debt to fully benefit from tax shield. Additionally, a study was conducted by Halil and Hasan (2012) on the relationship between firm size and firm performance of Turkish manufacturing firms over the period of 2005 to 2011. Using a sample of 143 firms, the study revealed that a positive relation exists between frim size which was measured by both total assets and total sales, and firm performance. Similarly, using a sample of firms in Nigeria, Akinyomi and Olagunju (2012) found a positive relationship between firm size represented by log of turnover and log of total assets, and firm performance measured by return on assets. Moreover, Papadogonas (2007) studied the relationship between return on investment as a proxy for firm performance and several determinants of profitability. The study found a significant positive relation between firm size measured by natural logarithm of sales and return on investment. Vijayakumar and Tamizhselvan (2010) also found a positive link between firm size and performance, by using total assets and sales as proxies of firm size and profits as a proxy of firm performance on firms in India.

On the other hand, some studies have shown a negative or weak relation between firm size and profitability. Ammar et al. (2003) came up with a surprising result, where they found out that the profitability of a firm starts decreasing when the firm's total sales grows above $50 million dollars. Jonsson (2007) also investigated the relation between firm size and performance on a sample of Icelandic firms. The study found a negative but not significant relationship between firm size and performance. A study by Serrasquiero and Nunes (2008) was aimed at distinguishing the relationship between firm size and performance for SMEs firms and larger firms in Portugal. The study found a positive significant relationship for SMEs firms, meanwhile the result was statistically not significant for larger firms. Using a sample of 7000 firms in the US, Lee (2009) investigated the impact of firm size on the performance of firms. The study found that although the profitability of a firm can be explained through firm size, a

nonlinear relationship exists, and the profitability of firms decreases for the largest companies. The reason behind the negative and weak association between firm's size and performance can be attributed to the well-known structural inertia theory (Hannan & Freeman, 1984). This theory argues that as a firm become bigger, the management becomes more complex, and hence adapting to changes may become more complex, hence a possible negative impact to the firm's profitability. This theory contradicts the common idea that larger firms are more likely to succeed in comparison to smaller firms facing financial barriers and human resource related issues.

2.4. The relationship between firm's Age and Performance

Besides firm's size, firm's age is another important factor that can potentially have an influence on the performance of a firm. The age of firm may be an important component to a firm's success. It is very common for firms to face financial barriers, but as a firm grows older, this financial constraint is decreased and their ability to raise funds increases. There are mixed results on the relationship between a firm's age and its performance. On one hand, some researches claim that a positive relationship should be expected between the age of a firm and its performance. However, the literature also suggests that firm's age can be detrimental to their success.

Coad et al. (2013) conducted a study on firms in Spain from 1998 to 2006 using different statistical methods. The study found out that indeed older firms enjoyed better profits and higher levels of productivity compared to younger firms. However, in the same study, the profitability decreased when some important control variables were included such as such as the level of expected growth rate and sales. In addition to that, Bhayani (2010) also studied the relationship between firm's age and firm's performance on firms in the cement industry in India from 2001 to 2008. The study revealed that firms age played a significant positive role to the performance of firms.

Alternatively, there are several arguments to why firm's age can be detrimental to the firm's performance. One of the main arguments can be attributed to the concept of organizational inertia. Leonard-Barton (1992) argues that organizational inertia prevents firms from valuing important signals due to the tendency of older firms to stick to organizational principles such as rule of conduct. This behavior makes it difficult for firms to adopt changes even when these changes could be of significant importance (Hannan & Freeman, 1984). Another reason why

one can expect a negative relationship between firm's age and performance can be attributed to Agarwal and Gort (1996) and (2002). Their results suggest that a firm's risk decreases at the initial stages of growth, but as the firm reaches the more mature stages, this risk rebounds. They believe that a firm loses its initial endowment as it grows older, through processes of investment and learning. Hence the initial endowment becoming obsolete due to the increase in firms age and may have a negative effect of their performance. Majumbar (1997) conducted a study between firm size and age, and its impact on firm performance on a sample of Indian firms. The study argues that the relationship between firm's age and performance depends on the institutional context in which the firm operates. However, their results showed that older firms tend to be less profitable but more productive than younger firms.

2.5. The relationship between Asset Tangibility and firm's performance.

Asset tangibility refers to the physical assets owned by a firm. They consist of a major part of a firm's total asset, such as land, buildings, etc. According to Hart and Moore (1994), and Liberti and Sturgess (2018), tangible assets are characterized by an undeniable low asymmetry of information when it comes to deriving their value, and hence they are very suitable to be used as collaterals in order to obtain external funds. Firms that are faced with limited tangible assets tend to encounter higher cost in raising external funds, and are forced to save up some internally generated funds for precautionary motives, which may lead to inefficient use of financial resources (Bates et al., 2009). In addition to that, since asset tangibility consist of an important part of collaterals, they may have a significant role in the economic growth of a country due to the fact that most corporate investments are oriented towards assets (Kiyotaki & Moore, 1997).

Empirically, some studies have investigated the possible relationship between firms' assets tangibility and financial performance. Sunder and Myers (1999) studied the impact of assets tangibility and some other factors such as growth, on the performance of firms. Using a sample of 157 firms between 1979 and 1981, the research concluded that there is a significant positive association between assets tangibility and both debt ratios and firm performance. Similarly, Pouraghajan et al. (2012) revealed that assets tangibility is positively related to the firms performance measured by ROA and ROE in their sample of Iranian firms.

Although some studies have shown that there exist a positive link between assets tangibility and firm performance, some other studies has shown a no significant or negative relationship

between assets tangibility and firm performance. This is the case for Zeitun and Tian (2007) for example, where they included the possible relationship between assets tangibility and firm performance in their study of Jordanian firms. Their results indicated that a negative link exists between assets tangibility and firm's performance. Abbas et al. (2013) studied the factors that affect the performance of firms in Pakistan, and their results stipulates that there is no significant role played by assets tangibility in determining the performance of firms. Similar results were found by Mwangi and Birundu (2015), where they argue that no significant relationship exists between assets tangibility and firm performance in their sample of SMEs in Kenya. With that being said, there is somehow an inconclusive idea regarding the relation between asset tangibility and firm's performance.

2.6. Capital structure and firm performance: An empirical outlook

Empirical research has shown mixed findings with respect to the direction of the relationship between financial leverage or capital structure and performance.

