EFFECT OF FIRM SPECIFIC CHARACTERISTICS ON FINANCIAL LEVERAGE OF QUOTED DIVERSIFIED COMPANIES IN NIGERIA

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BEING A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA. IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTERS OF SCIENCE DEGREE (M.Sc.) IN ACCOUNTING AND FINANCE

JANUARY, 2017

DECLARATION

I declare that this research thesis titled **"Effect of Firm Specific Characteristics on Financial Leverage of Quoted Diversified Companies in Nigeria"** have been performed by me in the Department of Accounting, Faculty of Administration, Ahmadu Bello University, Zaria. No part of this dissertation has been previously submitted for the award of any degree in any institution of learning in and outside Nigeria. All works consulted have been duly acknowledged in the reference. In addition, I take full responsibility for any errors found in the work.

_____ _____

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CERTIFICATION

This dissertation titled **"Effect of Firm Specific Characteristics on Financial Leverage of Quoted Diversified Companies in Nigeria"** by Umar Farouk ABDULKARIM meets the regulations governing the award of Masters of Science (M.Sc) Degree in Accounting and Finance of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literature presentation.

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DEDICATION

This dissertation is dedicated to Almighty Allah (SWT). The Lord of Universe for guiding and seeing me through the successful completion of this program, and then to my father Alhaji, Abubakar Abdulkarim whose humble passion to bring the excellence in me right from my day one to this length and also my beloved mother Hajiya Halima Yusuf for her care, support, love and understanding throughout the course of this work.

ACKNOWLEDMENTS

In the name of Allah the beneficent, the merciful. I express my gratitude to my Creator, the Omnipotent, the Omniscient and Omnipresent for creating, guiding, and blessing me with the desire to study and then bestowing me with good health perseverance and endurance to complete the M.Sc. Accounting and Finance Degree Programme within the relevant period.

My appreciation goes to my first supervisor, Dr. Salisu Abubakar; who has made tremendous impetus towards the successful completion of this dissertation. Sir, I owe a lot to you. To my second supervisor, Malam Lawal Mohammed Sani who closely monitored the work right from the coinage of the topic and took his time to go through every bit of this dissertation. I also say thank you Sir. The lessons drawn from both supervisors resulted into the eventual achievement of this work.

My special thanks go to my beloved father, Alhaji Abubakar Abdulkarim, a man of virtue and uprightness. Without him I wouldn't have come this far. I truly appreciate all he has done. Words alone cannot quantify how much he means to me. May ALLAH in his infinite mercy reward, and bless and make him live to enjoy the fruits of his labour and let Aljanatul Firdaus be his final destination.

I also want to show my appreciation to my dear mother, Hajiya Halima Yusuf; your prayers and support has made me what I am today. Mummy, you are the best, how lucky I am having a mother like her, thank you for everything.

This work would not have come to fruition without the effort of all Lecturers in the Department of Accounting, Ahmadu Bello University, Zaria. Their critique and reasonable argument in enriching the work cannot be over emphasized. Special thanks goes to Dr. A.B. Dogarawa, Dr. Auwalu Haruna, Dr. M.S Tijjani, Dr. H. S. Kargi, Dr. Luka Mailafiya, Mal. A.A Aliyu, Mal. J.I. Yero, Mal. Abakar Ahmad, Mal. Abakar Nuhu, Mal. Ibrahim Yusuf, Mal. Suleiman Salami, Mal Farouk Musa, Malama Dr. A.N. Mohammed and Malama Aisha Mahmud, and all others whose concern and constructive criticism has helped improved the overall quality of this research work.

I will also like to acknowledge the effort of my beloved elder brothers and sisters, Mal Abdurrashid Abdulkarim, Mal Muhammad Kabir Abdulkarim and Yusuf Abdulkarim, Malama Rukkayya Abdulkarim, Aisha Abdulkarim, Amina Abdulkarim and Zainab Abdulkarim for their tremendous support, encouragement, financially, morally and otherwise. I just want to say big

thank you. May Allah reward you abundantly and bless you all. Also, not forgetting the grand children of the house Fatille, Abdallah and Ihsan. May Allah continue to bless them abundantly.

I want to say thank you to the family of late Alhaji Abdullahi for their support and making me as one of their sons, may Allah continue to bless all our late fathers in their respective graves. To Mal Murtala Abdullahi, Alhaji Aminu Turaki, and Aunty Umma Sunisi Mukhtar, I say a very big thank you for your contribution to my life.

My appreciation as well goes to my friends. Alhassan (Chairman), Baba Habu, Afgani Dalhatu Ahmad Lawal, Mahmud Rufai, Umar Musa and Jafaru Modibbo not forgetting Aisha Chado, Farida Mohammed, Nafisa Abdllahi, Aliya Musa Mubi and Fatima Muhammad, you are close to my heart and deer to me. I want to say thank you. To my head of department in Peugeot Automobile Nigeria in person of Mr Yusuf Jiril and my colligue Comfort Momoh, Kabir Umar and Abdullaziz Abdullahi and to all my friends and course mates, space may not permit me to start mention all of you one after the other. I truly appreciate all your efforts and do say thank you.

I cannot brush things over without acknowledging the support, care, affection and love shown to me by my entire student in Albaniy International Science Academy particularly the Head boy and his deputy in the person of Abdurrahman Adamu Jani and Ardo Musa, the head girl and her assistant Hawau Madaki Goolollo and Fatima Yusuf Ibrahim during my entire struggle in the course of this programme. I really appreciate your effort, you are always close to my heart. To the remaining students, particularly Abdussalam Turaki and Rahma Muhammad Zango, words cannot express my appreciation, Thank very much.

ABSTRACT

Financial decision of a firm has continued to constitute concern amongst managers, analysis, researchers, scholars as well as policymakers. This study investigates the Effect of Firm Specific Characteristics on Financial Leverage of Quoted Diversified Companies in Nigeria. The population of the study is the six (6) Diversified Firms listed on the Nigerian Stock Exchange as at 31st December 2014. The study took a census approach of all the six (6) Listed Diversified Firms over the period of the study. Multiple regression technique using Ordinary Least Square (OLS) was employed in analyzing the panel data obtained from audited annual reports and accounts of the sampled firms for the period 2007-2014. The findings of the study revealed that, complexity of business, profitability, growth opportunity and the moderating effect of growth opportunity and profitability on financial leverage were found to be statistically significant. Dependency on external finance, the moderating effect of growth opportunity and complexity of business on financial leverage and the moderating effect of growth opportunity and dependency on external finance on financial leverage were found to be statistically insignificant. The study recommends among others that, management of quoted diversified companies in Nigeria should encourage diversification in line of businesses that their streams of revenue or income are not positively correlated. This can be done by seeking growth opportunities in industries where they can further diversify their business to break in revenue or which will allow them to conveniently finance their subsidiaries and reduce their bankruptcy risk through borrowing.

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CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

The genesis of the use of external financing by firms can be traced back to the period of micro trade by barter which was bedeviled by so many problems, including absence of a standard unit for measurement. This served as a barrier to lending and borrowing. The introduction of money as a medium of exchange facilitated the development of other forms of business such as sole proprietorship and partnership which were mainly sustained through internal financing. However, after the industrial revolution of the 1830s, the nature of business ownership and financing evolved, partnerships were formed, which lead to the emergence of joint stock companies. As a result of the formation of large joint stock companies which can take greater risks in business opportunities, internal sources of finance became insufficient for further expansion and growth, thus, necessitating business ventures to resort to external financing in order to boost their efficiency and productivity.

Moreover, expanding into new line of businesses and the possible increase in the number of their division/ subsidiaries became one of the reasons that necessitated the need for external source of funding in form of loans, or new equity from creditors, lenders, shareholders and other debt providers. These could come in form of debenture and loan usually termed as financial leverage with a fixed rate of charges attached to it in form of interest payment needed for such expansion. This gives raise to the concept of capital structure or debt/equity mix often referred to as leverage.

Companies spend a lot of time in trying to fashion out how to finance a project or an operation using the most appropriate source of financing at the right time. Project financing may

sometimes be achieved through the combination of both internal and external source of finance which entails the use of debt or issuance of equity or combination of both (Suleiman, 2012). Thus, optimum financing decision from the best source is very vital to the success and survival of a firm as it helps in determining financing, investment, liquidity and dividend decision which in turn helps in maximizing the shareholder's wealth.

Furthermore, several hypotheses and theories have been postulated with a view to explaining how capital combination of a firm affects its value. These include the pioneering work of Modigliani and Miller (1958) which proposed the irrelevancy theory based on the perfect market assumption. In 1963, Modigliani and Miller relaxed one of their earlier assumptions on corporate tax, thus making debt financing more advantageous than equity financing. Further development to the theory was made in 1977 when Modigliani and Miller added personal income tax into their previous hypotheses and found out that, tax shield can be offset by personal income tax.

However, due to criticism and unrealistic assumptions in Modigliani and Miller hypotheses over the years, researchers like Jensen and Meckling (1976), Myers and Majluf (1984) decided to develop other theories such as the agency theory, pecking order theory, trade off theory and the signaling theory among others in an attempt to explain capital structure further. These theories explained and exposed different patterns of firm behaviors suggesting that, different features, attributes or characteristics affect firm's critical decision such as financing, investing, dividend and liquidity decision. Some of these factors include profitability, size, age, liquidity, and tangibility, growth potentials, number of subsidiaries attached to these firms, the source and the financing structure and how these attributes affect the future risk and return of these firms and the value of shareholders. While these factors (profitability, size, age, liquidity, and tangibility, growth opportunity and complexity of business) are specific at firm level, yet other factors are

specific at industry level, others are specific at country's institutional environment and infrastructure. Among all these factors, firm-specific variables exert the highest influence on financial leverage (Onofrei, Tudose, Durdureanu & Anton, 2015). Therefore, corporate managers must focus primarily on these variables when making debt ratio decisions.

Furthermore, as noted by Mazur (2007), factors affecting capital combination of a firm differ from one country to another due to changes in the level of economic, technological, cultural and environmental factors. This variation could logically be applicable to various sectors of an economy, having different characteristics and unique nature of activities they engage in. This may be seen from the perspective of those companies that engage in manufacturing activities and those that engage in service provision. As such, findings from previous researches may not reasonably be applicable to other industries with unique attributes and different ways of funding their business activities, especially quoted diversified firms in this current period. Hence, the need for a specific study to be carried out in this area with a view to examining those unique firm specific characteristics that impact on the debt structure of quoted diversified companies in Nigeria.

The use of borrowed money in order to finance business operation or execute a project is termed as financial leverage (Gill & Mathur, 2011; Rehman, 2013). This may be in different forms, either short term financing which has to do with cash shortage and current liability management. As well as long term financing strategy such as diversifying into a new line of business in order to increase profitability and expansion in subsidiaries or branches for future growth and total liability use as debt instrument in financing strategy. A firm may require external source to sustain these investing activities. These decisions may efficiently be executed by exploring debt financing in the form of financial leverage. Debts used in business increases shareholders' risk

and return on investment and sometimes have tax incentives associated with borrowing, but increases bankruptcy cost (Shehu, 2011).

A firm may also choose to grow either by increasing the number of its subsidiaries which makes its operations more complex or diversify entirely in different line of business or product. This may bring about increase in profitability as well as liquidity of the firm. Complexity of business may be viewed from different perspectives including business complexity resulting from number of subsidiaries controlled by a firm or geographical complexity which relates to a firm's operating regions. According to Grant, Bricker, Fogarty & Previts (1999), firms with more lines of business or more geographical spread are more complex, more diverse, and are less focused due to the number of business activities they engage in. On the contrary, a less complex firm that engages in one line of business, or being wholly contained in one geographical region focuses more on its operations.

By and large, Heshmati (2001) noted that, small firms with concentrated ownership and expecting high growth will need more external finance through reliance on external source. This is because growing firms have little or no internal finance to relay on. Thus, dependence on external finance informs a firm on the extent to which they are likely to relay on external funding to meet up with their operational need for cash. It is one of the internal factors that determine the level of borrowing by a firm.

Profitability influences firm's growth potentials, this is because, the more profitable a firm is, the greater its capacity to generate funds internally and the less likely the firm is in defaulting settlement of its liabilities. Companies with fast growth potentials are likely to have high retain earning and thus may prefer to use such earning than utilizing external source of financing

(Suleiman, 2012). This justify why firms with potential growth has incentive to collect more debt for further growth opportunities. In addition, profitability is considered as an essential variable of financial leverage of a firm. It is already an established fact in pecking order theory that, highly profitable firms rely more on internal capital due to high revenue generation which reduces lenders exposure to probability of bankruptcy (Rajan and Zingales, 1995).

Tang and Jang (2007) opined that, market value as a measure of growth opportunity reflects the market's expectation on the current net worth of a firm and the firm's all-future earnings. A firm with better growth opportunity has great potentials for generating revenue, thus, going for more debt. This implies that, creditors also on their own part will be willing to extend facilities to firms with growth potentials.

Nigerian diversified companies are important sector of the economy that engage in entirely different businesses that fall under one corporate group, usually involving a parent company and many subsidiaries. They are often multi-industry and most times, large and multinational. They are made up of different seemingly unrelated businesses, cutting across number of economic sub-sectors such as consumer goods, oil and gas, banking and so forth.

An important question that needs to be empirically answered is on the specific firm characteristics that affect the financing pattern of quoted diversified companies in Nigeria. Therefore, this study aims to determine the effect of firm specific characteristics on financial leverage of quoted diversified firms in Nigeria.

1.2 Statement of the Problem

Financing decision of a firm has continued to constitute concern amongst financial managers, analysts, researchers, scholars as well as policymakers, especially with regards to financial

institutions (Ukaegbu, 2015). Previous empirical studies conducted have shown that, diversified firms mostly employ low leverage in their choice of capital mix (Lewellen, 1997). This is due to the fact that they can rely on their internal capital market to alter their investment policies and subsequently raise cash in any of their subsidiaries (Jensen & Meckling, 1976). More so, most diversified firms carryout their transactions with their subsidiaries by means of tunneling and propping, which entails the movement of financial resources from parent company to subsidiaries and vice versa, thus making external source of finance less attractive to them.

Evidence from existing literature on the link between firm specific characteristics and financial leverage is quite mixed. As such, there is no unanimous agreement on those factors that determine the financing pattern of firms in different countries and sectors of the economy. For example, most of the studies concentrated on countries like United State (U.S), Canada, Italy, Japan, Korea, Thailand and so forth (See Tang & Jang, 2007; Buhtani & Amarjit, 2009; Gill & Mathur, 2011; Rocca et al 2009; Choi, 2014; & Waranpee, 2011). Findings from these studies are still mixed and inconclusive. The developing countries have had their own share of research as evidenced from the empirical literature (See Hijazi & Tariq, 2006; Mishran, 2011; Akinlo, 2011; Shehu, 2011; Regasa, 2013; Kiran, 2013 & Namita 2014). In the same vein, findings from the African countries like other European countries are still inconclusive on the topic. This may be due to differences in institutional settings, laws, rules and regulation guiding business activities in different countries (Rejan & Zingales, 1995). Furthermore, the endogenous nature of leverage, which makes it sensitive to different measures of firm characteristics, differences in sample size, variable measurement may be additional factors that have contributed to the mixed findings (Lee, 2007).

In addition, of the several studies conducted in the developed and emerging economies, most of the studies dwelled on determinants of capital structure of their respective countries. These include Michaela (2015) who investigated the determinants of Capital structure of micro and small enterprises in Lasi, Romania; Choi (2014) in Korea, and Waranpee (2011) in Thailand. Gill and Mathur (2011) however examined those factors that influence the financial leverage of Canadian firms using one of the variables (Complexity of business) that will be tested using the Nigerian data, since finding in other economy may not be applicable to our economic settings due to differences in institutional factors.

Studies from other developing countries include Hijazi & Tariq (2006) who investigated the determinants of capital structure of listed firms in the cement industry of Pakistan. Mishran (2011) examined those factors that determine the capital structure of Indian Manufacturing Sector, Kiran (2013) further investigated the determinant of capital structure of textile, chemical fuel and energy of Pakistan's economy, while Regasa (2013), explored the determinants of financial leverage of unlisted private insurance companies in Ethiopia, lastly, Namita (2014) examined those variables that determine the leverage and risk of cement companies in India.

In the Nigerian context, most studies concentrated on variables such as firm size, firm age, tangibility, profitability, liquidity, growth opportunities among others with a large proportion of these empirical literatures paying more attention to other sectors of the economy to the exclusion of diversified firms. Good examples include the works of Salawu and Agboola (2008); Akinlo (2011) which all focused on the Nigeria listed non-financial firms. Mutalib (2010) and Suleiman (2012) who both examined the determinants of capital structure of cement companies in Nigeria, Shehu (2011) focused on Nigerian insurance firms, and Olayinka (2011), Suleiman (2011) and Tajudden (2014) who all explored Nigerian listed conglomerate firms. This study also

concentrated on the conglomerate firms otherwise called diversified companies, but analyzed different variables. Growth introduced as moderating variable which makes the work different from the previous studies such as those of Chandrasekharan (2012); Anake, Obim & Awara (2014) who explored Nigerian listed firms. Akinyomi and Olagungu (2013), dwelled on the Nigerian manufacturing firms, Akingunola and Oyetayo (2014), conducted a pilot survey on the SMEs in Nigerian. Lastly, Yadrichukwu and Magaret (2015) explore the Nigerian oil and gas sector. From the analysis of empirical literature, it can simply be seen that with the exception of the studies by Olayinka (2011), Suleiman (2011) and Tajudden (2014), all other studies focus on other sectors. Thus, the need arose to revisit the diversified companies in order to get a better understanding of financing decision and it determinants in such an important sector of the economy.