Indeed, a substantial range of studies found a positive effect between financial leverage and return on equity (Rafique, 2011; Weill, 2007; Abor (2007)). Ebaid (2009) also found significant positive relationships between debt ratios and measures of profitability. Gill et al. (2011) equally identified a positive association between debt and profitability. Using return on equity as their measure for firm performance, their study on 272 firms in America from 2005 to 2007 resulted in a positive association between leverage (short term debt to total assets and total debt to total assets) and firm performance (ROE) in the service industry, but a no significant relationship between performance and long term debt. While analyzing firms in the manufacturing industry, they found a positive relationship between all leverage measures (i.e short term debt to total asset, long term debt to total assets, and total debt to total assets) and firm performance. In their study of 48 American firms during the period 1981-1990, Roden and Lewellen (1995) evidenced a significant positive relation between profitability measured by return on assets and total debts as a percentage of the total buyout financial leverage. Several studies equally pointed out that the use of leverage was one way to improve the performance of the firm. In the literature, we notice that several studies follow the same line by suggesting that corporations with high level of profitability use high level of debts.

In the developing world context, a study from Abor (2005) reports a positive relation between capital structure measured by the ratio of short-term debt over total debt, and performance

measured by return on equity for Ghanaian firms over the period 1998-2002. However, as far as the long-term debt to total assets ratio is concerned, the study reveals a negative association with the return on equity. A research was conducted by Simon-Oke and Afolabi (2011) on capital structure and firm performance in Nigeria for agency cost and trade-off theory opinion by using 5 companies over a 9-year time period 1999-2007. By using a regression model technique to test results, they found that equity financing is positively related with firms' performance. They also discovered an optimistic link between debt to equity ratio and firms' performance, while debt financing has negative relationship with firms' performance due to high interest expenses on borrowing.

Another study was conducted by Rafique, (2011) to investigate on the relationship between capital structure and firm performance. The paper found out that capital structure represented by debt to equity ratio is positively related to firm's performance which was measured by return on assets, although the relationship was a weak one. Arabiyan and Safari (2009**)** investigated the effects of capital structure on profitability using 100 Iranian listed firms from 2001 to 2007: they found that short-term debts and total debts are positively related to profitability measured by ROE while long-term debt is negatively related to profitability. In continuity, Dessi and Robertson (2003) found that leverage represented by debt ratios positively affects expected financial performance measured by Tobin's Q. In this study, they argue that low growth firms attempt to depend on borrowings for utilizing the expected growth opportunities and investing borrowed money on profitable projects, thus increasing firm's performance.

Even though it has been ascertained by a wide number of studies portraying the positive and or significant relation between capital structure and firm performance in general, a non-negligible number of other studies have showcased a negative relation or non-significant impact at all between these two variables. Several studies argued for instance, that the use of excessive debt creates agency problems among shareholders and creditors that could result in negative relationship between leverage and profitability. Zeitun and Tian (2009) studied the effect of capital structure on the corporate financial performance of 167 firms in Jordan from 1989 to 2003. The study showed that capital structure has a negative link with both accounting and market proxies for firm performance, except for short term debt ratio that showed a positive link with the market measure Tobin's Q. Weill (2007) studied the relationship between capital structure measured by total liabilities to total asset ratio, and firm performance measured through ' frontier efficiency scores' using a sample of manufacturing firms from 7 different

countries in Europe. The study found a significant negative relation between capital structure and performance in Italy, whereas a positive relation was found for the remaining countries used in the study except for Portugal. Similar results were reported through studies from Abor (2007) on SMEs from Ghana and South Africa. The study found that all debt ratios, especially that of long-term debt, are negatively associated with performance of firms measured by return on assets. In addition, the results show that short term debt is also negatively associated with performance measured by gross profit margins. Abor (2005) also found a negative association between long term debt ratio and ROE. Similarly, a study conducted on firms in Oman by Rao and Mohamed (2007) argues that despite the tax advantages of debt, the interest payments may overcome the tax advantage, hence a negative relationship between leverage and firm performance. Fosberg and Ghosh (2006) investigated the relationship between capital structure and firm performance on a sample of 1022 firms listed in the New York stock exchange, and included 244 more firms from the America stock exchange. The study concluded that a negative relationship exists between debt ratios and return on assets. The study conducted by Pouraghajan et al. (2012) to analyze the affiliation among capital structure and firms' performance by using four hundred firms of 12 sectors, listed on TSE (Tehran Stock Exchange) revealed that, debt ratio has destructive and major impact on firm's performance represented by ROA and ROE. Sunder and Myers (1999) also found a negative relationship between debt ratios and firm performance.

Moreover, several studies show either a poor (no statistical significance) relation between capital structure and performance or obtained mixed results. This is for example the case for the study made by Ebaid (2009) who investigated the impact of capital structure choice on performance of 64 firms from 1997 to 2005 for firms in the Egyptian capital market. Using return on assets and return on equity as the accounting measures for firm performance, the study concluded that there is an insignificant to no relationship between leverage and firm performance. Weill (2007) found a no significant relationship between capital structure and firm performance in Portugal. Similarly, Rafique (2011) conducted a study that focuses on the examination of the capital structure of 11 listed companies in Pakistan automobile industry, by using an econometric approach over a time series of 5 years depicted that profitability is insignificantly related with capital structure.

The somewhat inconclusive arguments concerning the influence of capital structure (leverage) on firm performance compel more investigation onto the direction of differentiating industries

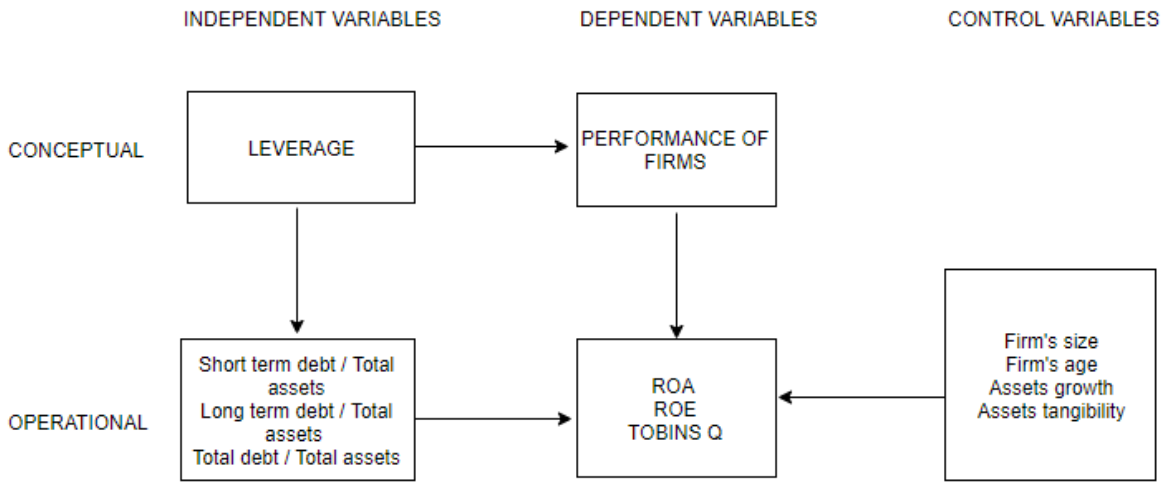
in this relationship. Some studies have provided evidence for the remarkable differences in capital structure among industries. This is also confirmed by Frank and Goyal (2009) who show how different factors affect the debt level in different industries. For instances, industries that need to make huge investments in fixed assets also face high fixed costs which often lead to higher level of leverage. Conversely, some industries operate with less fixed cost, hence firms in those industries tend to require less debt. As such, empirical evidences from Guney et al. (2011) revealed that there are significant differences in debt ratios among industries. That is explained by the fact that companies operating in the same industry have many similarities and operate in the same environment where they face similar challenges, competition, risks, technology, profitability and regulations. Additionally, Morri and Cristanziani, (2009) argue that preconditions to access capital may differ among industries. All these industry-related factors have an impact on firms' financial decisions and their optimal capital structure (Morri & Cristanziani, 2009). Hence, this study intends to use data collected from two industrial sectors so as to reassess this debate.

3. Hypothesis development

In order to empirically attain this study's objective, hypotheses are developed based on the above-mentioned findings that guide this research.

3.1. Conceptual framework

The figure below illustrates the variables used in this research, and how they are interconnected. This figure is based on the predictive validity framework developed by Libby et al.(2002)



The aim of embedding this predictive validity framework is to properly develop the hypotheses in this research, in order to increase reliability and validity. This is done by adding the necessary control variables to gain internal validity, while gaining construct validity is obtained through a proper operationalization of the variables.

3.2. Hypotheses:

Following the pecking order theory, that assumes that since profitable firms are more inclined to have greater internal funds, profitability is expected to have a negative effect on leverage (Myers & Majluf, 1984). This negative relationship could be supported by the pecking order theory that has been empirically confirmed by Harrison & Widjaja (2014) and Akdal & Sinan (2011). Hence, the first hypothesis of this study is formulated as follows:

H1: Profitability is negatively linked to Leverage for firms

The variations in the amount of debt used by firms could be explained by the firm's ability to deal with its assets in case of financial distress. More precisely, the speed at which a firm can

convert its assets into liquidity may affect the capital structure's choice. Various categories of firms in industries will in case of any eventuality find liquidation costly (firms manufacturing machines or high-tech firms) or cheap (service or traditional firms) hence different debt ratios. Yang et al., (2010) empirically attest that firms manufacturing machines and equipment are more likely to find liquidation costly and therefore use fewer debts. Also, Bello et al., (2009) proved that characteristics of markets such as level of competition, product differentiation, volume of buyers and sellers and ease of entry to the market varies in any industry and could likely affect leverage decisions and consequently performance differently. By investigating the importance of the above unique features of firms in analyzing leverage differentiation, Balakrishan and Fox (1993) found that more than 10% of firm's capital structure is justified by cross-industry effects. This may likely induce their respective performances, hence from this explanation and based on empirical research, the following assumption was formulated:

H2: The effect of capital structure on firm performance varies among industries

Besides capital structure, a firm's size can be considered as an important factor that can affect the firm's performance. This is due to the fact that larger firms have more diversity and are able to take bigger risk compared to smaller firms. Additionally, larger firms tend to benefit more from their economies of scale due to the large amounts of production, which in turn leads to improved performance (Penrose, 1959). This means that firms that are bigger in size are able to produce at lower costs in comparison to their rivals smaller in sizes, which makes them perform better. Therefore, in line with several findings such as that of Papadogonas (2007), the following hypothesis is developed

H3: There is a positive relationship between firm size and firm performance

A firm's level of assets tangibility is expected to have an influence on its performance. It is believed that the more the level of assets tangibility owned by a firm, the less the probability of bankruptcy, and the more the ability of the firm to adjust to suitable conditions when taking financial decisions. Since tangibility refers to the tangible assets a firm owns, it decreases the risk of financial distress since the firm can convert these assets into cash, or can obtain finances backed by these assets. Empirically, Murillo (2007) revealed that there exist a positive link between a firm's asset tangibility ratio and its performance. Additionally, Akintoye (2008) mentioned that the tendency to invest more in tangible assets decreases the cost of financial

distress compared to higher investment in intangible assets. Hence, the next hypothesis is developed as follows

H4: There is a positive relationship between asset tangibility and firm performance.

Firm's age is expected to have a positive relationship with the firm's performance. This is because with time, a firm keeps growing and accumulates experience. An empirical study by Hopenhayn (1992) shows that older and more mature firms tend to experience a better performance compared to the younger firms. In addition to that, Stinchcombe (1965) mentioned that older firms can overcome problems that are related to beginners and can also benefit from their experiences. Hence the following hypothesis is developed

H5: There is a positive relationship between firm's age and firm's performance

4.Methodology

This section discusses the sample used in this study. Furthermore, the data collection and the statistical techniques used to investigate the relationship between capital structure and the performance of firms in different industries are described.

4.1. Sample and Data collection

As mentioned earlier, this research aims at studying the effect of capital structures on firms' performance in different industries. More precisely, two categories of industries are used in this study, that is firms from the high-tech industry and those from the traditional industry. The reason for analyzing these different industries starts with the somehow unclear state in regards to the relationship between capital structure and firm performance. Mixed results have been suggested by the literature, which rises the thought that some specific characteristics may be taken into account in order to better understand the relationship. Several studies have proven that capital structure significantly varies within industries (Degryse et al., 2012; Bowen et al., 1982). In addition, the literature also suggests that the effect of capital structure and performance is significantly unequal for different industries (Yang et al., 2010; Bello et al.,2009). Therefore, due to the strong operational and structural difference between high tech and low-tech firms, there is a good reason to believe that the effect of capital structure and firm performance may be different for both categories of firms.

The sample consists of publicly listed firms from developed countries, since high-tech industries are mostly found in the developed world. The countries used in this research are all 28 countries in the European union and the USA. The period of study ranges from 2010 to 2018, that is after the crisis, in order to eliminate the possible pre and during crisis effects. In order to distinguish firms from the high-tech and those from the low-tech, this research follows the classification made by the OECD. In line with the OECD classification, the low-tech firms analyzed in this study are firms from the textile, paper, rubber and plastic, food and tobacco, wood and furniture, metal, and finally building and construction industry. On the other hand, high tech firms are those from the computer, electronic and optical products, chemicals, pharmaceuticals, machines and equipment, instruments and finally transportation industry. Moreover, financial institutions are excluded from this research in line with previous research, due to their complex comparability nature since they differ from other firms in terms of regulations, operation and reporting standards (Deloof, 2003). This leads to a total number of

414 firms in the low industry, and 689 firms in the high tech industry The relevant secondary data are retrieved from Orbis Database.

In short, this research's sample is based on the following criteria

1) Financial institutions are excluded from the research
2) For each year, the financial period ends as of December 31th.
3) The financial period for each firm should remain constant within the study timeframe.
4) All firms included in the research should be publicly listed.