The present study therefore looks at a combination of variables such as dependence on external finance, profitability and growth opportunity among the companies. It also incorporates a previously unexplored variable in Nigeria, complexity of business. Even within the developed economies, only a few studies such as Gill and Mathur (2011) established a direct link between complexity of business and financial leverage and found the variable to be significant and positively influence Canadian manufacturing sector's financial decision. This leaves a research gap within diversified firms in Nigeria, which this present study intends to fill, with a view to providing detailed and better understanding of the financing pattern of diversified firms in Nigeria.

1.3 Research Questions

i What is the effect of complexity of business on the financial leverage of quoted diversified companies in Nigeria?

ii What impact dependence on external finance has on financial leverage of quoted diversified companies in Nigeria?

iii What is the effect of profitability on financial leverage of quoted diversified companies in Nigeria?

iv What impact growth opportunity has on financial leverage of quoted diversified companies in Nigeria?

v To what extent does growth opportunity moderate the relationship between complexity of business and financial leverage of quoted diversified companies in Nigeria?

vi How does growth opportunity moderate the relationship between dependence on external finance and financial leverage of quoted diversified companies in Nigeria?

vii How does growth opportunity moderate the relationship between profitability and financial leverage of quoted diversified companies in Nigeria?

1.4 Objectives of the Study

The main objective of this study is to assess the impact of firm specific characteristics on financial leverage of quoted diversified companies in Nigeria. The specific objectives of the study are to;

i. Examine the effect of complexity of business on financial leverage of quoted diversified companies in Nigeria

ii. Evaluate the impact of dependence on external finance on financial leverage of quoted diversified companies in Nigeria.

iii. Evaluate the effect of profitability on financial leverage of quoted diversified companies in Nigeria.

iv. Ascertain the impact of growth opportunity on financial leverage of quoted diversified companies in Nigeria.

v. Assess the moderating effect of growth opportunity on the relationship between complexity of business and financial leverage of quoted diversified companies in Nigeria.

vi. Determine the moderating impact of growth opportunity on the relationship between dependence on external finance and financial leverage of quoted diversified companies in Nigeria.

vii. Determine the moderating impact of growth opportunity on the relationship between dependence on external finance and financial leverage of quoted diversified companies in Nigeria.

viii. Assess the moderating impact of growth opportunity on the relationship between profitability and financial leverage of quoted diversified companies in Nigeria.

1.5 Research Hypotheses

In line with the objectives of the study, the following hypotheses were formulated in null form:

$H0_1$: Complexity of business has no significant effect on financial leverage of quoted diversified companies in Nigeria.

$H0_2$: Dependence on external finance has no significant impact on financial leverage of quoted diversified companies in Nigeria.

$H0_3$: Profitability has no significant effect on financial leverage of quoted diversified companies in Nigeria.

$H0_4$: Growth opportunity has no significant impact on financial leverage of quoted diversified companies in Nigeria.

$H0_5$: Growth opportunity has no significant moderating impact on the relationship between complexity of business and financial leverage of quoted diversified companies in Nigeria.

$H0_6$: Growth opportunity has no significant moderating impact on the relationship between dependence on external finance and financial leverage of quoted diversified companies in Nigeria.

$H0_7$: Growth opportunity has no significant moderating impact on the relationship between profitability and financial leverage of quoted diversified companies in Nigeria.

1.6 Scope of the Study

The study intends to examine the effect of firm specific characteristics on financial leverage of quoted diversified companies on the Nigerian Stock Exchange as at 31st December, 2014. The study covers the period of eight years from 2007-2014. The justification for choosing diversified companies as domain of the study stems out of the nature of the variable the study is dealing with. This is due to the fact that, these firms are known to be having numerous subsidiaries attached to them, which internal source will not be adequate to finance their activities, hence result in depending on external financing.

1.7 Significance of the Study

Financing decision of every firm is very crucial to its survival and continuity both in the short and long run. A closer and proper empirical examination of these firm specific characteristics

among Nigerian diversified firms will help contribute and enhance to the existing body of literature of financing decision of these companies with a particular reference to Nigerian economy. This would help provide information that corporate financial managers would need in making reasonable decisions as regards investment, dividend, liquidity and financing decisions.

The result of this study will help in providing a better understanding and establishing link between these firm specific characteristics and financial leverage of diversified companies in Nigeria. This understanding will help managers of diversified companies in making optimal financial decisions since only limited researches were conducted on these firms in recent times. More so, financial managers of diversified firms in Nigeria could find the outcome of this study very significant as new variable (complexity of business) will be examined. In addition, to the best of our knowledge, this variable was not previously investigated in Nigerian literature. The result of the study will be of paramount importance to investors in understanding the growth opportunities awaiting their investment. This will help them in making optimal decisions as regards investing more capital or divesting from such sector.

This study will validate some of the previous findings, by studying dependence on external finance, profitability and growth opportunity. It will also add to existing body of literature, owing to the fact that, very few studies explore firm specific characteristics and financial leverage of diversified firms in Nigeria, combining the variables that this study used and exploring them from moderation angle.

Furthermore, debt providers will find this study of immense benefit in helping them to evaluate the nature of growth potentials of diversified companies in Nigeria, in terms of assessing their subsidiaries and evaluating if they worth given out loan for further expansion or not. Finally, the

outcome of this study will serve as a reference material for further studies in the area of financial leverage decision of diversified firms in Nigeria to students and other researchers.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter presents and synthesizes the concept of financial leverage as well as the concept of firm specific characteristics proxied by complexity of business, dependence on external finance, profitability and growth opportunity. Relevant empirical studies with regards to financial leverage on firm specific characteristics were reviewed with a view to identifying contributions made by previous researchers and identifying gaps that need to be filled. Also, the theoretical framework used to underpin the study is presented in this chapter.

2.2 Concept of Financial Leverage

Leverage as a whole is a concept that has been evolving from time immemorial. Theoretically, the concept has attracted formal attention most notably in the works of Modigliani and Miller (1958). However, as noted by Gill and Mathur (2013), empirical evidence regarding alternative theories to leverage is still inconclusive. The term leverage can simply be seen as the amount of debt that a firm uses in financing its assets (Kuhlemeyer, 2004). However, according to Nissin and Penman (2004), leverage are of two kinds: financing leverage which occur as a result of financing activities such as purchase of asset and is related to fixed debt cost while operational leverage resulting from operating activities, deal with the degree to which a firm incur a combination of fixed and variable cost as noted by Suleiman (2012). The focus of this study is on financial leverage of quoted diversified firms in Nigerian.

According to Akingunola and Oyetayo (2014), there are no hard and fast rules in setting an optimal debt ratio. It is the duty of the financial manager to determine how much to borrow. This implies that, what combination of debt and equity should be put together, were debt is chosen by the financial manager, than what is the nature of the debt, is it short dated, long dated or total

financial leverage that is to be used. All these combinations are bound to affect the risk, return and value of the firm.

More so, where the financial manager resort to using less expensive sources of funds, such as debt, since they are tax deductible, the interesting question here is, what portion of the revenue goes to the shareholders, and what portion of the revenue generated goes to lenders or credit providers. Firms with high debt ratio and high fixed interest charges have enough capital for operation, but are highly geared, while firms with low debt ratio have low fixed interest charges will have little capital for investment are said to be having low gearing ratio. Interestingly, as noted by Akingunola and Oyetayo (2014), debt is the cheapest source of generating capital compared to equity as demonstrated by finance literature, this is because interest is deductible for tax purposes in using debt financing.

Several literatures have defined financial leverage with no consensus among these definitions. Some of these definitions include that of Business Dictionary (2015), which defined financial leverage as the use of borrowed money to increase production volume and sales earnings. This definition sees financial leverage as a catalyst which is used in increasing productive capacity and subsequently sales revenue which will impact on the growth potentials of the firm and in the long run even increase in the number of its subsidiary. Another definition is the one given by Kiafar, Mahmood, Abadi and Valipour (2013), which sees the concept as a percentage of cash money financed by creditors. He further expatiate that financial leverage implies financing a project or business operation by borrowing or creating debt. This definition restricts the concept of financial leverage to one aspect only, forgetting that leverage can be of different forms (Financial, operating and or combined leverage). Hillier et al. (2010), described financial

leverage as the extent to which a firm relies on debt. This definition does not explicitly specify the type of debt referred to, whether short term debt, long term debt or total debt.

Pandey (2010) stated that financial leverage or gearing ratio or trading on equity is the use of fixed charge source of funds, such as debt and preference capital along with owner's equity in the capital structure. This definition shows that, debt providers have limited participation as regards partaking in the share of profit of a corporate entity, thus, they ensure the protection of the companies' earnings from which the payment of their own fixed charges will come from. The major aim of employing financial leverage by a company is to increase the rate of return compared to the fixed- interest charge paid by the company, the higher the rate of return on investments, the higher the profit and the lower the loss incurred by the entity. According to Rehman (2013), financial leverage is the extent to which a business or investor is using borrowed money. This definition clearly pointed out that as borrowed money increases financial leverage (gearing ratio) also increases with its corresponding increase in finance charges. Gill and Mathur (2011) describe financial leverage as the degree to which firms utilize borrowed money. They noticed that, higher leverage leads to risk of bankruptcy, but that does not imply that financial leverage is disadvantageous due to the fact that tax advantage on borrowing still exists.

In all the aforementioned definitions of the concept of financial leverage, one thing is common, which is the use of debt to finance business operation or a project. But the definition of Pandey (2010) is considered more encompassing which will be adopted for this study.

2.2.1 Leverage Hypotheses

Evidence from the early works on capital structure theories can be seen from the seminal paper of Franco Modigliani and Merton Miller(1958) with much of these works concentrating on the

connection between capital structure and firm value (Myers, 1984). From these studies, several theories spring up as regards capital choice decision of a firm. These include the pioneering work carried out by Miller and Modigliani which identifies the irrelevancy theory based on the perfect market condition in 1958, the relevancy theory by Modigliani and Miller (1963) and the traditional theory which strike balance between the two extreme points of view was also developed. In addition to this, Miller (1977) makes another contribution by adding personal income tax into their previous study. He find out that, corporate tax shield can be offset by the personal tax and he further noted that both personal tax and corporate tax can exist in the presence of optimal capital mix.

The work carried out by Modigliani and Miller in 1958, is considered one of the earliest theory of capital choice of a firm. This theory referred to as the net operating income theory or independence theory asserted that; capital structure does not matter, is irrelevant and not important in determining the value of a firm, This simply implies that, in whatever way an investor or a financial manager put together the combination of his firm's debt to equity ratio, the value of the firm will not be affected by such combination.

In 1963, Modigliani and Miller make a sudden U-turn and relaxed one of their assumptions on corporate tax. This development makes the value of a levered firm to be higher than that of the unlevered firm. In addition to this development, Miller (1977) makes another contribution by adding personal income tax into their previous hypothesis. He find out that corporate tax shield can be offset by the personal tax and he further noted that both personal tax and corporate tax can exist in the presence of optimal capital structure. Firms everywhere do pay corporate tax, thereby indirectly reducing the earnings available to investors. On the other hand, these investors do pay personal taxes on the income they earned. Thus, the effect of this can be seen from both

corporate and personal tax point of view. Therefore, a company should find a way of minimizing the effect of both taxes, while deciding on leverage financing decision (Pandey, 2010). However, due to criticism and unrealistic assumptions in M&M hypothesis over the years, researchers in the area of capital mix had to develop other theories such as the pecking order theory, the trade-off theory, the agency theory, the signaling theory and so forth.

2.3 Concept of Firm Specific Characteristics

According to Suleiman (2012), firm specific characteristics are those factors that are endogenous to a firm and are capable of influencing their financing decision. Most of these factors are within the control of the management, because they are firm attributes or characteristics which are financial in nature. In the context of this study, these include; complexity of business, dependence on external finance profitability and growth opportunity.

2.3.1 Complexity of Business

Complexity of business also referred to as business diversification has been defined in several ways by different authors. Grant, Bricker, Fogarty and Previts (1999) see the concept as the line of business or geographical operating regions of a firm. This definition concludes that, firms with more lines of business or more geographic operating regions are more complex, more diverse, and less focused. This definition goes further to incorporate geographical and operating regions of a firms to imply how diverse or complex a firm is.

Berry (1971) sees the concept as an increase in the number of industries a business participates in. In line with the above definition, Ajay and Madhumathi, (2012) see the concept as that process, by which a firm moves into segment, sectors, industries or markets which previously

was not engaged in. Business diversification or complexity can help improve debt capacity and also reduce the probability of bankruptcy as noted by Lewellin (1971).

According Hossain (2008), complexity is seen as the actual number of subsidiaries a firm is having as evident in Indian banks. This definition extends diversification to the number of subsidiaries surrounding a particular venture. Three major strategies to diversification are used across product segment. These include; related diversification, unrelated diversification and vertical integration. Literature from developed economies such as U.S.A and other European countries have shown that product diversification is the most popular strategy used among growing and large firms (Berry, 1971). Most of the studies on firm's diversification strategy are focused on developed countries. Developing countries have received little research attention in this regard as (Remelt, 1982 as cited in Ajay & Madhumathi, 2012). The present study adopted the definition of Hossain (2008) thereby looking at complexity of business as the number of subsidiaries a firm is having.

2.3.2 Dependence on External Finance

Dependence on external finance is a concept that has been evolving over time. The concept has attracted formal attention most notably in the works of Rajan and Zingales (1998). In their study, they explain that new establishments are more likely to be new firms, they depend more on external finance than established firms. They defined dependence on external finance as the extent to which a firm is likely to rely on external financing in order to meet up with its operational needs for funds. The concept is measured as capital expenditures on property plant and equipment minus cash flow from operations divided by capital expenditures. Cash flow from operations is broadly defined as the total cash flow from operations plus changes in working capital. In line with the aforementioned definition, the concept can also be seen as the extent to

which a firm is likely to rely on external financing in order to meet up with its operational needs for funds. It shows how much gap does a firm have in operating cash flow and how much external financing does firm require at the end of the operating cycle to breach this gap.

Vonfurstenberg & Kalckreuth (2007) used a cyclical adjusted measure of dependence on external finance derived from U.S. industries from (1977-1997) sees structural and technological factor as reasons why differences exist in depending on external finance by sectors. They adopted the definition given by Rajan and Zingales (1998) in their study. From the forgoing, it can clearly be seen that dependence on external finance shows how a firm's cash flow from operation will cover a firm capital expenditure property plant and equipment used in operations.

Myers & Majluf (1984) as cited by Adam (2002) asserted that, accessing external capital market for external finance is very expensive due to finance and bankruptcy cost. He further noted that, firms do not depend on external finance to make cover their cash deficit only, but they also resort to cutting investments thereby cutting expenditure. The study adopts the definition of Rajan and Zingales (1998) to measure dependence on external finance of a firm.

2.3.3 Profitability

Profitability is considered one of the important indicators of financial performance of an entity, which shows the ability of an entity to utilize its resources efficiently and effectively in ensuring continuous survival in business operations. According to Samad and Hassan (2000), it is the measure of net earnings per unit of a given asset and how a firm can convert it long term economic benefit.

Profitability is seen as one of the firm characteristics that may affect financial leverage of an entity. This is because, the more profitable a firm is, the more tax it can avoid by employing

higher leverage. Also, the greater its ability to generate internal funds and the less likely it is to default on its obligations (Cole, 2013).

2.3.4 Growth Opportunity

Penrose (1995) defined growth opportunity as an evolutionary process which involves the accumulation of knowledge unique to a firm. This unique knowledge about a firm may be factors affecting the firm internally or externally to its growth. The marker to book value ratio use to proxy growth opportunity of a firm has an important influence on the financial leverage of a firm. This is because a substantial part of the firm's value comes from their intangible assets.

As opined by Tang and Jang (2007) market value reflects the market's expectation on the current net worth of a firm and the firm's all future earnings. A firm with better growth opportunity has great potentials for generating revenue, thus, going for more debt. This implies that creditors also on their own part will be willing to extend credit to firms with growth potentials. This is because, creditors usually charge higher prices for debt where a manager plans to invest borrowed money in a riskier operation. In addition to this, as the amount of debt increases, there is every possibility of shift of control from shareholders to debt holders. This will give creditors the chance of rejecting any profitable but risky project that may endanger the company's going concern. This action will lead to proper utilization of retain earning in payment of debt in order to protect the shift in control and ownership, thus, committing funds that may be available for investment.

According to Jensen and Meckling (1976), firms that have a better growth opportunities use financial leverage in order to reduce the constrains put on them by lenders maximize future gain, therefore, an inverse relationship exists between growth opportunity and financial leverage. This

is in line with the prediction of pecking order theory which explains that, a company with fast growth potentials is likely to have enough retain earning and thus, the firm may prefer the use of internal source than external source of finance (Suleiman, 2012). Contrary to the Pecking order theory is the Trade-off theory which postulates a positive relationship between growth opportunity and financial leverage. This is due to the fact that firms with potential future growth have incentive to collect more debt for further growth. This was empirically supported by Mutalib (2010) and Shehu (2011) on determinants of capital structure of Nigerian insurance and cement firms respectively, who concludes a positive relationship between growth and leverage in support of trade off theory. The study adopted the definition of Tang & Jang (2007) in measuring growth opportunity of firms.

2.3. 5 Measures of Financial Leverage

Various empirical studies had proxied and measured financial leverage in different ways over the years as evidenced from the literature. For example, Wald (1999), Chen (2003), Tang and Jang (2007), Mutallib (2010), Hall (2012), Ali (2011), Shehu (2011), Zabrin (2012), Ashraf and Rasool (2013), Ishaya, Sannomo & Abu (2013), all measured debt ratio as long term debt to total asset. While Singh, Wallace and Suchard (2003), Bhutani and Amarjit (2009), Gill and Mathur (2011) Bundula (2012), Akinyomi (2013), Anake, Obim and Awara (2014), Regasa (2014), Namita (2014), Kiran and Samran (2013), Michaela (2015), all measured debt ratio as total debt to total asset. Salawu and Oyesola (2007), Suleiman (2011), Raza, Farooq and Aslam (2013) as well as Fauzi, Basyith and Idris (2013) used a three measure of debt ratio to measure and proxy leverage. This includes; the short term, long term and total debt in their studies, the present study will also base the measure of debt ratio or financial leverage base on the above three measures, that is, short term, long term and total debt d.

However, as noted by Suleiman (2011), firms vary from industry to industry, sector to sector, country to country and even the continent that the studies were carried out in terms of debt maturity. Tang and Jang (2007) revisiting on the determinants of capital structure noted that, lodging firms prefer short term loan than long-term loan in deciding on financial leverage decision. Furthermore, debt ratio translated into financial leverage is measured in different ways by various researchers, based on the situation on ground, such as the sector being studied, the variables in question, and other institutional and economic factors that need to be considered. Thus, debt ratio proxy as financial leverage has various components with different variables that are measured in different in different ways.

Rajan and Zingales (1995) as cited in Suleiman (2011) employ four methods of measuring capital structure use to proxy debt ratio. This includes total liabilities to total assets, total debt to total assets, total debt to net assets and total debt to capital. Bundula (2012) used total debt to total asset to measure debt ratio in his study of Tanzanian non-financial companies listed on Dar essalam Stock Exchange Market. Apart from the usual total debt to total assets use in measuring debt ratio, Mutallib (2010) measured debt ratio (leverage) as book value of long term debts divided by capital employed. That is long term debts plus shareholders' funds.

From the foregoing, it can be deduced that, the measurement of debt ratio or financial leverage is controversial among researchers. The contentious issue is whether to use short term loan, long term loan or total loan in measuring the debt ratio of financial leverage. Bauer (2004) measured the numerator of debt ratio as total liability and denominator as book value of equity.

Pandey (2010) specifically pointed out three ways of measuring financial leverage, these includes;

i Debt ratio; This is simply the ratio of total debt divided by total capital. Both debt and capital used in the computation of debt ratio can be measured in terms of book value. On the other hand, the shareholder's equity may be measured in terms of book value.

ii Debt to equity ratio; The debt to equity ratio is another measure of financial leverage which can either be expressed in book values or market values. The market value of financial leverage is considered more appropriate because it reflects the current attitude of investors. But he further noted that market prices are difficult to ascertain with certainty, this is due to fluctuation of market prices of securities.

iii Interest coverage; This is another way of measuring financial leverage by looking at the ratio of net operating income to interest charges. This measure clearly pointed out the ability of a firm to meet up its fixed financial charges.

2.4 Review of Empirical Studies

Previous empirical literature examined the relationship between firm characteristics and financial leverage in Nigeria, such as Mutalib (2010); Shehu (2011); Suleiman (2012) Ishaya, Sannomo and Abu (2013); Akingunola and Oyetayo (2014) and Yadrichukwu and Magaret (2015), among others. The studies aim to identify those factors that determine the capital structure or the debt ratio of different firms in different sectors of the economy, while others aim at finding the factors that maximize the capital structure decision of these firms.

Most of these studies examine the effect of variables such as profitability, firm size, firm age, growth opportunities, tangibility of asset, liquidity, non-debt tax shields, and so forth on financial leverage. This study specifically picked out variables that determine the debt ratio and behaviour of diversified companies such as; complexity of business, dependence on external finance profitability and growth opportunity with the aim of finding their impact on financial leverage of

the firms in question. The justifications for choosing these variables among others (complexity of business and dependence on external finance) is their less extensive use internationally and were found to be having significant impact on Canadian manufacturing industry (Gill & Mathur, 2011). These variables were not extensively used in most of the studies so far reviewed to the best of our knowledge up to the present period of this study within Nigerian literature, and by extension looking at it from a three way interaction angle. This was not attempted by any of the previous researchers which may be found to play an important role in determining the financial leverage of diversified companies in Nigeria.

2.4.1 Complexity of Business and Financial Leverage

Empirical studies in support of complexity of business as firm specific characteristics can be seen in the works of Ajay and Madhumathi (2012) who examined the impact of diversification strategies (international market and product diversification) on the leverage decisions of firms in Indian Manufacturing firms, Secondary data from audited annual reports were obtained from this sector using a sample of 579 Multinational Companies and 2524 domestic Companies which is classified on the basis of presence and absence of overseas asset investment in their statement of financial position. Panel data was used and regression analysis using fixed effect model was employed with a scope of seven years from 2004-2010. Leverage was used as dependent variable measured as the ratio of total borrowing (including short term and long term) to total asset, while firm size, firm age, tangibility, international market diversification and product diversification measured using her findhal index approach as the sum of each industry sale as proportion of group total sales. The result revealed that, complexity of business proxied as product diversification does not show any significant relationship with leverage for the full and sub-

sample. The study period is not too current as event after their study must have overtaken their research.

Gill & Mathur (2011) investigated the factors that influence financial leverage of 166 Canadian listed service firms. Secondary data from annual reports were obtained from this sector, using a correlational research design with a panel data, ordinary least square regression was employed as techniques of data analysis within a period of three years from 2008-2010. Leverage was used as dependent variable measured as total liabilities divided by total assets while collateralized asset, profitability, effective tax rate, firm size, growth opportunity, industrial dummy and complexity measured as number of subsidiaries of a firm were used as independent variable in the study. The result revealed that, financial leverage of Canadian firms is influenced by profitability, effective tax rate, firm size, growth opportunity, industrial dummy and number of subsidiary. Specifically, number of subsidiaries was found to be significant and positively related with financial leverage of Canadian Manufacturing Firms while on the contrary, the same variable was found to be insignificant and negatively related with financial leverage of service firms in Canada. The period under study is too short for reaching logical conclusion.

Koopman (2011) examines the main determinants of analyst coverage, based on an article by Bhushan (1989). Secondary data from audited annual reports were obtained from 839 sampled firms made up of 498 American firms and 341 European firms operating in ten major industries were used for the year 2011. Number of analysts was used as dependent variable while firms market capitalization, number of institutions holding, firm's inventory, cumulative percentage of inventory held by insiders, number of major industries the firm is operating in, the firm's historical volatility were used as independent variables. Ordinary least square regression was used with a view to determining the relationship between firm characteristics and analyst

following. A mixed finding was revealed in United States and Europe respectively. The study period is not too current as event after their study must have overtaken their research.

Rocca, Rocca, Gerace and Smark (2009) conducted a study with the aim of analyzing the financial strategy of Italian multi-business firms. Secondary data from annual reports of the sampled companies were used. Panel data was used with the Generalized Method of Moment model for analysis for a period of twenty seven years from 1980-2006. Leverage was used as dependent variable while return on asset, non-debt tax shield, firm size, growth opportunity and product diversification inform of business segment were used as independent variable. The finding of the study revealed that, firms following unrelated diversification strategy try to reach their optimum debt level strictly.

Hossain (2008) empirically investigates the extent of both mandatory and voluntary disclosure of Indian banks with firm specific attributes. Secondary data from annual reports for a period of two year from 2002-2003 were collected using 38 Indian banks listed on Bombay Stock Exchange and National Stock Exchange. The disclosure score received for each bank was used as dependent variable, while firm size, age, profitability, complexity of business, asset in place and market discipline were used as explanatory variable. Ordinary least square regression was used for analysis. The result reveals that Complexity of business is negative and statistically not significant. However, the period covered by the study is too short to generalize on the population of the study. Thus, the outcome of the study should be accepted with great caution, in order to avoid miss application judgment in terms of policy implication.

Singh, Wallace and Suchard (2003) investigated the relationship between the geographical and product diversification and their impact on corporate leverage of U.S listed firms using a sample

of 1127 listed firms. Secondary data from audited annual reports were obtained from the sampled firms. Using parametric test statistics, Multivariate regression analysis was employed as tool of analysis for the study covering a period of three years from 1994-1996. Leverage was used as dependent variable and measured as total debt divided by total asset while number of business segments were used to define diversity which is further divided into product focused firms, that is, where the firm operates into single business segments and product diversified firms which implies a business that operate in multiple segment with series of control variable such as firm size and asset turn over. The result reveals that, product diversity leads to greater and higher debt capacity and ratio respectively. Contrary to this finding is geographical diversity which is found to be associated with low debt ratio.

Grant, Bricker, Fogarty and Previts (1999) conducted a study on the association between multinational firm complexity and analyst following. Secondary data from audited annual reports were obtained from 249 sampled firms for the year 1996. Analyst following was used as dependent variable; measured as number of equity analyst firms following the company, while complexity of business proxy by number of subsidiary the firm have is used as an explanatory variable. Ordinary least square regression was used to empirically test the relationship separately, jointly and interactively between firm complexity and analysts following. The result reveals that, firm complexity is significant and negatively related with analyst following. However, the study did not clearly define the scope used, in terms of time dimenssion, thus leading to covering an indefinite period, which may render the findings of the study misleading as time passes by.

Kooij (2013) who examined the association between a corporation being a conglomeration and leverage as well as the effect of bad corporate governance and financial crisis on conglomerate leverage of 998 US firms. Secondary data from audited annual reports were obtained from this

sector. Panel data with logit and tobit regression were employed for a period of eight years from 2002-2009. Leverage was used as dependent variable measured as total debt to total asset while tangibility, growth, non-debt tax shield and profitability are used as independent variables. The result reveled that, conglomerates firms are statistically significant and more leveraged than non-conglomerate. The study period is not too current as event after their study must have overtaken their research.

2.4.2 Dependence on External Finance and Financial Leverage

Beck & Levine (2000) found out that industries that are heavily dependent on external finance grow faster in economies with a higher level of overall financial development and with better protection of outside investors through the use of ordinary least square and two staged least square, negating evidence from previous studies for neither the market-based nor the bank-based hypothesis. The study also found that overall financial development stimulates the establishment of new firms, which is consistent with the Schumpeterian view of creative destruction.

Adam (2002) investigated the use of derivatives by North American golden mining industry is likely to affect their financing strategies which in turn reduce their dependence on external finance. Using secondary data from annual reports obtained from 111 sampled firms for a period covering eleven years from 1989-1999. Panel data methodology with fixed effect regression model was employed as technique of data analysis. Firm's fixed future stream was used as dependent variable while size, growth, conservatism and financial constrain are some of the controls used in the study. The result revealed that, firms that do hedge finance a smaller fraction of their investment expenditure more precise exactly than those firms that do no hedge. The study period is not too current as event after their study must have overtaken their research.

According to Kroszner, Laeven & Klingebiel (2005), developed and developing countries that experienced financial crises during the last quarter century, dependence on external source of finance varies with the depth of the financial system. To portray their point, they investigated the growth impact of financial crises on industries with different levels of dependence on external sources of finance to analyze the mechanisms linking financial shocks and real activity. The study found out that sectors highly dependent on external finance tend to experience a substantially greater contraction of value added during a banking crisis in deeper financial systems than in countries with shallower financial systems. On average, in a country experiencing a banking crisis, a sector at the 75th percentile of external dependence and located in a country at the 75th percentile of private credit to GDP experienced 1.6 percent greater contraction in growth in value added between the crisis and pre-crisis period than a sector at the 25th percentile of external dependence and private credit to GDP. The pitfall of the findings of this study is that the results obtain is only peculiar to banking crises but not for other types of economic distress, such as currency crises and economic recessions.

Furstenberg & Kalckreuth (2007) conducted with cyclically adjusted annual measures of dependence on external finance derived from U.S. industry data for 1977-1997. Rather than using firm level data, annual values of dependence on external finance were used which is measured as the difference between capital expenditure on fixed asset and cash flow from operations divided by capital expenditure. The findings of the study revealed that, variables that may be regarded as structural or technological have very low explanatory power and that dependence on external finance figure calculated from microeconomic data does not correspond from what is obtainable from aggregate figure, and hence, Rajan and Zingales assumption could not be validated.

In addition, Dodonov (2009) examined the effect of dependence on external finance on firm-level volatility through financial development in manufacturing and construction sectors in order to establish a link with output volatility. The study is based on general equilibrium model of financial development that include risk-taking, risk-diversification, firm-level, and aggregate volatility. The findings revealed a significant positive effect of financial development on firm-level volatility but stronger for firms in industries that are relatively more dependent on external finance, ascribing it to technological characteristics of the industry thereby choosing higher risk-taking strategies, most especially countries that are more financially developed.

2.4.3 Profitability and Financial Leverage

Previous studies observed a mixed relationship between profitability and financial leverage. A good example of these studies includes the works of Anake, Obim and Awara (2014) who analyzed the determinants of capital structure of 25 Nigerian quoted firms. Secondary data from audited annual reports were obtained from the sample firms. The study used panel data for a period of thirteen years from 1999-2012. Pooled ordinary least square multiple regression which give an unbiased estimate of the linear relationship among the variables was employed as a tool of analysis. Using leverage as a dependent variable measured as total debt divided by equity plus total debt, while tangibility of assets, operating risk, firm size, growth opportunity and profitability were used as explanatory variable. The result revealed that, tangibility, earnings volatility and profitability, are important factors that determine financial structure of quoted firms in Nigeria. In the same vein, Shehu (2011) examined the determinants of capital structure of listed insurance firms in Nigeria, using multiple regression as a tool of analysis for a period of

ten years from 2001-2010, he reported a significant positive relationship between profitability and financial leverage.

Ishaya, Sannomo and Abu (2013) examined the determinants of capital structure of listed Nigerian Chemical and paint companies, for a period of five years from 2005 to 2009. Secondary data from annual reports and account were obtained from the sampled firms**.** Leverage was used as dependent variable with tangibility, age, size, growth opportunity and profitability as explanatory variables. Ordinary least square (OLS) regression was employed as technique of data analysis. Profitability was found to be significant and negatively related with Leverage. However, a critical look at the regression analysis reveals a contradictory result, as the findings reported in the study is not in tandem with the regression output.

Akinyomi and Olagungu (2013), who conducted their study on the determinant of capital structure in Nigerian using eighty-six manufacturing firms. Secondary data obtained from annual account of twenty four randomly selected manufacturing firms for a period of ten years from 2003-2012. The study employs descriptive survey research design. Correlation coefficient and multiple regression were used as technique of analysis. Financial leverage was measured as total liability divided by total asset, while asset tangibility, firm size, tax, growth opportunity and profitability were used as independent variables, The result revealed that profitability is insignificant and positively related with financial leverage.

Another study conducted by Chandrasekharan (2012) explored the determinants of capital structure of Nigerian listed firms for a period of five years from 2007 to 2011. Secondary data from audited annual reports were obtained from the sampled of 87 firms. Data was analyzed using panel multiple regression model. Leverage was measured as book value of long-term debts

divided by capital employed while tangibility of asset, size, growth and profitability were used as explanatory variables. The result indicates that, profitability is significant and positively related with leverage. However, the study suffered serious limitations as the period of the study was seriously misunderstood and the coefficient of regression results was completely different from what the study reported

Further empirical evidence can be seen in the study conducted by Akinlo (2011), who concluded that, leverage was significantly affect profitability in his study on determinants of capital structure in Nigeria using panel data of 66 listed non-financial firms. Secondary data from audited annual reports and account for a period of Nine years from 1999-2007 was used. Leverage was used as the dependent variable measured as debt ratio of firm together with six independent variables namely; liquidity, size, tangibility of asset, business environment, growth opportunity and profitability. Regression analyses of pooled ordinary least square fixed and random effects model were used. The study concludes that, size, growth opportunity and profitability are significant with leverage at 10% level of significant. The period of the above study is not too current as event after their study period must have overtaken their research, thus making the findings obsolete.

Mutalib (2010) examined the determinants of capital structure of cement companies in Nigeria. Secondary data from audited annual reports were obtained from this sector for a period of ten years from 2000-2009. Multiple regression is used by the study in analyzing the time series data. Financial Leverage was used as the dependent variable measured as book value of long term debts divided by capital employed with eight independent variables (firm age, firm size, tangibility of assets, liquidity, volatility of earning, lag of leverage, growth opportunity and profitability). Leverage was found to be significant and positively related with profitability. The

study period is not too current as event after their study must have overtaken his research. Furthermore, Salawu and Agboola (2008), upon whose study Mutalib build his own study, investigated the determinant of 33 non-financial quoted companies on the first and second tiers of Nigerian Stock Exchange. Secondary data from audited annual reports were obtained from this sector for a period of fifteen years from 1999-2004. Panel data methodology was used and multiple regression (O.L.S), fixed and random effects models were used in analyzing the data. Financial leverage was categorised into short term, long term and total debt ratio, while size, tangibility, non-debt tax shield, dividend growth opportunity and profitability were used as independent variables. The result revealed a significant positive relationship between profitability and long term liabilities of the sampled firms.