4.2 Operationalization of measurements

4.2.1. Dependent Variables

The dependent variable of this study consists of the performance of a firm. Firm performance refers to the financial performance of a firm, which signifies the result, profit or firm value. Firm performance can be measured in two main ways, that is the market-based measure, and the accounting-based measure. The accounting-based measure consist of measuring a firm's financial performance by focusing on some firm's accounting aspects such as earning per share, return on assets, and return on equity (Zollo & Singh, 2004; Krishnan et al., 2007). On the other hand, market-based measures such as Tobin's Q, which is considered as one of the best market-based measure (Ebaid, 2009; Salin and Yadav, 2010), can be used to measure the firm's performance or profitability. Each performance measure has its own advantages and disadvantages. In this study, firm performance will be measured using both accounting and market measures to gain more validity. More precisely, from the different accounting-based measures that exists such as earnings per share, sales, cash flows, return on assets is used as a proxy for firm performance under the accounting-based measure. According to Although Meeks and Meeks (1981), a good way to measure performance is through return on assets due to its more stable nature compared to the firm's net worth. Although Porrini (2004) argued that return on asset should be preferred from return on equity due to the fact that equity compared to assets can be more affected by the leverage choice of a firm, return on equity remains a crucial performance measure. Hence, this study includes return on equity as an additional proxy for firm performance. Return on assets is measured by dividing net income with the total asset of the firm, while return on equity is measured by dividing the net income with the value of total equity. More, Tobin's Q is used to represent the market measure for performance. In line with Nigel and Sarmistha (2007) and King and Santor (2008), the Tobin's Q is measured using the market value to total assets of the firm. Return on assets and return on equity as accounting-

based measures, and Tobin's Q as a market-based measure have been intensively used in previous studies as proxies for firm performance, and hence they are incorporated in this study as the dependent variables in the regression models.

4.2.2. Independent Variables

Capital structure represents the independent variable in this study, and leverage will be used as a proxy for capital structure in accordance with previous researches. It refers to the portion of a firm's assets that is financed by borrowed funds. The amounts of long-term, short-term, and total debt are used as measurements of leverage in line with previous research. Many researches in the realm of finance use the book value of debt in order to measure the leverage of the firm, although using it instead of market values may affect the results (De Jong, 2002). However, a study conducted by De Jong et al. (2011) revealed that using either market or book value of debt to measure financial leverage has a no significant difference. This means that using book value instead of market value of debt does not make a big difference. Hence, this study uses the book value debt, where the leverage is represented by debt to asset ratio, where the debt of the firm is divided by its assets' value (Rajan & Zingales, 1995; Michaelas et al, 1999). More precisely, three debt ratios will be used, short term debt to total assets, long term debt to total assets, and finally total debt to total assets.

4.2.3. Control Variables

In order to efficiently study the relationship between capital structure and firm performance, this research includes some control variable that are academically known to have an influence on the performance of the firm. The first control variable included in the research has to do with the firm's size. Based on the literature, firm size is expected to have an influence on the performance of the firm. This is because larger firms tend to have a better management, more diverse, and are able to take more risk. Meanwhile, smaller firms are those that are faced with more challenges such as information asymmetry and financial issues. In this sense, firm size could also have an influence on the performance of the firm, and hence added as a control variable in the study. Firm size is measured through the natural log of the total sales of a firm. Total sales is used to represent size rather than total assets because sales can be more accurate and may better reflect the size of a firm compared to total assets which can be misleading.

Secondly, firm's age too has a potential influence on the performance of the firm as discussed earlier, and hence is included as a control variable in the study. There are several opinions that

exist out there when it comes to defining the age of a firm in a study. Some studies, such as that of Shumway (2001) argue that the age of firm should be represented by the number of years since a firm has been listed. This is because they believe that being listed is a new stage for a firm, and hence represents the firm better in economic terms. Other studies believe that the age of firm should be represented by the number of years since incorporation. Gitzmann (2008) and Pickering (2011) argue that a firm should be viewed as a legal person, and hence the age should be the same as the number of years since incorporation. In this study, the age will be measured by the number of years of incorporation.

Tangibility is another factor that can potentially impact the performance of a firm. In line with the literature, asset tangibility is represented as fixed assets divided by total assets. Another control variable included in the study is assets growth. This is because assets growth has been proved to have an effect on the performance of firms (Manawaduge et al., 2011). Asset growth is measured by the percentage change of firm's asset each year.

Table 1 : Summary of variables

Category	Variable	Definitions	Measurement
Dependent variable	ROA	Firm's performance	Net income / Total assets
Dependent variable	ROE	Firm's performance	Net income/ Shareholders equity
Dependent variable	Tobins Q	Firm's performance	Total Market value / Total assets
Independent variable	STD	Short term debt ratio	Current liabilities/ Total assets
Independent variable	LTD	Long term debt ratio	Non current liabilities/ Total assets
Independent variable	TD	Total debt ratio	Total liabilities/ Total assets
Control variable	GROWTH	Assets growth	Annual percentage change in assets
Control variable	LNSIZE	Firm's Size	Natural log of total sales
Control variable	AGE	Firm's Age	Years of incorporation
Control variable	TAN	Assets Tangibility	Fixed assets/ Total assets

4.3.Method

In continuity with previous studies within the area of capital structure and firm performance (Berger and Bonaccorsi di Patti, 2006; Margaritis and Psillaki, 2010), this study intends to effectuate an Ordinary least squares (OLS) regression. This regression is one of the widely used estimation technique with aims of finding and analyzing links between different variables (Croci et al., 2011; Studenmund and Cassidy, 1997). Since we are using cross sectional data at different point in time, the panel character of the data allows the use of panel data methodology. One advantage of using panel data is that because of several data options, the degree of freedom is increased and co-linearity among the explanatory variable is reduced hence improving efficiency.

To test our hypothesis, the following regression models are developed:

1) $ROA_{it} = \beta_0 + \beta_1 \text{STD} + \beta_2 \text{LTD} + \beta_3 \text{TD} + \beta_4 \text{LNSALES} + \beta_5 \text{TAN} + \beta_6 \text{AGE} + \beta_7 \text{GROWTH} + \beta_8 \text{LTDTD} + \text{I.YEARS} + \text{I.INDUM} + \text{I.COUNTRYDUM} + \varepsilon_{it}$
2) $ROE_{it} = \beta_0 + \beta_1 \text{STD} + \beta_2 \text{LTD} + \beta_3 \text{TD} + \beta_4 \text{LNSALES} + \beta_5 \text{TAN} + \beta_6 \text{AGE} + \beta_7 \text{GROWTH} + \beta_8 \text{LTDTD} + \text{I.YEARS} + \text{I.INDUM} + \text{I.COUNTRYDUM} + \varepsilon_{it}$
3) $TOBIN'S\ Q_{it} = \beta_0 + + \beta_1 \text{STD} + \beta_2 \text{LTD} + \beta_3 \text{TD} + \beta_4 \text{LNSALES} + \beta_5 \text{TAN} + \beta_6 \text{AGE} + \beta_7 \text{GROWTH} + \beta_8 \text{LTDTD} + \text{I.YEARS} + \text{I.INDUM} + \text{I.COUNTRYDUM} + \varepsilon_{it}$

Where the dependent variables ROA, ROE and TOBIN'S Q represent the performance measures. The intercept of the regression line on the y-axis is represented by β0, while the independent variables' coefficients are represented by β1 to β3, and the control variables' coefficients by β4 through β7. The error term is represented by Ɛ.