2.4.4 Growth Opportunity and Financial Leverage

Previous studies observed a mixed association between growth and financial leverage. A good example of these studies includes the works of Yadrichukwu and Magaret (2015) who empirically investigated the factors that could be considered as the determinant of capital structure in Nigerian oil and gas sector. Secondary data from audited annual reports were obtained from this sector for a period of twenty two years from1990-2012. The study employed multiple regression as a tool of analysis. The results revealed that, profitability, tangibility, firm size, non-debt tax shied, growth opportunity and volatility of earnings are determinants of capital structure of Nigerian oil and gas sector. The findings of the study further revealed that the financing decision of oil and gas sector of Nigerian economy do follow peaking order theory. A critical look at the methodology in this study shows that, the number of sample used is not clearly defined which may mislead the reader.

In the same vein, Akingunola & Oyetayo (2014) conducted a pilot survey with a view to testing the existence and the strength of those factors that determine the financial structure of Small and Medium Enterprises in Nigerian. Secondary data from audited annual reports of 10 firms were obtained for the period of five years from 2005-2009. The study employed panel data and ordinary least square regression as a tool of analysis. Financial leverage was used as dependent variable while profitability, size, tangibility and growth measured as percentage change in total asset were used as independent variable. The result of the study revealed that growth opportunity is insignificant and positively related with financial leverage. The period is not too current looking at where the scope stopped (2009), as event after the study period must have overtaken their research.

Suleiman (2011) conducted a study with a view to empirically testing peaking order theory in Nigerian Conglomerate industry. Secondary data from audited annual reports and account of six quoted diversified firms were obtained for a period of eight years from 2002-2009. Using Watson and Wilson's model of (2002), with retain earnings, debt and equity as independent. Ordinary least square (OLS) model was used in analyzing the parameters of the model. The findings of the study contradict the peaking order hypothesis as the major financing theory of conglomerate firms in Nigeria. The study revealed that, firms in diversified sector of Nigerian economy mainly financed their deficit by issuing equity financing as opposed to what the theory hypothesized.

Tang and Jang (2007) in revising the determinant of capital structure by comparing US lodging and software firms. Secondary data from COMPUSTAT database was obtained for a period of Seven years from 1997-2003. Financial leverage was used as dependent variable measured as long term debt to total asset. Fixed asset, volatility of earnings, firm size, agency cost, and

profitability and growth opportunity were use as independent variables. Regression analysis of ordinary least square and generalize least square was used. The finding indicates that, fixed asset, growth opportunity and the joint effect of property plant and equipment with growth are significant with financial leverage in both lodging and software firms. The period of this study is not too current as event after the study period must have overtaken their research, thus making the findings obsolete.

Kiran (2013) investigates the determinants of capital structure of quoted textile, chemical and fuel and energy of Pakistan using data taken from the State Bank of Pakistan Publication for the period of five years from 2001-2006. The fixed effects model was applied in the study. Book value of debt is used to represent leverage as dependent variable and measured by dividing the value of total liabilities by total assets. Six independent variables, which include size, profitability, and growth, non-debt tax shield, tangibility and earning volatility, were used in order to measure their effect on the leverage ratio. The result reveals that, growth was found to be negative and statistically not significantly related with financial leverage. The scope of the study is considered short for reaching logical conclusion.

Regasa (2014) who further corroborated the findings of Kiran (2013) explored the determinants of financial leverage of eight unlisted private insurance companies in Ethiopia. Secondary data from audited annual reports were obtained mainly from financial statements of Ethiopian private insurance companies for the period of Ten years from 2002- 2011. In the same vein, the result of random effect regression model shows that growth was found to be negatively and statistically insignificant with financial leverage. Only that the period of the study is considered not too current considering the scope of the study coverage (2011).

Namita (2014) examined those variables that determine the leverage and risk of cement companies in India. Secondary data from audited annual reports were obtained mainly from financial statements of sampled firms for a period of five years from 2008-2012. Linear regression model was used to establish the effect of leverage and risk on capital structure. The result of the study reveals that, growth opportunity is positive and insignificantly related with financial leverage of Indian Cement Companies. In the same geographical location, Ali (2011) examined the determinant of leverage of one hundred and seventy Indian textile firms listed on the Bombay Stock Exchange Market. Secondary data from audited annual reports and account were obtained from this sector for a period of Five years from 2006-2010. Panel data methodology was used and multiple regression ordinary, fixed and random effects model were used in analyzing the data. The result revealed that growth opportunity is negative and highly significantly related with debt ratio. In contrast, Mishran (2011) found out growth opportunity to be positively related with financial leverage in his study of those potential factors that determine the capital structure of Indian Manufacturing Sector for a period of five years from 2006-2010.

Hijazi and Tariq (2006), found a highly negative and significant relationship between growth opportunity and financial leverage on his investigation on determinants of capital structure of sixteen listed firms in the cement industry of Pakistan. Secondary data from audited annual reports were obtained from this sector for a period of five years from 1997-2001. Pooled regression in a panel data was methodology was used in the analysis. In the same vein, Ashraf and Rasool (2013) empirically investigated the determinant of financial leverage in Pakistan Automobile non-financial firms listed on the Karachi Stock Exchange Market. Secondary data from annual reports of the sampled firms were obtained for a period of six years from 2005-2010.Using panel data and fixed effect model were employed. Leverage was use dependent

variable and measured by dividing the value of long term debt to total asset, while profitability, tangibility, tax, risk and growth opportunity were used as independent variables. The result of the study revealed that, growth opportunity is significant and negatively related with financial leverage. Most of the studies conducted in developing countries period are very short for reaching logical conclusions.

Other studies conducted in developed economies include the study of Michaela (2015) who investigated the determinant of Capital structure of micro and small enterprises in Lasi, Romania. Secondary data from annual reports were obtained mainly from financial statements of sampled firms for a period of three years from 2008-2010. Fixed effect regression technique was used. The result of the study revealed that, growth opportunity was found to be significant and negatively related with financial leverage. In the same vein, Choi (2014) investigated the impact of capital structure on Korean firms for a period of five years from 2008 to 2012. Secondary data from annual reports and accounts were obtained from the sampled firms**.** Multiple regression was employed as technique of data analysis. Leverage was used as dependent variable while size, profitability, tax shield and growth opportunity was used as independent variables and was found to be negative and insignificantly related with financial leverage.

A further investigation by Waranpee (2011), who examined the determinant of capital structure of Thailand listed companies for a period of five years from 2004-2008 shows that growth opportunity was positive and insignificantly related with financial leverage. Another study with similar findings conducted by Bhutani and Amarjit (2009) on the determinant of capital structure of U.S service industry. Secondary data from audited annual reports and account were obtained from the sampled firms**.** Using a correlational research design, growth opportunity was found to be positive and insignificantly related with financial leverage.

Bauer (2004) analyses the determinant of capital structure of seventy two listed non- financial companies in Czech Republic. Secondary data from audited annual reports were obtained mainly from financial statements of sampled firms for a period of just one year from 2000-2001. Ordinary Least square regression was used in analyzing data. The result revealed that, growth opportunity is negatively related with financial leverage.

2.5 Theoretical Framework

There exist many theories that try to explain the relationship between firm specific characteristics and financial leverage. These include the trade- off theory, the pecking order theory, the agency theory and the signaling theory and so forth. This study intends to stick to only those relevant theories that clearly explain both the independent and dependent variables used in the study. The justifications for selecting these theories are to provide a clear a priori relationship that is expected between the regressors and the regressand. Empirically, evidence in support of their use can be seen in the works of Mutallib (2010); Shehu (2011); Olayinka (2011); Ajao and Ema, (2013). These include the Agency Theory, Pecking Order Theory and the Tradeoff Theory.

2.5.1 Agency Theory

The first theory used to underpin this study is the agency theory propounded by Jensen and Meckling (1976). The theory explains the relationship that exists between the owners of the business (shareholders) called the principals and those that manage the business (managers) called; the agents. Debt translated into financial leverage is seen as the central theme of this study which acts as a catalyst that speeds up the rate of conflict between the above mentioned stakeholders in a firm. Agency theory regards debt financing as a governance device that reduces conflict of interest between shareholders and managers (Ajay & Madhumathi, 2012).

Jensen and Meckling (1976) in support of this assertion suggested that, an optimal debt level that can minimize the agency costs arising from the conflict of interest which subsists between shareholders and managers, and also between debt holders and managers. In view of this problem, they suggested that, a solution to the agency cost problem is, either to increase the ownership of the managers in the firm in order to make parallel the interest of managers with that of the owners or use of external finance that will attract fixed financial charges (financial leverage) should be motivated to control managers' tendency for excessive consumptions and extra perks. This can be achieved through the use of the free cash flow available to firm managers; in order to ensure financial discipline on their own part,

According to Koopman (2011), a similar reason why insider holdings could be applied to firm diversification is that, there could be the principal and agent problems. This relationship may spring up conflict between shareholders and creditors. Managers being appointed by the shareholders may act in the best interest of the owners, thus chosen to undertake riskier investment that have the effect of increasing the wealth of the shareholders at the expense of debt providers. This expansion may be in form of increasing the number of line of business (subsidiaries) attached to a firm, or resorting to source of finance externally. Doing this may increase the market value of their shares at the expense of debt providers, who are only interested in their obligation settlement first before minority value of the firm. In support of this assertion, Gordon (2013) opines that, Diversified companies are firms that operate in more than one industry where they have not demonstrated expertise and may not act in the best interest of its shareholders which may trigger an agency problem between the parties involved.

2.5.2 The Pecking Order Theory

Most researches carried out in this area are rooted in pecking order theory framework. The theory was developed from the works of Myers and Majluf (1984) and Myers (1984).The pecking order theory is based on the notion of Information asymmetry which implies that managers of corporate organizations have more Information about their company's prospects, risk and return than outside investors do have (Ajao &Ema, 2013).

Asymmetry of information gives managers the power to possess confidential information about the firm's investment opportunities and future prospects which outside investors are not aware of (Pandey, 2001). Due to this notion of information asymmetry, other things being equal, managers of corporate organizations will issue debt, when they are positive about their firm's future prospects. This implies that, the firm has the ability to pay the principal amount and the interest on it as at when due, and there is no perceived bankruptcy as a result of volatility which may affect the future growth of the firm. On the other hand, corporate managers will only issue equity when they are not sure about the growth opportunity. This allows corporate managers to only deal with dividend on the shares they issue, as there is no law mandating the payment of dividend in Nigeria. It is only done at the discretion of the management.

Looking at the barrier to information, firms do follow a pecking order in financing their business activities and assume the non-existence of optimum capital structure, by following a priority of utilizing the internal source, followed by secured debt to unsecured debt and then lastly to issuance of equity as the last resort. This hierarchical order, in which funds are assessed by a firm, clearly indicates that, internal source of capital are considered an easier way of generating fund (Retained earnings) followed by debt, which rank second and need to be serviced with fixed charge in form of interest payment. The last option has to do with issuing of equity which is less

preferable to firms as describe by the theory. This is due to the fact that, equity is kwown to dilute control and ownership. The theory as noted by Goyel (2009) is deficient in the sense that, it is able to explain the financing decision of firms the way it is been sequentially arranged.

2.5.3 The Trade-off Theory

A third theory developed by Modigliani and Miller (1963) is the tradeoff theory which asserted that, firms optimize their debt level such that marginal tax advantages of additional borrowing are offset by the increase in the costs of financial distress. The theory as noted by Myers (1984) emphasize that, firms making use of the trade-off theory set their target debt ratio and gradually move toward actualizing it. This implies that, since interest payments are tax deductible, raising more debt increases the tax benefits. However, an increase in debt also increases the probability of default in payment of interest and hence the expected cost of bankruptcy (Ajao & Ema, 2013).

Corporate taxes enable firms to deduct interest on debt in arriving at their taxable profits. This in effect, makes debt financing very cheap than the use of equity financing, and as a result, firms are encouraged to use more of their debt than equity in financing decisions, as this increases shareholders value (Miller, 1977).This lead to the contentious debate on why firms will not be fully levered, by having 100% debt in their capital mix. This is in view of its offsetting tax incentive. When a firm raises excessive external debt to finance its operations, it may default on the servicing of such debt due to insufficient growth in capacity, this may risk the firm to incur bankruptcy costs. For these reasons, trade-off theory claims that tax shield benefits of debt financing need to be adjusted for financial distress costs that rise with increasing debt levels, creating an optimal capital structure that balances both forces (Brounen & Eichholtz, 2001)

This chapter explains conceptual, empirical and theoretical frameworks relevant to the study. The concepts, types, proxies and measures of firm specific characteristics and financial leverage were analyzed. Significant empirical evidence on the subject matter was critically reviewed. This was done with the sole aim of identifying gaps that will be filled up in subsequently. Conclusively, review of theoretical frame work was carried out in order to select those theories that are relevant to underpin the study. Some of these gaps identified from the literature include.

i Most of the study periods both in developed and developing countries are not current and are too short for reaching logical and meaningful conclusion.

ii Complexity of business and dependence on external finance are some of the firm specific characteristics yet to be explored within the Nigerian economy. Complexity of business to be precise is a variable sensitive to diversified companies in Nigeria due to the nature of their activities.

iii A review of various studies from developing economies including Nigeria economic settings shows that, few studies were conducted on diversified firms and even among them, none considered the moderating effect of firm specific characteristics on one another, and the overall impact they will have on financial leverage of diversified firms.

iv Internationally, a review from developed economies shows that, only one study, that is the work Gill and Mathur (2011) tested the relationship between complexity of business and financial leverage and was found to be significant in the manufacturing sector of Canadian economy

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This Chapter discusses the research design, population and sample of the study adopted. In addition, various sources and method through which data are collected were discussed. The techniques employed in the analysis of data with their justification were explained. Finally, the variable measurement, model specification and their justification were also explained.

3.2 Research Design

Choosing a research design for a study like this is usually based on the nature of the problem at hand and how best the research objectives can be achieved. This study employs a correlational research design. This is because the design is appropriate in determining the relationship and the degree to which firm specific characteristics affect financial leverage of quoted diversified companies in Nigeria. The choice of correlational design is informed by the research paradigm which is positivist in nature. This approach is associated with scientific, experimental, quantitative and deductive framework where researchers strive for specific quantifiable observations by using statistical experiment to test their hypothesis.

3.3 Population and Sample of the Study

The population of the study is limited to diversified firms listed on the Nigerian Stock Exchange as at 31st December, 2014. The number of diversified companies listed as at 31st December, 2014 on the Nigerian Stock Exchange (NSE) and shown in Fact book are six, namely as below:

Table 3.1 List of Quoted Diversified Companies in Nigeria as at December, 2014

S/N	Company Name
1	Chellarams PLC
2	John Holt PLC
3	A.G Leventis (Nigeria) PLC
4	SCOA Nigeria PLC
5	Transnational Corporation of Nigeria PLC
6	UAC of Nigeria PLC

Source: Extracted from the Nigeria Stock of Exchange, 2014.

The justification for choosing diversified firms is premised on the fact that, it is still an area with paucity of studies. Six firms were used as sample of the study and as such census approach was employed as sampling technique. This is because these firms have available and complete set of financial statements for the periods under study.

3.4 Sources and Method of Data Collection

To achieve the objective of the study, secondary data from annual reports of the sampled firms were used. Given the model estimated, the data was stacked in panel form. This is to enable the objective of the study to be achieved and hence the problem of the study solved. The data that relate to firm specific characteristics proxies and financial leverage of diversified companies were extracted from the audited annual reports and accounts of the sampled firms for a period of eight years. Panel regression technique of data analysis was used. This is because the study uses data that has both cross sectional and time series characteristics.

3.5 Data Analysis Technique

The data collected was analyzed using multiple regression technique. The technique is considered appropriate because the data for the study is balanced panel data. Stata 10 package was used as tool of analysis, capturing both independent variables (complexity of business, dependence on external finance, profitability and growth opportunity,) and the dependent

variables (Financial leverage) of the study, denoted by short term liabilities, long term liabilities and total liabilities. Various tests were also conducted ranging from normality test, multicolinearity test, heteroscedasticity test, hausman specification test, and langrangian multiplier test.

3.6 Variables Measurement and Model Specification

The study primarily used four independent variables and three dependent variables. The independent variables were represented by firm specific characteristics proxied by complexity of business, dependence on external finance, profitability and growth opportunity. On the other hand, the dependent variables are represented by financial leverage which include; short term liabilities, long term liabilities and total liabilities. The justification for choosing these proxies in measuring financial leverage is that, short term liability will basically show how current asset and cash shortages are financed among diversified companies (Hoyakimian et al. 2001 as cited in Tang & Jang, 2007). Also, long-term debt is usually preferred source of financing firm growth potentials in the future among diversified companies and would also help in seeing the extent of their dependence on external finance. Total debt was also used as proxy of financial leverage in order to see the compacted effect of both short term and long term liability on firm specific characteristics of diversified companies in Nigeria.