In order to have a better control in the regressions, year fixed effect and time invariant factors are included in the regressions. That is, industry dummies (I.INDUM), country dummies (I.COUNTRYDUM), and years fixed effects (I.YEARS) are included in the models to gain more understanding of the relationships using the OLS regressions. Besides, an interaction term between long term debt and total debt (LTDTD) is included in the regression to control for the potential impact of long-term debt in the relationship between firm performance and total debt.

5.RESULTS

In this section, the results of the study conducted using Stata are revealed. The chapter starts with a summary of all variables, presented under the descriptive statistics section. Furthermore, to test for the presence of autocorrelation and multicollinearity in the data, correlation matrices are presented and VIF tests are conducted . Moreover, the main results of the regression analyses conducted in this study are discussed. Finally, the chapter ends with the discussion of the robustness checks results in order to gain more validity.

5.1. Descriptive statistics

Since this study relies on OLS regressions, it is important to meet some of the assumptions. The descriptive statistic in this study starts with checking whether our data is normally distributed. This is done by conducting a detailed summary for each variable using Stata in order to check the skewness and kurtosis coefficients. All variables not normally distributed are adjusted using the 'Winsor method' at 4%. This method allows the variables to obtain a normal distribution.

For all variables, the summary statistics are presented in table 1 a and b in appendix A and B respectively. This study has total number of 3312 observations for the low-tech industry, and 5512 observations for the high-tech industry. From Table 1a, we can observe the mean of the all variables. For the dependent variables, the mean of return on assets is 3.033, return on equity has a mean of 5.8507., and finally a Tobin's Q mean of 1.4098. Table 1 b shows a ROA mean of 0.9059, ROE mean of 0.5387 and finally a Tobin's Q mean of 1.9604. The remainder of the descriptive statistics can be seen in the above-mentioned tables.

Additionally, to conduct an OLS regression, a linear relationship should exist between the dependent variable and the independent variable. This linear relationship between the dependent and independent variable is tested by deriving scatterplots. The results of the scatter plots show a linear relationship existing between the dependent and independent variables, hence satisfying the requirement. Besides, another OLS assumption has to do with the homoscedasticity of error terms of the independent variables, that is for each value of the independent variables, the error terms should be constant. The homoscedasticity assumption is tested using the white test for heteroscedasticity. The test reveals that the error terms are not constant for all values of the independent variables, hence a problem of heteroskedasticity. This

leads to a decrease in validity of the study. To overcome this problem, regressions for each model include robust error terms to increase the validity of the study.

5.2. Correlation

This section focuses on analyzing the correlations between the variables, in order to test for multicollinearity. This is because multicollinearity is problematic to the analysis, hence an independent variable should not be linearly predicted from one or more other independent variables. In order to check for multicollinearity, VIF tests are conducted. Tables 2 and 3 present the results obtained from the VIF tests. From the VIF results on table 2 for low tech firms, STD and LTD are found to be highly correlated with each other based on the coefficients, meanwhile all other variables are statistically acceptable. Hence, STD is excluded from the model in order to satisfy the OLS assumption of non-collinearity between one or more independent variables. After dropping STD from the model as seen on table 2 in appendix C, no collinearity between variables exists. Similarly, as seen on table 3 in appendix D, a significant correlation seems to exist between STD and LTD, and hence STD is dropped in order to get rid of the issue.

Additionally, in order to better understand the sample used in this research, a correlation matrix is derived for all variables and the results are presented in tables 4 and 5 in appendix E and F respectively. According to Wooldridge (2012), two variables are said to be perfectly correlated if the coefficient in the correlation matrix between them is 1 or -1. The tables show low correlation between the variables, hence no correlation issues. This is because STD was removed from the regression models due to its correlation with LTD.

5.3. Hypotheses testing

This section aims at testing the developed hypotheses. As already mentioned earlier, all hypotheses are tested through OLS regressions using panel data. Specifically, robust error terms are included in the regressions to control for heteroscedasticity. All five hypothesis are tested with three OLS regression models.

Tables 6a and 6b illustrate all the three models' findings for low tech and high-tech firms respectively. The OLS regression shows a significant negative relationship between ROA and total debt (TD) for the low-tech industry ($p<0.01$), and a positive relationship between ROA and long-term debt (LTD). Similarly, for the high-tech industry, a negative relationship

between ROA and TD exists at ($p<0.01$) significance, while a positive relationship exists between ROA and at ($p<0.01$) significance. For the low-tech industry, the R-squared for model 1 is 0.3838, meaning that about 39% of changes in ROA can be explained by the independent variables included in the model, meanwhile the high-tech industry shows a R-squared coefficient of 0.3570 for model 1. Furthermore, the interaction term between LTD and TD turns out to be significant for the high-tech firms, meaning that the relationship between ROA and TD is affected by the level of LTD used by each firm. Therefore, a statistically significant negative relationship exists between ROA and TD for both high tech and low tech on the one hand, while a positive relationship exists between ROA and LTD for both categories of firms. Hence, hypothesis1 is accepted for both industries with total debt as a proxy for capital structure.

TABLE 6A:OLS REGRESSION RESULTS WITH ROBUST ERROR TERMS LOW TECH INDUSTRY

	ROA	ROE	TOBINSQ
Constant	-6.8561	-26.8254	1.6553
	(0.000)***	(0.000)***	(0.000)***
LTD	2.2106	3.9298	-0.8570
	(0.096)*	[0.224]	(0.000)***
TD	-9.0109	-11.5418	-0.4614
	(0.000)***	(0.000)***	(0.001)***
LTDTD	-3.2137	-3.4453	0.8835
	[0.162]	[0.597]	(0.000)***
GROWTH_W	11.5742	30.3441	0.5641
	(0.000)***	(0.000)***	(0.000)***
AGE_W	-0.0029	-0.0069	-0.0008
	[0.150]	[0.218]	(0.001)***
LNSALES	0.9861	2.4386	0.0280
	(0.000)***	(0.000)***	(0.000)***
TAN	-3.6424	-6.7097	-0.0781
	(0.000)***	(0.000)***	(0.000)***
Year fixed effects	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes
Country effect	Yes	Yes	Yes
R-squared	0.3838	0.3254	0.3307