Table 3.2 Variables Measurement

Variables	Nature-of variable	Definition-and measurement	Sources
Long term debt	Dependent variable	Measured as long term liability divided by total asset	Klein (2001); Tang and Jang (2007); Mutalib(2010); Shehu (2011).
Total debt	Dependent variable	Measured as total term liability divided by total asset	Bauer (2001); Gill and Mathur (2011). Bundula (2012).
Complexity of business	Independent variable	Measured as Actual number of subsidiaries	Hossain (2008); Gill and Mathur (2011).
Dependence on external finance.	Independent variable	Measured as capital expenditure on property, plant and equipment less cash flow from operation divided by capital expenditure	Rajan and Zingales (1998); Vonfurstenberg and Kalckreuth (2007).
Profitability	Independent	Measured as earning before interest and tax	Mutalib (2010); and Shehu, (2011).
Growth opportunity	Independent variable	Measured as market price of equity divided by book value.	Myers (1984); Tang and Jang (2007).

Source: Author's compilation, 2016

3.6.1 Model Specification

The models adopted for the study are panel regression models which differs from a regular time-series or cross section regression model by the double subscript ($_{it}$) attached to each variable (Ekele, 2014). The study then specifies the general form of the panel data models compactly as:

$$Stlb_{it} = \beta_0 + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO_{it} + \beta_4 GW_{it} + \mu_{it} \quad (1)$$

$$Ltlb_{it} = \beta_0 + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO_{it} + \beta_4 GW_{it} + \mu_{it} \quad (2)$$

$$Tlb_{it} = \beta_0 + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO_{it} + \beta_4 GW_{it} + \mu_{it} \quad (3)$$

The first three models try to estimate the direct relationship between the independent and the dependent variables proxied by short-term liabilities, long-term liabilities and total liabilities without considering the likely moderating effect of growth opportunity.

The second regression models include a three-way moderator effector variable with growth opportunity moderating the relationship between complexity of business, dependence on external finance and profitability as presented below.

$$Stlb_{it} = \beta_{0\,it} + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO + \beta_4 GW_{it} + \beta_5 CX*GW_{it} + \beta_6 DOF*GW_{it} + \beta_7 PRO*GW_{it} + \mu_{it} \text{---------- (4)}$$

$$Ltlb_{it} = \beta_{0\,it} + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO + \beta_4 GW_{it} + \beta_5 CX*GW_{it} + \beta_6 DOF*GW_{it} + \beta_7 PRO*GW_{it} + \mu_{it} \text{---------- (5)}$$

$$Tlb_{it} = \beta_{0\,it} + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO + \beta_4 GW_{it} + \beta_5 CX*GW_{it} + \beta_6 DOF*GW_{it} + \beta_7 PRO*GW_{it} + \mu_{it} \text{---------- (6)}$$

The study expects differences in complexity of business, dependence on external finance and profitability will affect growth opportunity of the firms under study. This is because a firm with potentials to grow will find internal source of finance inadequate, thus, may need to depend on external finance in order to increase the number of their subsidiaries, explore growth opportunity and profitability among diversified firms. This can conveniently be done through debt financing. In view of the foregoing, the study introduces growth opportunity as a moderating variable, moderating the combined effect of complexity of business, dependence on external finance and profitability on financial leverage of quoted diversified companies Nigeria. As shown in the second model equations, which include multiplicative variable between growth opportunity and complexity of business, growth opportunity and dependence on external finance and growth opportunity and profitability respectively.

Where:

Stlb = Short Term Liability

Ltlb = Long Term Liability

Tlb = Total Liability

CX = Complexity of business

DOF = Dependence on External Finance

PRO = Profitability

GW = Growth Opportunity

CX*GW = Growth opportunity as a moderator of complexity of business

DOF*GW = Growth opportunity as a moderator of dependence on External Finance

PRO*GW= Growth opportunity as a moderator of Profitability

μ= error term

β= Intercept

β_1- β_5 parameters to be estimate

it= firm i, time t

Mean-centered values of the ratio of independent variable, moderating variable and the absolute values of the dependent variable were run. This is done in order to avoid the likely problem of harmful multicolinearity which may occure as a result of the including the multiplicative variables in the model. Mean-Centering the independent variable is in line with the prescriptions of Dowson (2012).

The rule in using moderator variable is to estimate two separate equations, the first equation without the interacting effect of the moderator variable, while the second equation has the interacting effect of the moderator variable in it. The two equations would then be compared with one another by observing the R-square (r^2) of the two results in order to ascertain whether or not the moderator variable has an effect on the independent variables. Where the R-square (r^2) of the result that include the interacting effect is higher than the R-square (r^2) of the first result,

the moderator is relevant and the hypotheses would be considered for analysis, or otherwise, the hypotheses would be discarded. In addition to this, changes in the size of the coefficient and their respective sings will be observed.

CHAPTER FOUR
DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter presents the descriptive statistics and regression result of the study. Also, the chapter discusses the various robustness tests conducted for the purpose of ensuring that the sampled data meets the assumptions of the regression analysis. The chapter ends by discussing result of the study, key findings and policy implications of the findings.

4.2 Descriptive Statistics

The descriptive statistics is presented in table 4.1. The calculated minimum, maximum, mean, standard deviation, skewness and kurtosis of the data for the variables used in the study are presented.

Table 4.1 Descriptive Statistics of the variable

Variable	Min	Max	Mean	Std dev.	Skewness	Kurtosis
Tlib	0.031	0.834	0.560	0.168	0.656	3.379
Ltlib	0.000	0.497	0.0768	0.115	2.284	8.130
Stlib	0.105	2.640	0.569	0.399	3.417	17.580
Cxp	1	13	5.625	3.119	0.804	2.690
Dof	0.070	48.97	6.752	11.747	2.378	7.897
Prof	0.089	19.722	3.510	3.330	2.667	13.001
Gw	0.010	5.030	1.521	1.252	1.169	3.994
Cxpgw	0.042	55.355	8.913	10.470	2.20	9.454
Dofgw	0.009	82.372	7.992	16.173	3.452	15.108
Profgw	0.025	37.326	4.726	6.655	3.167	14.530

Source: *Researchers compilation, using Stata 10*

Table 4.1 presents descriptive statistic for both dependent and the independent variables of the study. From the table, it can be seen that the minimum level of total leverage is 0.031while long term leverage is 0.000 and short term leverage among diversified firms in Nigeria stood at 0.105 respectively. The level of long term leverage which shows a minimum value of zero (0.000) implies that there are firms with no long-term debt obligation among diversified firms in Nigeria during the period of this study. However, the most leveraged diversified firms under total leverage stood at 83%, while long term leverage is about 50% and short term leverage is about 264%. The average total leverage in the sector stood at 56% while long term leverage stood at 8% and the short term leverage is about 57%. Looking at the long term leverage, it is simply implying that, diversified firms in Nigeria are in line with the theoretical proposition of Jensen & Meckling (1976) and the empirical works of Lewellin (1997) that diversified firms tend to eschew debt. Furthermore, from the skwness and kurtosis, it appears that, the debt may be somewhat skewed and leptokurtic. The skeweness of 2.284 and kurtosis 8.130 imply that, at levels, there are some outliers in the data, meaning that a few of the diversified firms have greater debt than the required industrial average. This can be further seen from the fact that on an average, the outliers deviate by about 17% for total leverage, 12% for long term leverage and 40% for short term leverage respectively from the average (mean).

Furthermore, the table shows that, Ttlib which represent total liability, Ltlib which represents long term liability and Stlib representing short term liability as dependent variables, while Cxp represent complexity of business, Dof represent dependence on external finance, Prof represent profitability, Gw represent growth opportunity, Cxgw represent moderating effect of growth opportunity on complexity of business and Dofgw represent the moderating effect of growth

opportunity on dependence on external finance and Profgw represent the moderating effect of growth opportunity on profitability as independent variables .

The descriptive statistics result in Table 4.1 shows that complexity of business has an average mean value of 5.625 with a minimum value of 1 and a maximum value of 13. This clearly shows that, firms among Nigerian diversified companies increase the number of their subsidiaries as an expansion strategy to grow faster, more efficient and effective. In addition to this, dependence on external finance reveals an average value of 6.752%. This value ranges from a minimum of 0.070% to a maximum of 48.97% signifying how diversified firms in Nigeria engage in low level of external finance in their activities. More so, profitability shows an average value of 351 million, this value ranges from a minimum of 8.9 million to a maximum of 1,972 million, this clearly shows a rapid positive increase in profitability among diversified firm within the period of study.

In addition, growth opportunity has a mean value of 1.521%. This value ranges from a minimum of 0.010% to a maximum of 5.030%, implying that diversified firms in Nigeria have growth prospect. The moderating effect of growth opportunity and complexity of business shows an average value of 8.913% with a minimum value of 0.042% and a maximum value of 55.355%. This shows the multiplicative effect of the two variables among Nigerian diversified firms. The moderating effects of growth opportunity and dependence on external finance have a mean value of 7.992%. This value ranges from a minimum of 0.009% to a maximum of 82.372%, signifying the multiplicative effect of the two variables among Nigerian diversified firms. The moderating effects of growth opportunity and profitability have a mean value of 4.726%. This value ranges from a minimum of 0.025% to a maximum of 37.326% clearly signifying the multiplicative effect of the two variables among Nigerian diversified firms.

Among the independent variables of the study, the moderating effect of growth opportunity on dependence on external finance has the highest standard deviation of 16.173 signifying its low contribution in explaining financial leverage of quoted diversified companies in Nigeria. On the contrary, growth opportunity without the interacting variable has the lowest standard deviation of 1.252 among the independent variables, showing its highest contribution in explaining financial leverage of quoted diversified companies in Nigeria. More so, three of the independent variables have high standard deviation (Dofgw, Cxpgw and Dof), indicating there is wide dispersion in the data.

4.3 Correlation Matrix

Table 4.2 shows the correlations between independent and dependent variables and among the independent variables themselves. The values are gotten from the Person correlation of two-tailed significance. It shows the correlation matrix with the top values showing the Pearson correlation coefficient among all variables and the asterisk (*) beside the Person correlation coefficient showing the two- tailed significance of these coefficients.

Table 4.2 **Correlation Matrix of dependent and independent variables Result**

	Tllib	Ltlib	Stlib	Cpx	Doe	Prof	Gw	Cxpgw	Dofgw	Progw
Tllib	1.0000									
Ltlb	-0.3872*	1.0000								
Stlib	0.4780*	-0.0887	1.0000							
Cxp	-0.1869	0.2104	-0.3271*	1.0000						
Dof	0.1693	0.0235	0.0676	0.1188	1.0000					
Prof	-0.2422	0.0615	-0.0419	-.01426	0.1974	1.0000				
Gw	-0.0902	0.2127	0.1260	-0.0027	0.0025	-0.0722	1.0000			
Cxgw	-0.1081	-0.1328	-0.2127	0.5058*	0.0284	0.0009	0.3751*	1.0000		
Dfgw	0.1776	-0.1036	0.0455	0.0809	0.4570*	0.0460	0.0548	0.1245	1.0000	
Prfgw	-0.2904*	0.2966*	0.1254	-0.1322	-0.2033	0.5684*	0.6770*	0.1551	-0.0195	1.0000

Source: *Researchers compilation, using stata 10*

* Correlation is significant at 0.01 levels (2 tailed)
** Correlation is significant at 0.05 levels (2 tailed)
***Correlation is significant at 0.10 levels (2 tailed)

A look at the pattern of the correlation among the independent and dependent variables shows that, with the exception of the moderating effect of growth opportunity and profitability of diversified companies in Nigeria, none of the explanatory variables is approaching 0.8 or greater.

Table 4.2 shows that there is a negative association between complexity of business and total leverage. This is indicated by a coefficient of correlation of -0.1869. More so, profitability and growth opportunity are also negatively associated with total leverage. This is indicated by coefficient of correlation of -0.2422 and -0.0902 respectively. In addition, the moderating effect of growth opportunity and complexity of business and the moderating effect of growth opportunity and profitability are all negatively associated with total leverage. This is shown by a correlation coefficient of -0.1081and -0.2904 respectively. From the above coefficient as

indicated by table 4.2, the association between the independent and the dependent variables of the study is not too strong

Furthermore, table 4.2 shows a positive association of 0.1693 between dependence on external finance and total leverage, long term leverage and short term leverage of the study. The moderating effect of growth opportunity and dependence on external finance also shows a positive association with the series of dependent variables. This is shown by a correlation coefficient of 0.1776 as indicated in the result. As evidenced by the correlation coefficients from the result, the association between the independent and the dependent variables is not that strong.

The relationship between the independent variables themselves was found to be significantly related with the exception of few that were found not to be significantly related, though, this may not be enough to conclude that harmful multicollinearity exists among the independent variables of the study until the variance inflation factor and the tolerance values fail to fall within the expected limit. The V I F and the tolerance are two advance measures of assessing multicollinearity between the regressors. The V I F and the tolerance are computed and were found to be consistently smaller than one and ten respectively, This clearly indicates the absence of harmful multicollinearity among the independent with the exception of the multiplicative variable which were found to appear above the normal limit. This is due to the effect of multiplying the two variables for the purpose of achieving a moderated relationship among them. This shows the appropriateness of fitting the study model with four independent variable and three interacting variables in order to see their moderating impact on the relationship between financial leverage of quoted diversified companies in Nigeria.

4.4 Robustness Test

In order to ascertain the validity of statistical inferences of the study, this section presents and discusses the result of the robustness test conducted. The robustness tests conducted includes:

i **Multicolinearity Test:** This was conducted to check whether there is a higher correlation between independent and dependent variables which will mislead the result of the study. Tables 4.2 present the matrix of linear relationships among independent and dependent variables and among the independent variables themselves. From the observation, variables with higher correlation above 0.50 are: the moderating effect of growth opportunity on complexity of business and complexity of business (0.51), moderating effect of growth opportunity on profitability and profitability (0.57) and moderating effect of growth opportunity on profitability and profitability (0.68). Furthermore**,** growth opportunity and dependence on external finance are having low positive correlation among themselves of (0.0025), the relationship between growth opportunity and complexity of business is seen to be negative and also low which stood at (-0.0027). More so, the relationship between the moderating effect of growth opportunity and complexity of business on profitability is positive and very low (0.0009). The low magnitude of the correlation amongst the independent variables of the study as shown in table 4.2 is an evidence that multicollinearity is not a problem in the sample of the study. In order to prove and further substantiate the absence of harmful multicollinearity between the independent variables, colinearity and diagnostics tests were carried out as the tolerance values and the variance inflation factor (V I F) values show absence of multicolinearity in the data. The result is shown in Table 4.3 and 4.4 respectively.

ii **Heteroscesdasticity Test:** Breusch- Pagan / Cook- Weisberg is used to test the null hypothesis that the error variances are all equal versus the alternative that the error variances are a multiplicative function of one or more variables. The alternative hypothesis states that the error variances increase or decrease as the predicted values of Y increase. That is, the bigger the predicted value of Y, the bigger the error variance will be. A large chi-square would indicate that heteroscedastisicity was present. In the result obtained from the heteroscedasticity test conducted. The chi-square value is 21.23 with p-value of 0.0000, indicating heteroscedasticity was present and this shows the violation of assumption number four of the classical linear regression model which states that there must be constant variance, that is, the distribution appearing in the population regression function is homoscedastic. (See result Attached as Appendix A)

iii **Hausman Test**: In order to decide between Fixed effect model output and Random effect model output which is the best, researchers often rely on the Hausman (1978) specification test. The Hausman test is designed to detect the violation of the random effects modeling assumption that the explanatory variables are orthogonal to the unit effects. If there is no correlation between the independent variables and the unit effects then estimates of β in the fixed effects model should be similar to estimates of β in the random effect model. The Hausman test statistic H is a measure of the difference between the two estimates. Under the null hypothesis of orthogonality, H is distributed chi-square with degree of freedom equal to the number of independent variable in the model. A findings that $p < 0.05$ is taken as evidence that, at conventional level of significance, the two model are different enough to reject the null hypothesis, and hence to reject the random effect model in favour of the fixed effect model. If the Hausman test does not

indicate significant difference (p >0.05), however, it does not necessarily follow that the random effects estimator is "safely" free from bias, and therefore, to be preferred over the fixed effects estimator. Therefore, the result obtained from the hausman specification test conducted shows a chi^2 value of 0.82 with p-value of 0.9358 which is statistically insignificant. In order to decide between GLS and OLS, the result from lagrangian multiplier test revealed a chi^2 value of 1.72 with P-value 0.1903 which is not significant at any level of significant. Therefore, the study adopted OLS model. (See result Attached as Appendix A)

4.5 Presentation and Interpretation of Regression Result

The summary of the regression results obtained from the models of the study comprising of both the main and the effector model is presented in table 4.3 and 4.4 while the full result is attached as appendix.

$$Stlb_{it} = \beta_0 + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO_{it} + \beta_4 GW_{it} + \mu_{it} \text{----------} (1)$$

$$Ltlb_{it} = \beta_0 + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO_{it} + \beta_4 GW_{it} + \mu_{it} \text{----------} (2)$$

$$Tlb_{it} = \beta_0 + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO_{it} + \beta_4 GW_{it} + \mu_{it} \text{----------} (3)$$