***** significant at 1%, ** at 5%, and * at 10%**

TABLE 6B: OLS REGRESSION RESULTS USING ROBUST ERROR TERM HIGH TECH INDUSTRY			
	ROA	ROE	TOBINSQ
Constant	-35.0243	-63.6237	2.5002
	(0.000)***	(0.000)***	(0.000)***
LTD	5.9999	8.2671	0.0226
	(0.001)***	(0.010)***	[0.898]
TD	-10.6484	-19.2570	-0.8586
	(0.000)***	(0.000)***	(0.000)***
LTDTD	-12.9801	-18.3347	0.4936
	(0.000)***	(0.008)***	[0.116]
GROWTH_W	14.1757	28.3292	1.0617
	(0.000)***	(0.000)***	(0.000)***
AGE_W	0.0125	0.0280	-0.0029
	(0.000)***	(0.000)***	(0.000)***
LNSALES	2.7269	5.0903	0.0402
	(0.000)***	(0.000)***	(0.000)***
TAN	4.1415	6.6771	-1.2236
	(0.000)***	(0.001)***	(0.000)***
Year fixed effects	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes
Country effect	Yes	Yes	Yes
R-squared	0.3570	0.3592	0.2616
*** significant at 1%, ** at 5%, and * at 10%			

Additionally, the tables above provide evidences to whether accept or reject the remaining four hypotheses. The second hypothesis suggests that the effect between capital structure and firm performance differs within industries. The regression for the low-tech industry shows a beta coefficient of -9.01 between ROA and TD, while the high-tech industry shows a coefficient of -10.64 for the same relationship, at the same significance ($p<0.01$.). These results indicate that the relationship between leverage and firm performance does not change within industries. That is, from the sample used in this research, capital structure is negatively related to firm performance in both industries. Hence, hypothesis 2 is rejected.

Moreover, the third hypothesis claims that a positive relationship exists between firm size and performance. Table 6a shows that a positive and significant relationship exists between LNSALES and ROA for the low-tech industry. Table 6b shows similar results, where a positive relationship exists between LNSALES and ROA for high tech industry. Hence, from the

sample used in this research, a significant and positive relationship appear to exist between firm size and performance. Therefore, hypothesis 3 is accepted.

Based on the results in table 6a and 6b, a significant relationship is believed to exist between assets tangibility and firm performance. Table 6a shows a significant ($p<0.01$) negative relationship between a firm's assets tangibility and the firm performance measured by ROA. On the contrary, table 6 b shows an opposite pattern, where a positive and significant ($p<0.01$) relationship exists between assets tangibility and ROA. Hypothesis 4 claims that a positive relationship exists between asset tangibility and firm performance. Hence, the fourth hypothesis of this research is accepted for the sample of firms in the high-tech industry but rejected for the low-tech industry.

Lastly, the above results illustrate evidences for the fifth hypothesis of this research. For the low-tech industry on table 6a, there is a negative relationship between a firm's age and ROA, but this relationship is found to be not significant ($p<0.150$). On the other hand, the high-tech industry on table 6b shows a positive relationship between a firm's age and firm performance. Since hypothesis 5 suggests that a positive relationship do exist between a firm's age and its performance, hypothesis is hence accepted for the high-tech industry, but rejected for the low-tech industry.

All regressions models show a positive relationship between firm's assets growth and firm performance. That is, for all three performance measures used in this research, there is a positive and significant ($p<0.01$) relationship between firm performance. Additional, for each model, some significant coefficients are observed for the years fixed effect, industry dummies and country dummies, meaning that they have play a significant role in controlling for the relationships being studied.

5.4 Robustness Check

As mentioned earlier, this research includes two other dependent variables to measure firm performance. More precisely, besides ROA as the main measure for firm performance, ROE and Tobin's Q are included in this research. Hence, model 2 includes ROE as the dependent variable, while model 3 includes Tobin's Q.

As seen on table 6a, when taking into consideration ROE as the measure for performance, the low-tech industry shows a negative and significant ($p<0.01$) relationship between TD and ROE,

and a positive but not significant relationship between LTD and ROE. Model 2 provides a R-squared coefficient of 0.3254 for the low-tech industry, and 0.3592 for the high-tech industry. Similarly, Tobin's Q as a measure of firm performance shows a negative relationship between TD and Tobin's Q at ($p<0.01$) significance level. Additionally, a negative and significant ($p<0.01$) relationship also exists between LTD and Tobin's Q. For the low-tech industry, the interaction term between LTD and TD turns out to be significant, meaning that the relationship between Tobin's Q and TD depends on the value of LTD. On the other hand, table 6b shows that for the high-tech industry, a negative relationship exists between TD and ROE at a significance level of ($p<0.01$), while a positive relationship exists between LTD and ROE at ($p<0.01$) significance. Tobin's Q however shows a negative and significant ($p<0.01$) relationship with TD, but an insignificant relationship with LTD. Therefore, adding Tobin's Q and ROE to the study confirms the negative relationship that is claimed to exist between leverage and firm performance. Hence, hypothesis 1 is accepted.

The second hypothesis can also be answered based on table 6a and 6b. Specifically, for both categories of industries, the relationship between ROE and TD turns out to be negative, at same confidence level. Moreover, a negative relationship exists between Tobin's Q and TD for both high tech and low-tech firms. Therefore, it can be concluded that for both the high tech and low-tech industry, there is a negative relationship between leverage and firm performance. Hence, hypothesis two is rejected.

ROA and LNSALES shows a positive and significant relationship. Using ROE and Tobin's Q as other performance measures, similar results are found. A positive and significant relationship exists between ROE and LNSALES, and the same goes for the relationship between TOBINSQ and LNSALES. These results indicate that from the sample used in this research, a significant and positive relationship appear to exist between firm size and performance. Therefore, hypothesis 3 is accepted.

Moreover, the fourth hypothesis is tested with ROE and Tobin's Q as dependent variables. Based on the regression results, a negative relationship exists between ROE and assets tangibility at ($p<0.01$) for low tech firms. Conversely, a positive and significant ($p<0.01$) relationship is found to be existing between a ROE and assets tangibility for the high-tech firms. Considering Tobin's Q, table 6a shows a negative relationship with assets tangibility for low tech firm, but the results turn out to be insignificant. The high-tech industry however shows a significant ($p<0.01$) and negative relationship between Tobin's Q and assets tangibility. Since

hypothesis four suggests a positive relationship between assets tangibility and firm performance, it is only valid for high tech firms using ROE, but rejected for low tech using ROE and both the high tech and low-tech industry using Tobin's q.

Lastly, the fifth hypothesis claims a positive relationship between firm's age and performance. Table 6a shows that using ROE as a measure of performance, a negative but statistically insignificant relationship appears to exist between ROE and firms age, while table 6b shows a positive and significant ($p<0.01$) relationship between firms age and ROE. Model 3 shows R-square values of 0.3307 and 0.2616 for the low and high-tech industries respectively. However, for Tobin's Q, both the high tech and low-tech industries show a negative relationship between firm's age and Tobin's Q at ($p<0.01$) significance. Hence, hypothesis5 is accepted for the high-tech industry using ROE, and rejected for the remainders.

5.5. Summary of results

In short, the empirical analysis of this research began with the verification of all variables in order to make sure that they meet the OLS assumptions. In doing so, some variables are modified in order to be in line with the requirements to perform OLS regressions. Due to multicollinearity existing between short term and long-term debt ratios, the variable short-term debt is excluded from the model. Additionally, the white test conducted reveals the presence of heteroscedasticity in the error terms of the data, hence the need to run regressions with robust error terms.

The OLS regressions show a negative relationship between the total debt of firms and their ROA in both the low tech and high-tech industries leading to the approval of the first hypothesis, which is in line with the findings of Zeitun and Tian (2009) and Abor (2007). This indicates that as firms increase their debt level, they are likely to experience a fall in their performance. Hence, as far as total debt is concerned, hypothesis 1 is accepted. Conversely, a positive relationship between ROA and long-term debt is also found, in line with Ebaid (2009) and Gill et al (2011). In addition to that, analyzing two different categories of industries showed no difference related to the effects of capital structure and firm performance. The results suggest that total debt is negatively associated to ROA, while LTD is positively associated to ROA, in both low tech and high-tech industries. This leads to a rejection of hypothesis 2.

Besides capital structure, other factors appear to be significantly related to the performance of firms. The results of the study suggest that a positive and significant relationship exist between firm size measured by the logarithm of sales, and ROA for both the low tech and high-tech industries, hence accepting the third hypothesis. Furthermore, ROA is found to be positively associated to assets tangibility for the high-tech industry, but negatively associated to assets tangibility for the low tech, leading to an acceptance of the fourth hypothesis only for the high-tech industry. Lastly, firm's age is found to be positively associated to ROA for the high-tech industry, but a negative and insignificant relation exists in the low-tech industry. This means that for the high-tech industry's sample, the fifth hypothesis is accepted.

In addition to ROA, other measures for performance has been used to gain more validity in the study. ROE turns out to have a significant negative association with TD but an insignificant relationship with LTD for the low-tech industry. For the high-tech industry, a significant negative relationship between ROE and TD is found, meanwhile LTD is positively and significantly related to ROE. On the other hand, Tobin's Q has negative association with both TD and LTD for the low-tech industry, while the High tech's sample shows a negative relationship between Tobin's Q and TD and an insignificant relationship with LTD. The interaction term between TD and LTD turns out to be significant for Tobin's Q in the low-tech industry, and for ROE in the high-tech industry. Hence, hypothesis 1 can be accepted for low tech using ROE and TD, ROE with TD for the high tech, and finally Tobin's Q with both TD and LTD. Since similar patterns are observed between high tech and low-tech firms, hypothesis 2 claiming a difference between high tech and low tech can be rejected.

LNSALES shows a positive and significant relationship with ROE for both the low tech and high-tech industry. Similarly, Tobin's Q shows similar results for both categories of industries, leading to an acceptance of hypothesis 3. Besides, assets tangibility is found to be negatively related to ROE in the low-tech industry, but positively related to ROE in the high-tech industry. On the other hand, Tobin's Q is negatively related to assets tangibility in the high tech and insignificant in the low industry. This shows that hypothesis 4 is only valid for ROE but not for Tobin's Q. Finally, firm's age is found to be insignificantly related with ROE in the low-tech industry, but positively and significantly related in the high-tech industry, while firm's age is negatively related to Tobin's Q in both categories of firms. Hence hypothesis 5 is valid only for ROE in the high-tech industry.

6.Conclusion, Discussion and Limitations

This research was aimed at investigating on the relationship between capital structure and firm's performance within different industries. More specifically, two distinct categories of industries were studied, that is low tech and high industries, in order to answer the research question formulated as follows: '*Does capital structure have a significant differential impact on firm's performance in different industries?'*. The choice to perform a cross industry study has to do with the somewhat mixed results suggested by the literature. That is, previous research has shown that a positive, negative and non-significant relationship can exist between the capital structure and financial performance of a firm. Furthermore, some researches such as those of Yang et al., (2010) and Bello et al. (2009) has shown that the effect of capital structure and firm performance could be affected by the industry a firm belongs to. Hence, this research aims at tackling the possible impact of the industry type on the relationship between capital structure and firm performance.

In order to have an answer to the above-mentioned research question, this research developed five hypotheses in accordance to the literature. Furthermore, OLS regressions (including robust standard errors) using panel data were used to test the developed hypotheses. The results suggest that a significant negative relationship exists between leverage represented by total debt and firm performance measured by return on assets, returns on equity, and Tobin's Q for both categories of industry. These results support the pecking order theory, which suggest that a firm will be more likely to use internally generated funds to satisfy their financial needs rather than relying on external sources of funding (Myers, 1984; Myers and Majluf, 1984). Additionally, this result is line with that of Abor (2007), who believes that higher debt levels will negatively affect return on assets due to the increased chances of bankruptcy related to the debt. Conversely, the results suggest a positive and significant association between long-term debt and performance measured by return on assets and return on equity for the high-tech firms, and a similar result in found in the low-tech industry with return on assets. These results contradict the pecking order theory since it shows a positive relationship between leverage and firm performance. The results hence suggest that, when the total debt of a firm is taken into account, regardless of the industry and the operationalization of firm performance, a negative relationship exists which is in line with the pecking order theory, compared to long term debt offering mixed results.

The above-mentioned results provide evidences to the believe of a differential impact of capital structure on firm performance. Specifically, the results fail to prove a differential impact between the low tech and high-tech industry on the relationship between leverage and firm performance, since the results show similar patterns, especially with total debt. However, this research helps understand how other factors such as firm size, assets tangibility and firm's age affect firm performance in different ways according to the industry they belong to. The results from the regressions show that firm size is positively associated to all performance measures used in this research, and for both low and high-tech industries. This result is hence in line with the suggested economies of scale theory, which believes that the bigger the size of a firm, the higher the profitability due to the benefits of huge production levels (Penrose,1959). Moreover, the positive relationship between firm performance and firm's age in the high-tech industry using ROA and ROE confirms the firm age theory, where more mature firms are expected to perform better due to the accumulated experience and expertise compared to younger firms (Hopenhayn,1992). However, the negative relationship between Tobin's Q and firm's age in both industries contradicts the firm's age theory, but in line with the organizational inertia theory, suggesting that older firms may fail to adapt to useful changes in their environment but instead stick to their principles and rule of conduct, although the latter may be ineffective (Leonard-Barton,1992).

The positive relationship found in this research between asset tangibility and both ROE and ROA in the high-tech industry is line with Murillo (2007) suggesting that firms can overcome financial distress through their tangible assets by converting them into cash or collateral when needed. The research also shows that the higher the assets' growth of a firm, the higher the performance, regardless of the measure of performance used. A possible reason for this finding could be that the assets of firm keep increasing, especially the non-current assets, a greater net income can simultaneously be realized, due to an increase in production and utilization capacities.