Table 4.3 **Summary of Base Model Regression Result**

	STD					**LTD**					**TD**				
Variables	Cef	Ttest	P-Val.	VIF	Tol	Cef.	T-test	P-Val.	Tol.	VIF	Coef	T-test	P-Val.	VIF	Tol
Const	0.649	6.58	0.000			0.041	1.09	0.282			0.600	8.06	0.000		
Cxp	-0.036	-2.59	0.013	1.13	0.88	0.000	0.03	0.977	088	1.13	-0.009	-0.18	0.246	1.13	0.88
Dof	0.004	1.17	0.247	1.04	0.96	0.000	0.03	0.978	0.96	1.04	0.003	1.54	0.131	1.04	0.96
Prof	-0.010	-0.89	0.379	1.14	0.88	-0.008	-2.13	0.039	0.88	1.14	-0.001	-0.11	0.913	1.14	0.88
Gw	0.049	1.05	0.298	1.05	0.95	0.041	2.14	0.038	0.95	1.05	-0.005	-0.34	0.738	1.05	0.95
R2	0.21					0.282					0.060				
F-Stat.	3.07					3.76					1.25				
F. Sig			0.026					0.010					0.305		

Source: *Regression result Output 10, 2016 using Stata*

The conditional regression models include a three way moderator effector variable as presented below:

$Stlb_{it} = \beta_{0\,it} + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO + \beta_4 GW_{it} + \beta_5 CX*GW_{it} + \beta_6 DOF*GW_{it} + \beta_7 PRO*GW_{it} + \mu_{it}$ ---------- (4)

$Ltlb_{it} = \beta_{0\,it} + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO + \beta_4 GW_{it} + \beta_5 CX*GW_{it} + \beta_6 DOF*GW_{it} + \beta_7 PRO*GW_{it} + \mu_{it}$ ---------- (5)

$Tlb_{it} = \beta_{0\,it} + \beta_1 CX_{it} + \beta_2 DOF_{it} + \beta_3 PRO + \beta_4 GW_{it} + \beta_5 CX*GW_{it} + \beta_6 DOF*GW_{it} + \beta_7 PRO*GW_{it} + \mu_{it}$ ---------- (6)

The Regression Result are presented in table 4.4

Table 4.4 **Summary of Regression Result**

	STD					LTD					TD				
Variables	Cef	Ttest	PVal.	VIF	Tol	Cef	Ttest	PVal.	Tol.	VIF	Cef	Ttest	PVal.	VIF.	Tol
Const	0.469	2.14	0.021			-0.129	-2.17	0.036			0.537	4.58	0.000		
Cxp	-0.009	-0.50	0.623	4.38	0.228	0.014	2.34	0.024	0.228	4.38	2.05	-0.44	0.660	4.38	0.222
Dof	0.004	1.47	0.149	2.04	0.490	0.000	0.39	0.696	0.488		0.000	0.05	0.963	2.05	0.488
Prof	0.000	0.01	0.990	8.38	0.119	0.025	2.54	0.015	0.120	8.32	0.021	0.95	0.346	8.32	0.120
Gw	0.130	1.00	0.326	4.99	0.200	0.114	3.92	0.000	0.201	4.98	0.017	0.49	0.625	4.98	0.201
Cxpgw	-0.012	-1.25	0.219	8.43	0.119	-0.005	-1.64	0.110	0.118	8.46	-0.001	-0.27	0.791	8.46	0.118
Dofgw	-0.001	-0.48	0.636	2.12	0.471	-0.001	-0.79	0.432	0.471	2.12	0.002	2.17	0.036	2.12	0.471
Profgw	-0.004	-0.25	0.800	8.98	0.111	-0.018	-3.43	0.001	0.112	8.96	-0.012	-1.18	0.245	8.96	0.112
R2	0 .25					0.49					0.11				
F-St	2.10					3.71					3.09				
F-Sig			0.067					0.004					0.011		

Source: ***Regression result Output, 2016 using Stata10***

The data set was estimated using the robust OLS as the best estimator. This is done without including the interacting variables in the first model. While the conditional model was estimated using the robust OLS, including the interacting variables in order to see if there is any significant changes between the two set of models.

A comparative analysis between the six set of regression models was carried out in order to determine whether the inclusion of the moderator variable in the second set of models is relevant or not and to determine which of the model will be the best to base the study among the three dependent variables models used in the study. The cumulative R^2 of the first set of models short term liabilities, long term liabilities and total liabilities has a value ranging from 0.21, 0.28 and

0.06 while the second set of models have a cumulative value of R^2 ranging from 0.25, 0.49 and 0.11. Hence, this signifies that 21%, 28% and 6% of the total variation in financial leverage of quoted diversified companies in Nigeria is caused by the nature of business complexity, the extent of dependence on external finance, their profitability and the pettern of their growth opportunity in the first model. While 25%, 49% and 11% of the total variation in the explanatory variable is caused by the same set of independent variables and the interacting variables in the second model. This implies that, for any change in firm specific characteristics of quoted diversified companies in Nigeria, their financial leverage (short term liabilities, long term liabilities and total liabilities) will significantly be affected by an additional 4%, 21% and 5% variation respectively between the first and the second set of models. This justified why the inclusion of the interacting variables which makes it relevant in the whole analysis in the second set of models.

Futhermore, the F-statistic for the first set of models have a coeffient of 3.07, 3.76 and 1.25 for short term liabilities, long term liabilities and total liabilities with p-value of 0.026, 0.010 and 0.305 respectively, indicating significance at 5% and 10% level, while the second set of models have a coefficient value of 2.10, 3.71 and 3.09 for short term liabilities, long term liabilities and total liabilities, with a p-value 0.067, 0.004 and 0.011 showing significance at 10%, 1% and 5% respectivly. This signifies the fitness of firm specific characteristics and financial leverage in the second set of models which shows that, there is a 90%, 99% and 95% percent probability that the relationship among the variable is not just by mere chance. The increament in the value of F-statistic coefficient between the first and the second model further substantiates the relevance of including the moderator variable in the second model. From the analysis of the six model of the study, it can simply be observed that, long term liabilities model has a better explainatory power

with the series of independent variables of the study. This justifies why the testing of hypotheses and the findings of the study will be based on it.

Another variation between the two models can be seen from the size and sign of the coefficients. The first regression model which has no inclusion of the interacting variables has smaller coefficients. On the contrary, the second regression model has larger value of coefficient with the interacting variables carring negative signs. These are some of the differencess the study expected in order to justify the inclusion of the interacting variables in the model.

4.6 Hypotheses Testing

This section presents the data set estimated using robust OLS with interacting variable in the model inorder to test the hypotheses stated in chapter one of the study. The test for each hypothesis is carried out hereunder.

Hypotheses

$H0_1$: Complexity of business has no significant effect on financial leverage of quoted diversified companies in Nigeria.

Complexity of business was found to be significant and positively effecting financial leverage at 5% level of significance indicating that an increase in the number of subsidiaries increases the amount of financial leverage of quoted diversified companies in Nigeria. This implies that, complexity of business in the interaction model has significantly affected financial leverage.

In view of the above result reported in respect of complexity of business showing that the variable is statistically significant in influencing financial leverage, this therefore provides an evidence for rejecting hypothesis one of the study.

$H0_2$: Dependence on external finance has no significant impact on financial leverage of quoted diversified companies in Nigeria.

Dependence on external finance was found to be statistically insignificant, which means that, the variable is not significantly impacting on financial leverage of quoted diversified companies in Nigeria. Therefore, dependence on external finance has not significantly impacted on financial leverage. Owing to this, the study fails to reject hypothesis two of the study.

$H0_3$: Profitability has no significant effect on financial leverage of quoted diversified companies in Nigeria.

Profitability was found to be significant and positively effecting financial leverage at 5% level of significance. This indicates that the more profitable a firm is, the more leverage financing is use in their capital combination. This implies that, profitability in the interaction model has significantly affected financial leverage.

In view of the above result reported in respect of profitability showing the variable is statistically significant in affecting financial leverage, this therefore provides an evidence for rejecting hypothesis three of the study.

$H0_4$: Growth opportunity has no significant impact on financial leverage of quoted diversified companies in Nigeria.

Growth opportunity is positive and significant at 1% level of significance. This is an indication that the variable is significantly impacting on financial leverage of quoted diversified companies in Nigeria. In line with this finding, the study rejects the forth null hypothesis. Thus, hypothesis 4, $H0_4$ is rejected.

In accordance with the rule established for testing an interaction between variables, two separate equations were estimated, the first equation without the interacting effect of the moderator variable, while the second equation has the interacting effect of the moderator variable in it. The two equations are then compared with each other by observing the R-square (r^2) of the two results in order to ascertain whether or not the moderator variable has an effect on the independent variables. Where R-square (r^2) of the result that include the interacting effect is higher than the R-square (r^2) of the first result, the moderator is relevant and the hypothesis would be considered for analysis, or otherwise, it would be discarded. From the two separate regression model the (r^2) of the first regression equation is approximately 28% while after including the interaction variable, the value of the (r^2) raised to approximately 49% which serves as a basis for testing hypotheses five and six and seven of the study.

$H0_5$: Growth opportunity has no significant moderating impact on the relationship between complexity of business and financial leverage of quoted diversified companies in Nigeria.

The moderated relationship between growth opportunity and complexity of business was found to be negative and insignificant. This clearly shows that, the interaction between the two variables is insignificantly impacting on financial leverage of quoted diversified companies in Nigeria. This implies that growth opportunity and complexity of business does not interact well with financial leverage of quoted diversified firms in Nigeria. Looking at these findings, the study has enough evidence for failing to reject null hypothesis five of the study.

$H0_6$: Growth opportunity has no significant moderating impact on the relationship between dependence on external finance and financial leverage of quoted diversified companies in Nigeria.

The moderated relationship between growth opportunity and dependence on external finance is found to be negative and statistically insignificant at all level. This implies that, the interaction between the two variables is insignificantly impacting on financial leverage of quoted diversified companies in Nigeria. This implies that, growth opportunity does not interact well with dependence on external finance and thus, the interaction between the two variables has no significant effect on financial leverage of quoted diversified companies in Nigeria. Owing to this, hypothesis six of this study cannot be rejected.

$H0_7$: Growth opportunity has no significant moderating impact on the relationship between profitability and financial leverage of quoted diversified companies in Nigeria.

The moderated relationship between growth opportunity and profitability was found to be negative and significant at 1% level. This implies that, the interaction among the two variables is significant and negatively impacting on financial leverage of quoted diversified companies in Nigeria. This implies that growth opportunity interacts well with profitability and together they have a significant impact on financial leverage. Looking at this finding, the study has enough evidence for rejecting hypothesis seven of the study.

4.7 Discussion of Result and Findings

From Table 4.4 it can be observed that complexity of business has coefficient value of 0.014 with t-value of 2.34 which correspond to a P-value of 0.024 after including the interacting variables in the model. This is contrary to the result obtained in the first model in Table 4.3 where complexity of business as a variable in the model appears to be significant only under the short term liability. This further served as a justification for the including the interaction variable in the second model. This implies that, complexity of business has positive and significantly affected financial leverage of quoted diversified companies in Nigeria. Also, this shows that for

every one-percent increase in the number of subsidiaries of these companies, financial leverage of quoted diversified companies in Nigeria will increase by 0.014. The finding is in line with those of Gill and Mathur (2011) and Kooij (2013) but contrary to those of Grant et al. (1999), Rocca et al. (2009), Jay and Madhumathi (2012).

More so, complexity of business has being found to have a positive effect on financial leverage of quoted diversified companies in Nigeria when included in the moderated model. This implies that complexity of business also referred to as number of subsidiaries a firm is having affects the way diversified companies finance their activities significantly. It is also clear from the findings of the study that, the more a firm is expanding in to new line of business, the more the need for debt financing in form of financial leverage in order to finance such expansion and the less available free cash flow for managers to exhibit opportunistic behavior. This helps in reducing conflict of interest among various stakeholders in the business which is in line with the Agency theory as forwarded by Jensen & Meckling (1976).

Dependence on external finance shows coefficient value of 0.000 with a t-value of 0.39 and a p-value of 0.696. This signifies that dependence on external finance does not significantly influence financial leverage of quoted diversified companies in Nigeria. This clearly indicates that, whether there is an increase or decrease in the extent to which a firm depends on external finance, financial leverage may not necessarily change either by increasing or decreasing the extent of such reliance on external finance. This may be due to the fact that quoted diversified companies in Nigerian resort to using internal source of finance in order to avoid financial cost of interest payment and diluting ownership. This is in line with special use of debt hypothesis under the agency theory, where managers of corporate organizations shift the burden of debt, making it easier for them to generate capital internally and avoiding finance charges. The above

finding is in line with Myers and Majluf (1984) assertion, as cited by Adam (2002) that, accessing external capital market for external finance is very expensive. Thus, firms do not depend on external finance to cover their cash deficit, but they also resort to cutting investments thereby cutting expenditure. The finding of the study is in line with that of Adam (2002) but contrary to Vonfurstenberg and Kalckreuth (2007).

In addition, dependence on external finance individually shows an insignificant relationship with financial leverage in table 4.3. This result was further substantiated when it was included in the interacted model in table 4.4. This implies that, managers of diversified companies in Nigeria are shifting greatly from financial cost of depending on external financing, thus utilizing retain earning in accordance with Pecking Order Theory as propounded by Myers & Majluf (1984) and Myers (1984).

The regression result reveals that profitability as show in table 4.4 has coefficient value of 0.025 with a t-value of 2.54 corresponding to significant p-value of 0.015.This implies that, profitability is positive and significantly affecting financial leverage of quoted diversified companies in Nigeria. This implies that, for every one point increase in the profitability of these firms, their financial leverage will increase by 0.025. This shows that the more profitable a firm is, the greater its capacity to generate funds internally and the less likely the firm is in defaulting settlement of its liabilities. The findings of the study are in line with these of Mutalib (2010) and Shehu (2011) but contradict that of Ishaya, Sannomo & Abu (2013) and Anake et al. (2014).

The positive and strong significant relationship between profitability and financial leverage of diversified companies in Nigeria implies that, profitable firms with future growth opportunity

have incentive to collect more debt for further expansion. This is empirically supported by Mutalib, (2010) and Shehu (2011).

The regression result reveals that growth opportunity as show in table 4.4 has coefficient value of 0.114 with a t-value of 3.92 corresponding to significant p-value of 0.000.This implies that, growth opportunity is positively strong and significantly impacting on financial leverage of quoted diversified companies in Nigeria. This implies that, for every one point increase in the growth opportunity of these firms, their financial leverage will increase by 0.114. This is due to the fact that expanding or diversifying into new line of business requires a large capital outlay to be achieved. The findings of the study is in line with that of Akinlo (2011) but contradict those of Kiran (2013); Akingunola and Oyetayo (2014).

In-addition, growth opportunity having found to be positively impact on financial leverage of diversified companies in Nigeria before and after its inclusion in the moderated model implies that, the more a firm expands in any form, either by diversifying into new line of business, or establishing new subsidiaries, the more the need for external financing in form of financial leverage or borrowing. The positive and strong significant relationship between growth opportunity and financial leverage of diversified companies in Nigeria implies that, firms with potential future growth opportunity have incentive to collect more debt for further growth. This is in line with the proposition of Trade off Theory as postulated by Modigliani and Miller (1963).

From Table 4.4, the moderating impact of growth opportunity on the relationship between complexity of business and financial leverage shows coefficient value of -0.005 with t-value of -1.64 and a corresponding p-value of 0.110. This implies that even though the interaction between growth opportunity and complexity of business is negative and insignificantly impacting on

financial leverage of quoted diversified companies in Nigeria. This finding implies that, diversified companies in Nigeria are complex and the pattern of their growth is insignificantly influencing financial leverage.

From the foregoing, the findings of the study revealed an insignificant relationship between the moderating impact of growth opportunity and complexity of business on financial leverage of quoted diversified companies in Nigeria. This shows that, the interaction between growth opportunity and complexity of business on financial leverage does not influence the debt decision of diversified firms to a large extent; this shows an evidence of internal capital market operation and eschewing debt financing, thus reducing probability of bankruptcy by these firms.

From Table 4.4, the moderating impact of growth opportunity on the relationship between dependence on external finance and financial leverage shows a coefficient value of -0.001 with t-value of -0.79 corresponding to a p-value of 0.432. This implies that the interaction between growth opportunity and dependence on external finance is negative and insignificantly impacted on financial leverage of quoted diversified companies in Nigeria. This implies that, growth opportunity and dependence on external finance combined does not impact on the extent to which diversified companies expand as shown by the model in Table 4.4. This may be due to the fact that, diversified companies in Nigeria normally shift the financial cost of external financing and utilize internal fund. This was evidenced from the base model 4.3, which shows that dependence on external finance is not significant. This result was further substantiated by the second model in Table 4.4 which shows how insignificance dependence on external finance is even when interacted with growth opportunity. This implies that, diversified firms as earlier noted do follow a pecking order in assessing external finance or assesses such fund through internal capital market between the parent company and other subsidiaries.

From Table 4.4, the moderating impact of growth opportunity on the relationship between profitability and financial leverage shows coefficient value of -0.018 with t-value of -3.43 and a corresponding p-value of 0.001. This implies that the interaction between growth opportunity and profitability is strong and significantly impacting on financial leverage of quoted diversified companies in Nigeria. This shows the extent to which diversified companies in Nigeria are profitable, which in turn affect their growth pattern and significantly influence financial leverage. In effect, the more profitable a firm is, the better it stand a chance to grow. This is evidenced from a significant outcome from the interaction of the two variables (growth opportunity and profitability). This was clearly seen from the base model in table 4.3, where profitability as a variable is was significant and also when it interacted with growth opportunity in the moderated model was also found to impact on financial leverage positively. This justifies its inclusion as a variable in the second model.

Conclusively, it is worthy to note that the individual and joint impact of the two variables in the effector model in Table 4.4 while considering leverage decision among diversified companies in Nigeria include complexity of business (cpx), growth opportunity (gw), profitability (Prof) and the interaction between growth opportunity and profitability (Profgw) had a significant influence on quoted diversified companies in Nigeria. The finding indicates that, besides the main effect of profitability and growth opportunity, the interaction effect of the two variables is important when studying diversified companies in Nigeria. On the contrary, dependence on external finance may have seems to behave differently, but this contradiction seems to be within the purview of what the pecking order theory explain.

4.8 Policy Implications of Findings

The discovery of a unique finding of the interaction between profitability and growth opportunity has a greater rationale on financing pattern of diversified companies in Nigeria. The study has a lot of theoretical, practical and regulatory implications that represent the contribution of the work to the existing body of knowledge within the financing scope of corporate organizations, financial managers, lending institutions or credit providers, investors, as well as regulators has a significant role to play.

From the aforementioned analysis, it was revealed that, complexity of business has a significant and positive impact on financial leverage. This implies that managers in the quoted diversified companies play an important role in expanding their subsidiaries in the presence of better growth opportunities. The implication of this finding provides support for agency theory and how it can be used to reduce opportunistic behaviour of managers by using the excess cash flow for re-investment so as to meet the desired expansion level of the firm.

Furthermore, from the analysis, it can be seen that dependence on external finance was found to be statistically insignificant in influencing financial leverage of quoted diversified companies in Nigeria. This implies that dependence on external finance do not play any significant role in ensuring financial leverage effectiveness in decision making of these firms. This may be due to utilizing of internal capital market fund among the various subsidiaries of the business. This renders external financing less important to them as shown by the result. The implication of this findings provide support for Pecking Order Theory which shows a proper utilization of retain earnings as the most preferred option of financing to utilizing secured and unsecured debt and so forth.

The analysis also shows that, profitability has a significant positive impact on financial leverage. This implies that managers in the quoted diversified companies can collect more debt in order to expand their subsidiaries in the presence of better growth opportunities. The implication of this finding provides support for trade off theory which asserted that, firms optimize their debt level such that marginal tax advantages of additional borrowing are offset by the increase in the costs of financial distress.

In addition, our analysis reveals that growth opportunity is significant and positively impacting on financial leverage of diversified companies in Nigeria. This implies that growth opportunity plays a vital role in influencing financial leverage decision in such a way that higher growth rate is accompanied by more debt. This is because companies with growth potential have incentive to collect more debt for further expansion, but this should be done in such a way that tax shield benefits of debt financing is adjusted for financial distress costs which rises with increasing debt levels (Brounen & Eichholtz, 2001). The implication of this finding is to lending institutions that provides debt financing to companies, this should be done in accordance with the proposition of trade off theory that, the marginal tax advantage of debt financing should offset the increase in the cost of financial distress.

Also, our empirical analysis on the interaction between growth opportunity and complexity of business is insignificant but negatively impacting on financial leverage of diversified companies in Nigeria. This finding has significant policy implication for existing and prospective investors, which implies that growth opportunity is affected by the extent to which diversified firms are complex in nature. The more complex a company is, the greater it stands a chance to grow by utilizing retain earning through internal capital market among its subsidiaries. This justifies the negative impact on financial leverage which shows less usage of debt financing by these firms.

More so, our analysis on the moderating impact of growth opportunity and dependence on external finance on financial leverage indicate that, the interaction between the variables was insignificant among Nigerian diversified companies. This implies that the interaction between the variables does not play any significant role in influencing financial leverage. The implication here is that, investor should not bother much on the moderating impact that dependence on external finance and growth opportunity may have on financial leverage among diversified companies in Nigeria.

The empirical analysis on the interaction between profitability and growth opportunity is strongly significant but negatively impacting on financial leverage of diversified companies in Nigeria. This finding has significant policy implication for existing and prospective investors. It implies that growth opportunity is affected by the extent to which diversified companies are profitable. The more profitable a firm is, the greater it stands a chance to grow by utilizing retain earning and internal capital market funds among its subsidiaries. This justifies the negative impact on financial leverage which shows less usage of debt financing among these firms.

Conclusively, for accountant in practice, regulators and researchers, the study has being able to look at firm specific characteristics construct from a different direction by introducing moderating variables. This would add to existing body of knowledge within the purview of the subject matter and also will help accountants in practice (External auditors), as well as regulator in adjusting policies and making sound decision that will help diversified companies in efficient and effective discharging of their financing decisions.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

Financial leverage is considered one of the most important decisions which corporate managers need to take very seriously. Several studies from both developed and emerging economies have studied the subject matter without reaching consensus. In an effort to make the right decision that will maximize value of a firm and minimize shareholders risk, various firm specific characteristics interfere with such decisions. This may be due to the development of various theories that explained different directions and behaviour displayed by these factors on the activities of some companies. These include the Agency theory, the trade -off theory the Pecking Order Theory and so forth.

This study investigated the effect of firm specific characteristics on financial leverage of quoted diversified companies in Nigeria. In doing this, a multiple regression technique based on OLS robust model was used with a view to explaining empirically the impact of selected firm-specific characteristics on the financial leverage of quoted diversified companies in Nigeria. Six models were constructed in order to capture the individual and the interactive effect of seven variables made up of four independent and three dependent variables.

The result in the first set of models of the study (without the interacting variables) reveals that complexity of business under short term liability, profitability and growth opportunity under long term are significantly related with financial leverage among the four explanatory variables used in the study (complexity of business, dependence on external finance, profitability and growth opportunity). After introducing growth as a moderating variable in the next set of models which moderates both complexity of business, dependence on external and profitability on financial

leverage, the result of the second model with the interacting variables significantly impacted on the financial leverage, with four out of the seven explanatory variables under the long term liability being significant (complexity of business, growth opportunity, profitability and the moderating effect of growth opportunity and profitability on financial leverage). In the second model with the interacting variables, none of the independent variables was found to be significant under both short term debt and total liability. This justify why the study was based on long term liability in the second moderated model result.

Furthermore, among the three explanatory variables that were significant under the long term liability, complexity of business and growth opportunity were found to be positively related with financial leverage of quoted diversified companies in Nigeria and are significant at one percent, while, the interaction between growth opportunity and complexity of business on financial leverage was found to be significant but negatively relates with financial leverage at five percent level of significance.

More so, dependence on external finances though insignificant, was found to be positively related with financial leverage. The interaction between growth opportunity and dependence on external finance on financial leverage and the interaction between growth opportunity and complexity of business on financial leverage were both found to be negative and insignificant at all levels.

5.2 Conclusions

The study has provided evidence on the usage of four independent variables that made up firm specific characteristics (complexity of business, dependence on external finance, profitability and growth opportunity) and three dependent variables (short term liability, long term liability and

total liability) in predicting financial leverage of quoted diversified companies in Nigeria. The study introduced growth opportunity as a moderator variable, moderating the relationship between complexity of business, dependence on external finance and profitability on financial leverage of quoted diversified companies in Nigeria.

The study concluded that complexity of business has positive and significant impact on financial leverage of quoted diversified companies in Nigeria. This implies that, the more diversified a company is, the more likely the company is to borrow, which is an indication that quoted diversified companies in Nigeria are fund growth. That is, as diversification increases, borrowing increases in order to fund such growth. In addition, dependence on external finance has a positive but insignificant effect on financial leverage of quoted diversified companies in Nigeria. This relatively implies that firms within the quoted diversified companies in Nigeria may not relay on external finance, thus utilizing internal capital market as alternative capital.

In the same vein, it was also concluded that profitability was positive and significantly influencing financial leverage of quoted diversified companies in Nigeria. This is because profitable firms can collect more debt in order to expand their subsidiaries in the presence of better growth opportunities. More so, growth opportunity was positive and significantly influences financial leverage of quoted diversified companies in Nigeria. This is because companies with growth potentials have incentives (tax shield) to collect more debt for further expansion among quoted diversified companies in Nigeria. The study further established that the moderating impact of growth opportunity on complexity of business was insignificant and negatively impacting on financial leverage of quoted diversified companies in Nigeria. This implies that, expanding into new line of business or diversifying in other forms of business under growth condition through diversification helps in generating new cash streams. These cash flows

help in cross-subsidizing other subsidiaries by means of utilizing internal capital market. This helps in avoiding external capital market by way of eschewing debt financing and reducing probability of bankruptcy and technically utilizing the benefit of borrowing internally to fund such growth.

The moderating impact of growth opportunity and dependence on external finance on financial leverage shows an insignificant negative association. This implies that, firms in the diversified sector rarely make use of external financing due to availability of internal capital market at their disposal to fund new growth opportunities. This reveals that, their interaction has no impact on financial leverage of diversified companies in Nigeria. On the overall, the study concludes that firm specific characteristics used in the study significantly impact on financial leverage of quoted diversified companies in Nigeria.

Lastly, the moderating impact of growth opportunity and profitability on financial leverage shows a significant positive effect. This implies that, diversified companies in Nigeria are profitable and affect the pattern of growth opportunity which significantly influences financial leverage. In effect, the more profitable a firm is, the better it stand a chance to grow.

5.3 Recommendations

The following recommendations are made based on the findings of the study;

i. It appears that Nigerian diversified companies are more likely to fund diversification through borrowing, since borrowing increase with increase in diversification. Therefore, the study recommends that shareholders within diversified companies in Nigeria should focus more attention toward regulating expansion by management through borrowing, which is likely to dilute ownership and increase the risk of bankruptcy.

ii. Since quoted diversified companies in Nigeria are profitable with the capacity to collect more debt for the purpose of expanding their subsidiaries. The study therefore recommends that, lenders of fund to quoted diversified companies in Nigeria should seek opportunities in profitable firms with future prospect to grow.

iii. The study recommends that management of quoted diversified companies in Nigeria should pay attention to the trade-off between the risk of bankruptcy as they expand against tax shield from increasing profit through growth; as more borrowing gives room for more growth opportunity.

iv. Management of quoted diversified companies in Nigeria should encourage diversification in line of businesses that their streams of revenue are not positively correlated. This can be achieved by seeking growth opportunities in industries where they can further diversify their businesses to enhance profit generation, which will allow them to conveniently finance their subsidiaries and reduce bankruptcy risk through borrowing.

5.4 Limitations of the Study

Like any other research, the result of this study is subject to some limitations. The study is limited to a particular sector, that is the quoted diversified companies on the floor of the Nigeria Stock Exchange as at 31st December, 2014. Therefore, the findings and recommendations are only applicable to quoted diversified companies in Nigeria. Furthermore, the study is limited to the use of only four specifically selected firm specific characteristics (complexity of business, dependence on external finance profitability and growth opportunity).

5.5 Suggestion for Further Research

The study investigated the effect of firm specific characteristics on financial leverage of quoted diversified companies in Nigeria. The findings of the study are believed to have given way for further research in the following areas.

i The study makes use of only four specifically selected firm specific characteristics (complexity of business, dependence on external finance, profitability and growth opportunity). Therefore, the study suggests to researchers who might have interest in this area to test the moderating impact of other firm specific characteristics such as tangibility, liquidity, earning volatility, non-debt tax shield and so forth.

ii Future studies should examine other sectors such as industrial goods and consumer goods firms other than diversified section.

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APPENDIX

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  Statistics/Data Analysis             StataCorp
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Notes:
      1.  (/m# option or -set memory-) 1.00 MB allocated to data
      2.  New update available; type -update all-

. edit
(12 vars, 48 obs pasted into editor)
- preserve
- preserve

. xtset id year, yearly
       panel variable:  id (strongly balanced)
        time variable:  year, 2007 to 2014
                delta:  1 year
```