This research is characterized with some limitations. The first limitation has to do with the limitations towards the exploration of industries. This research focuses on the high tech and low-tech industries in order to study the possible differential impact of capital structure on the performance of firms. However, a deeper understanding of the effect of capital structure and firm performance could be achieved by studying industries in more detail. That is, although this research aims at studying the differential impact of capital structure and firm performance

between the high and low tech industries, analyzing industries individually such as the food, wood, and tobacco industries could lead to a better understanding of capital structure and firm performance rather than combining them all under low tech firms as done in this study.

Secondly, the time frame used in this research can be seen as a limitation of the study. Since the study uses a period of 2010 to 2017 for the analysis, the generalizability of the findings may be questionable due to the limited time frame. Additionally, the period studied in this research may be limited since it includes only the post crisis period. Including only the post crisis period may prevent the generalizability of the results since it cannot be ascertained that the pre-crisis would have led to the same results. The reason why the time frame was chosen as such was due to the availability in Orbis database, where most data were available only from 2010 to 2017. Therefore, future research may use different database in order to study a wider time frame to gain more validity.

Thirdly, researches on the impact of capital structure and firm performance within different industries is very limited. More precisely, there is no research that has studied the possible differential impact of capital structure on firm performance between the low tech and high-tech industry. This makes it difficult to compare the results found in this study, and those of previous researches. Hence, the results of this research should not the taken as a final point of view, but rather as a starting point for further research.

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APPENDIX A

TABLE 1A : SUMMARY STATISTICS FOR THE LOW TECH INDUSTRY					
Variables	Observations	Mean	sd	Min	Max
ROA_W	3312	3.3614	5.8938	-10.745	15.314
ROE_W	3312	6.8036	15.123	-34.773	36.619
TOBINSQ_W	3312	1.3347	0.63725	0.54645	3.1113
STD	3312	0.54188	0.2299	0.000159	1
LTD	3312	0.45819	0.23007	0	0.99986
TD	3312	0.53851	0.190847	0.005158	1.045337
LTDTD	3312	0.2553	0.165328	0	0.824901
GROWTH_W	3312	0.03074	0.144048	-0.20573	0.41481
AGE_W	3312	56.9858	44.0369	8	168
LNSALES	3312	13.20115	2.23081	0.29278	18.4846
TAN	3312	0.54643	0.191335	0.003916	0.987053

APPENDIX B

TABLE 1B : SUMMARY STATISTICS FOR THE HIGH TECH INDUSTRY					
Variables	Observations	Mean	sd	Min	Max
ROA_W	5512	1.28582	12.0222	-36.017	17.428
ROE_W	5512	3.12128	22.61698	-64.934	35.009
TOBINSQ_W	5512	1.86342	1.12595	0.7127958	5.246614
STD	5512	0.589561	0.24036	0.038589	1.457099
LTD	5512	0.4106007	0.24065	-0.457098	0.96141
TD	5512	0.46268	0.20482	0.01287	0.99119
LTDTD	5512	0.2104562	0.1674302	-0.08923	0.80972
GROWTH_W	5512	0.068152	0.19127	-0.231629	0.6234
AGE_W	5512	43.244	36.4753	7	138
LNSALES	5512	12.6227	2.42516	0.194003	18.8232
TAN	5512	0.456398	0.20529	0.0003868	0.997054

APPENDIX C

TABLE 2: VIF RESULTS FOR THE LOW TECH INDUSTRY					
BEFORE OMITTING STD			AFTER OMITTING STD		
Variable	VIF	1/VIF	Variable	VIF	1/VIF
STD	7937.94	0.000126	LTD	1.46	0.686959
LTD	7936.73	0.000126	TAN	1.32	0.757733
TAN	1.32	0.757415	LNSALES	1.22	0.820634
LNSALES	1.22	0.820372	TD	1.18	0.846486
TD	1.18	0.846087	AGE_W	1.04	0.961033
AGE_W	1.04	0.960484	GROWTH_W	1.02	0.978032
GROWTH_W	1.02	0.977971			
Mean VIF	2268.64		Mean VIF	1.21	

APPENDIX D

TABLE 3: VIF RESULTS FOR THE HIGH TECH INDUSTRY					
BEFORE OMITTING STD			AFTER OMITTING STD		
Variable	VIF	1/VIF	Variable	VIF	1/VIF
STD	2540.12	0.000394	LTD	1.7	0.586599
LTD	2541.41	0.000393	TAN	1.52	0.657411
TAN	1.52	0.65678	LNSALES	1.48	0.677322
LNSALES	1.48	0.676016	TD	1.35	0.741162
TD	1.35	0.741115	AGE_W	1.17	0.855052
AGE_W	1.17	0.853349	GROWTH_W	1.03	0.97333
GROWTH_W	1.03	0.972581			
Mean VIF	726.87		Mean VIF	1.37	

APPENDIX E

TABLE 4: CORRELATION MATRIX FOR THE LOW TECH INDUSTRY									
VARIABLES	ROA_W	ROE_W	TOBINSQ_W	LTD	TD	GROWTH_W	AGE_W	LNSALES	TAN
ROA_W	1.0000								
ROE_W	0.9144	1.0000							
TOBINSQ_W	0.4907	0.4401	1.0000						
LTD	-0.0263	0.0311	0.0137	1.0000					
TD	-0.2173	-0.0461	-0.0658	0.1946	1.0000				
GROWTH_W	0.3157	0.3055	0.1963	0.0221	-0.082	1.0000			
AGE_W	0.0302	0.0442	-0.0775	-0.1118	0.0873	-0.0372	1.0000		
LNSALES	0.2515	0.3063	0.1569	0.2703	0.3451	0.0452	0.1072	1.0000	
TAN	-0.1089	-0.0843	-0.0173	0.4728	-0.0108	-0.059	-0.0718	0.0561	1.0000

APPENDIX F

TABLE 5: CORRELATION MATRIX FOR THE HIGH TECH INDUSTRY									
VARIABLES	ROA_W	ROE_W	TOBINSQ_W	LTD	TD	GROWTH_W	AGE_W	LNSALES	TAN
ROA_W	1.0000								
ROE_W	0.9458	1.0000							
TOBINSQ_W	-0.0486	-0.0431	1.0000						
LTD	0.0891	0.1043	-0.0223	1.0000					
TD	0.0285	0.0561	-0.1887	0.4157	1.0000				
GROWTH_W	0.1948	0.2087	0.243	0.0793	-0.0259	1.0000			
AGE_W	0.2101	0.216	-0.1664	0.0952	0.2154	-0.0943	1.0000		
LNSALES	0.4586	0.4703	-0.0558	0.3917	0.4142	0.0231	0.3499	1.0000	
TAN	0.1915	0.1928	-0.1833	0.5551	0.2543	-0.0247	0.1544	0.3688	1.0000