```
. su tllib ltlb stlib cpx dof prof gw cxpgw dofgw progw, detail
```

Tl lib

Percentiles		Smallest		
1%	.031	.031		
5%	.3148	.3073		
10%	.3204	.3148	Obs	48
25%	.4487	.3148	Sum of Wgt.	48
50%	.5529		Mean	.560325
		Largest	Std. Dev.	.1677802
75%	.7065	.7541		
90%	.7492	.7907	Variance	.0281502
95%	.7907	.8032	Skewness	-.6563518
99%	.8338	.8338	Kurtosis	3.379231

ltlb

Percentiles		Smallest		
1%	0	0		
5%	0	0		
10%	0	0	Obs	48
25%	0	0	Sum of Wgt.	48
50%	.0327		Mean	.0768354
		Largest	Std. Dev.	.1150593
75%	.1125	.264		
90%	.2175	.3237	Variance	.0132386
95%	.3237	.4866	Skewness	2.284125
99%	.4968	.4968	Kurtosis	8.129747

St lib

Percentiles		Smallest		
1%	.1053	.1053		
5%	.2116	.1691		
10%	.2311	.2116	Obs	47
25%	.3567	.2195	Sum of Wgt.	47
50%	.5083		Mean	.5693702
		Largest	Std. Dev.	.3992643
75%	.6716	.7971		
90%	.7592	.8437	Variance	.159412
95%	.8437	1.6875	Skewness	3.416572
99%	2.64	2.64	Kurtosis	17.58003

CPX

Percentiles		Smallest		
1%	1	1		
5%	2	2		
10%	2	2	Obs	48
25%	4	2	Sum of Wgt.	48
50%	4		Mean	5.625
		Largest	Std. Dev.	3.11909
75%	8	11		
90%	10	12	Variance	9.728723
95%	12	13	Skewness	.8041962
99%	13	13	Kurtosis	2.689678

DOF

Percentiles		Smallest		
1%	.07	.07		
5%	.09	.07		
10%	.27	.09	Obs	48
25%	.755	.1	Sum of Wgt.	48
50%	1.325		Mean	6.752292
		Largest	Std. Dev.	11.74707
75%	5.26	28.83		
90%	27.37	31.82	Variance	137.9936
95%	31.82	47.58	Skewness	2.378327
99%	48.97	48.97	Kurtosis	7.896638

PROF

Percentiles		Smallest		
1%	.089	.089		
5%	.224	.188		
10%	.442	.224	Obs	48
25%	1.346	.264	Sum of Wgt.	48
50%	2.713		Mean	3.510188
		Largest	Std. Dev.	3.330505
75%	4.3695	8.822		
90%	7.032	8.968	Variance	11.09226
95%	8.968	9.897	Skewness	2.666995
99%	19.722	19.722	Kurtosis	13.00119

GW

	Percentiles	Smallest		
1%	.01	.01		
5%	.11	.01		
10%	.13	.11	Obs	48
25%	.645	.13	Sum of Wgt.	48
50%	1.285		Mean	1.521458
		Largest	Std. Dev.	1.251765
75%	2.125	3.29		
90%	3.18	4.49	Variance	1.566915
95%	4.49	5.02	Skewness	1.151837
99%	5.03	5.03	Kurtosis	3.964081

CXPGW

	Percentiles	Smallest		
1%	.0421566	.0421566		
5%	.44	.0584982		
10%	.9375967	.44	Obs	48
25%	2.571187	.8149918	Sum of Wgt.	48
50%	4.80321		Mean	8.912595
		Largest	Std. Dev.	10.46967
75%	12.93191	23.9		
90%	23.3	27.04508	Variance	109.6139
95%	27.04508	31.42921	Skewness	2.280313
99%	55.35489	55.35489	Kurtosis	9.45453

DOFGW

	Percentiles	Smallest		
1%	.0093264	.0093264		
5%	.0891	.0871		
10%	.101348	.0891	Obs	48
25%	.6959618	.0955227	Sum of Wgt.	48
50%	1.999543		Mean	7.992173
		Largest	Std. Dev.	16.17301
75%	7.731245	19.81718		
90%	18.98252	32.1044	Variance	261.5664
95%	32.1044	71.71453	Skewness	3.451995
99%	82.37152	82.37152	Kurtosis	15.10793

PROGW

	Percentiles	Smallest		
1%	.02464	.02464		
5%	.042399	.0317206		
10%	.4237062	.042399	Obs	48
25%	.947963	.3068655	Sum of Wgt.	48
50%	2.531297		Mean	4.725657
		Largest	Std. Dev.	6.65467
75%	5.550424	13.6324		
90%	10.82111	14.49296	Variance	44.28463
95%	14.49296	24.69257	Skewness	3.166535
99%	37.32571	37.32571	Kurtosis	14.53043

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. pwcorr tllib ltlb stlib cpx dof prof gw cxpgw dofgw progw, star (0.05) sig
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	tllib	ltlb	stlib	cpx	dof	prof	gw
tllib	1.0000						
ltlb	-0.3872* 0.0065	1.0000					
stlib	0.4780* 0.0007	-0.0887 0.5531	1.0000				
cpx	-0.1869 0.2034	0.2104 0.1511	-0.3271* 0.0248	1.0000			
dof	0.1693 0.2500	-0.0235 0.8738	0.0676 0.6515	0.1188 0.4215	1.0000		
prof	-0.2422 0.0972	0.0615 0.6780	-0.0419 0.7796	-0.1426 0.3335	-0.1974 0.1786	1.0000	
gw	-0.0902 0.5422	0.2127 0.1466	0.1260 0.3986	-0.0027 0.9855	0.0025 0.9867	-0.0722 0.6258	1.0000
cxpgw	-0.1081 0.4646	-0.1328 0.3683	-0.2127 0.1511	0.5058* 0.0002	0.0284 0.8479	0.0009 0.9950	0.3791* 0.0079
dofgw	0.1776 0.2271	-0.1036 0.4834	0.0455 0.7614	0.0809 0.5845	0.4570* 0.0011	-0.0460 0.7560	0.0548 0.7112
progw	-0.2904* 0.0452	0.2966* 0.0406	0.1254 0.4011	-0.1322 0.3704	-0.2033 0.1659	0.5684* 0.0000	0.6770* 0.0000

	cxpgw	dofgw	progw
cxpgw	1.0000		
dofgw	0.1245 0.3993	1.0000	
progw	0.1551 0.2926	-0.0195 0.8955	1.0000

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  Statistics/Data Analysis             StataCorp
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                                       College Station, Texas 77845 USA
                                       800-STATA-PC        http://www.stata.com
                                       979-696-4600        stata@stata.com
                                       979-696-4601 (fax)

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Notes:
      1.  (/m# option or -set memory-) 1.00 MB allocated to data
      2.  New update available; type -update all-

. edit
(7 vars, 48 obs pasted into editor)
- preserve
- preserve

. xtset id year, yearly
       panel variable:  id (strongly balanced)
        time variable:  year, 2007 to 2014
                delta:  1 year

. reg  tllib  cpx  dof  prof  gw

      Source |       SS       df       MS              Number of obs =      48
-------------+------------------------------           F(  4,    43) =    0.68
       Model |  .078853878     4   .01971347            Prob > F      =  0.6087
    Residual |  1.24420478    43  .028934995            R-squared     =  0.0596
-------------+------------------------------           Adj R-squared = -0.0279
       Total |  1.32305866    47  .028150184            Root MSE      =   .1701

------------------------------------------------------------------------------
       tllib |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0085453   .0084574    -1.01   0.318    -.0256013    .0085106
         dof |   .0027655    .002156     1.28   0.206    -.0015825    .0071135
        prof |  -.0006637   .0079396    -0.08   0.934    -.0166755     .015348
          gw |  -.0054333   .0203185    -0.27   0.790    -.0464094    .0355428
       _cons |   .6003153   .0756222     7.94   0.000     .4478087     .752822
------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
        prof |      1.14    0.880452
         cpx |      1.13    0.884703
          gw |      1.05    0.951697
         dof |      1.04    0.959774
-------------+----------------------
    Mean VIF |      1.09
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of tllib

         chi2(1)      =     1.13
         Prob > chi2  =   0.2881

. xtreg  tllib  cpx  dof  prof  gw, fe

Fixed-effects (within) regression               Number of obs      =        48
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.1043                         Obs per group: min =         8
       between = 0.0822                                        avg =       8.0
       overall = 0.0058                                        max =         8

                                                F(4,38)            =      1.11
corr(u_i, Xb)  = -0.6002                        Prob > F           =    0.3679

------------------------------------------------------------------------------
       tllib |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |   .0243555   .0196751     1.24   0.223    -.0154748    .0641857
         dof |   .0016663    .001594     1.05   0.302    -.0015607    .0048933
        prof |  -.0004289   .0061492    -0.07   0.945    -.0128773    .0120195
          gw |  -.0068198   .0202139    -0.34   0.738    -.0477407    .0341011
       _cons |   .4239558   .1342706     3.16   0.003     .1521391    .6957724
-------------+----------------------------------------------------------------
     sigma_u |  .16961204
     sigma_e |  .12345931
         rho |  .65366856   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(5, 38) =     8.73                 Prob > F = 0.0000

. est store fixed
```

```
. xtreg  tllib  cpx  dof  prof  gw, re

Random-effects GLS regression                   Number of obs      =        48
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.0260                         Obs per group: min =         8
       between = 0.1240                                        avg =       8.0
       overall = 0.0596                                        max =         8

Random effects u_i ~ Gaussian                   Wald chi2(4)       =      2.73
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.6048

------------------------------------------------------------------------------
       tllib |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0085453   .0084574    -1.01   0.312    -.0251215    .0080309
         dof |   .0027655    .002156     1.28   0.200    -.0014602    .0069912
        prof |  -.0006637   .0079396    -0.08   0.933    -.0162251    .0148976
          gw |  -.0054333   .0203185    -0.27   0.789    -.0452567    .0343901
       _cons |   .6003153   .0756222     7.94   0.000     .4520986    .7485321
-------------+----------------------------------------------------------------
     sigma_u |           0
     sigma_e |  .12345931
         rho |           0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store random

. hausman fixed random

                 ---- Coefficients ----
              |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
              |    fixed        random       Difference          S.E.
--------------+----------------------------------------------------------------
         cpx  |   .0243555    -.0085453        .0329008        .0177647
         dof  |   .0016663     .0027655       -.0010992               .
        prof  |  -.0004289    -.0006637        .0002348               .
          gw  |  -.0068198    -.0054333       -.0013865               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =    -0.42    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test
```

```
. hausman fixed random, sigmamore
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
cpx	.0243555	-.0085453	.0329008	.0257555
dof	.0016663	.0027655	-.0010992	.0004186
prof	-.0004289	-.0006637	.0002348	.002957
gw	-.0068198	-.0054333	-.0013865	.0190481

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 22.50
Prob>chi2 = 0.0002

```
. xttest0
```

Breusch and Pagan Lagrangian multiplier test for random effects

tllib[id,t] = Xb + u[id] + e[id,t]

Estimated results:

	Var	sd = sqrt(Var)
tllib	.0281502	.1677802
e	.0152422	.1234593
u	0	0

Test: Var(u) = 0
chi2(1) = 28.77
Prob > chi2 = 0.0000

```
. reg  tllib  cpx  dof  prof  gw, robust
```

Linear regression

Number of obs = 48
F(4, 43) = 1.25
Prob > F = 0.3047
R-squared = 0.0596
Root MSE = .1701

tllib	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
cpx	-.0085453	.007263	-1.18	0.246	-.0231927	.006102
dof	.0027655	.0017959	1.54	0.131	-.0008563	.0063873
prof	-.0006637	.0060081	-0.11	0.913	-.0127803	.0114528
gw	-.0054333	.0161319	-0.34	0.738	-.0379665	.0270999
_cons	.6003153	.0744476	8.06	0.000	.4501773	.7504533

```
. reg tllib  cpx  dof  prof  gw  cxpgw  dofgw  progw
```

Source	SS	df	MS		
Model	.148154506	7	.021164929	Number of obs =	48
Residual	1.17490415	40	.029372604	F(7, 40) =	0.72
				Prob > F =	0.6552
Total	1.32305866	47	.028150184	R-squared =	0.1120
				Adj R-squared =	-0.0434
				Root MSE =	.17138

tllib	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
cpx	-.0052467	.0167784	-0.31	0.756	-.0391571	.0286637
dof	.0001016	.003045	0.03	0.974	-.0060525	.0062557
prof	.020766	.0216545	0.96	0.343	-.0229994	.0645314
gw	.0170477	.0445846	0.38	0.704	-.0730612	.1071566
cxpgw	-.0012401	.0069446	-0.18	0.859	-.0152758	.0127955
dofgw	.0024665	.002253	1.09	0.280	-.0020869	.0070198
progw	-.011622	.0112456	-1.03	0.308	-.0343501	.0111062
_cons	.5365834	.1171028	4.58	0.000	.2999097	.773257

```
. vif
```

Variable	VIF	1/VIF
progw	8.96	0.111591
cxpgw	8.46	0.118217
prof	8.32	0.120151
gw	4.98	0.200645
cpx	4.38	0.228186
dofgw	2.12	0.470717
dof	2.05	0.488448
Mean VIF	5.61	

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of tllib

         chi2(1)      =     0.00
         Prob > chi2  =   0.9960
```

```
. xtreg tllib cpx dof prof gw cxpgw dofgw progw, fe

Fixed-effects (within) regression               Number of obs      =        48
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.1185                         Obs per group: min =         8
       between = 0.0609                                        avg =       8.0
       overall = 0.0007                                        max =         8

                                                F(7,35)            =      0.67
corr(u_i, Xb)  = -0.5469                        Prob > F           =    0.6941

------------------------------------------------------------------------------
       tllib |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |   .0250845   .0221465     1.13   0.265    -.0198753    .0700443
         dof |   .0006438   .0022867     0.28   0.780    -.0039984    .0052859
        prof |   .0058533   .0163679     0.36   0.723    -.0273754     .039082
          gw |   .0023323   .0379931     0.06   0.951    -.0747977    .0794624
       cxpgw |  -.0010689   .0060694    -0.18   0.861    -.0133905    .0112527
       dofgw |   .0010361   .0017248     0.60   0.552    -.0024654    .0045375
       progw |  -.0034407   .0086245    -0.40   0.692    -.0209493    .0140678
       _cons |   .4082886   .1455717     2.80   0.008     .1127623    .7038148
-------------+----------------------------------------------------------------
     sigma_u |  .16378456
     sigma_e |  .12761648
         rho |  .62223482   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(5, 35) =     7.43                 Prob > F = 0.0001

. est store fixed
```

```
. xtreg tllib cpx dof prof gw cxpgw dofgw progw, re

Random-effects GLS regression                   Number of obs      =        48
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.0451                         Obs per group: min =         8
       between = 0.3125                                        avg =       8.0
       overall = 0.1120                                        max =         8

Random effects u_i ~ Gaussian                   Wald chi2(7)       =      5.04
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.6546

------------------------------------------------------------------------------
       tllib |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0052467   .0167784    -0.31   0.755    -.0381317    .0276383
         dof |   .0001016    .003045     0.03   0.973    -.0058664    .0060696
        prof |    .020766   .0216545     0.96   0.338     -.021676    .0632081
          gw |   .0170477   .0445846     0.38   0.702    -.0703365     .104432
       cxpgw |  -.0012401   .0069446    -0.18   0.858    -.0148514    .0123711
       dofgw |   .0024665    .002253     1.09   0.274    -.0019492    .0068822
       progw |   -.011622   .0112456    -1.03   0.301    -.0336629     .010419
       _cons |   .5365834   .1171028     4.58   0.000      .307066    .7661007
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  .12761648
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store random

. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |    fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
         cpx |   .0250845    -.0052467        .0303312        .0144552
         dof |   .0006438     .0001016        .0005422               .
        prof |   .0058533      .020766       -.0149127               .
          gw |   .0023323     .0170477       -.0147154               .
       cxpgw |  -.0010689    -.0012401        .0001713               .
       dofgw |   .0010361     .0024665       -.0014304               .
       progw |  -.0034407     -.011622        .0081812               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =    -3.99    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test
```

```
. hausman fixed random, sigmamore

Note: the rank of the differenced variance matrix (5) does not equal the number
      of coefficients being tested (7); be sure this is what you expect, or
      there may be problems computing the test.  Examine the output of your
      estimators for anything unexpected and possibly consider scaling your
      variables so that the coefficients are on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |    fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
         cpx |   .0250845    -.0052467        .0303312        .0245575
         dof |   .0006438     .0001016        .0005422        .0003982
        prof |   .0058533      .020766       -.0149127        .0037777
          gw |   .0023323     .0170477       -.0147154        .0248112
       cxpgw |  -.0010689    -.0012401        .0001713        .0042675
       dofgw |   .0010361     .0024665       -.0014304         .000538
       progw |  -.0034407     -.011622        .0081812        .0027726
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       20.59
                Prob>chi2 =      0.0010
                (V_b-V_B is not positive definite)
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        tllib[id,t] = Xb + u[id] + e[id,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                 --------+------------------------------
                   tllib |    .0281502        .1677802
                       e |     .016286        .1276165
                       u |           0               0

        Test:   Var(u) = 0
                                 chi2(1) =     23.64
                               Prob > chi2 =     0.0000
```

```
. reg tllib  cpx dof prof gw cxpgw dofgw progw, robust

Linear regression                               Number of obs =      48
                                                F(  7,    40) =    3.09
                                                Prob > F      =  0.0106
                                                R-squared     =  0.1120
                                                Root MSE      =  .17138

------------------------------------------------------------------------------
             |               Robust
      tllib |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0052467   .0118293    -0.44   0.660    -.0291546    .0186612
         dof |   .0001016   .0021816     0.05   0.963    -.0043077    .0045109
        prof |    .020766   .0217874     0.95   0.346    -.0232679      .0648
          gw |   .0170477    .034644     0.49   0.625    -.0529705    .0870659
       cxpgw |  -.0012401   .0046478    -0.27   0.791    -.0106337    .0081535
       dofgw |   .0024665   .0011373     2.17   0.036      .000168     .004765
       progw |   -.011622   .0098437    -1.18   0.245    -.0315169     .008273
       _cons |   .5365834   .1172709     4.58   0.000     .2995701    .7735967
------------------------------------------------------------------------------

.

. xtset id year, yearly
       panel variable:  id (strongly balanced)
        time variable:  year, 2007 to 2014
                delta:  1 year

. reg  ltlb  cpx  dof  prof  gw

      Source |       SS       df       MS              Number of obs =      48
-------------+------------------------------           F(  4,    43) =    4.22
       Model |  .175267646     4  .043816911            Prob > F      =  0.0057
    Residual |  .446948383    43  .010394148            R-squared     =  0.2817
-------------+------------------------------           Adj R-squared =  0.2149
       Total |  .622216029    47  .013238639            Root MSE      =  .10195

------------------------------------------------------------------------------
        ltlb |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |   .0001685    .005069     0.03   0.974    -.0100541     .010391
         dof |   .0000263   .0012922     0.02   0.984    -.0025797    .0026322
        prof |  -.0078522   .0047586    -1.65   0.106    -.0174489    .0017445
          gw |   .0409955   .0121779     3.37   0.002     .0164364    .0655546
       _cons |   .0409004   .0453244     0.90   0.372     -.050505    .1323057
------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
        prof |      1.14    0.880452
         cpx |      1.13    0.884703
          gw |      1.05    0.951697
         dof |      1.04    0.959774
-------------+----------------------
    Mean VIF |      1.09
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ltlb

         chi2(1)      =    21.23
         Prob > chi2  =   0.0000
```

```
. xtreg  ltlb  cpx  dof  prof  gw, fe

Fixed-effects (within) regression               Number of obs      =        48
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.2172                         Obs per group: min =         8
       between = 0.5892                                        avg =       8.0
       overall = 0.2458                                        max =         8

                                                F(4,38)            =      2.64
corr(u_i, Xb)  = -0.4722                        Prob > F           =    0.0489
```

ltlb	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
cpx	.0090807	.0168893	0.54	0.594	-.0251099	.0432712
dof	-.0001888	.0013683	-0.14	0.891	-.0029589	.0025812
prof	-.0062523	.0052785	-1.18	0.244	-.0169381	.0044335
gw	.0448952	.0173518	2.59	0.014	.0097684	.080022
_cons	-.0193277	.1152589	-0.17	0.868	-.2526571	.2140017
sigma_u	.03696606					
sigma_e	.10597838					
rho	.10846958	(fraction of variance due to u_i)				

F test that all u_i=0: F(5, 38) = 0.36 Prob > F = 0.8733

```
. est store fixed

. xtreg  ltlb  cpx  dof  prof  gw, re

Random-effects GLS regression                   Number of obs      =        48
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.2106                         Obs per group: min =         8
       between = 0.7944                                        avg =       8.0
       overall = 0.2817                                        max =         8

Random effects u_i ~ Gaussian                   Wald chi2(4)       =     16.86
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0021

------------------------------------------------------------------------------
        ltlb |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |   .0001685    .005069     0.03   0.973    -.0097665    .0101034
         dof |   .0000263   .0012922     0.02   0.984    -.0025064    .0025589
        prof |  -.0078522   .0047586    -1.65   0.099     -.017179    .0014745
          gw |   .0409955   .0121779     3.37   0.001     .0171272    .0648638
       _cons |   .0409004   .0453244     0.90   0.367    -.0479338    .1297345
-------------+----------------------------------------------------------------
     sigma_u |           0
     sigma_e |  .10597838
         rho |           0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store random
```

```
. hausman fixed random
```

	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
cpx	.0090807	.0001685	.0089122	.0161107
dof	-.0001888	.0000263	-.0002151	.00045
prof	-.0062523	-.0078522	.0015999	.0022843
gw	.0448952	.0409955	.0038998	.0123605

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 0.82
Prob>chi2 = 0.9358

```
. xttest0
```

Breusch and Pagan Lagrangian multiplier test for random effects

ltlb[id,t] = Xb + u[id] + e[id,t]

Estimated results:

	Var	sd = sqrt(Var)
ltlb	.0132386	.1150593
e	.0112314	.1059784
u	0	0

Test: Var(u) = 0
chi2(1) = 1.72
Prob > chi2 = 0.1903

```
. reg  ltlb  cpx  dof  prof  gw, robust
```

Linear regression

Number of obs = 48
F(4, 43) = 3.76
Prob > F = 0.0104
R-squared = 0.2817
Root MSE = .10195

ltlb	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
cpx	.0001685	.0058718	0.03	0.977	-.0116731	.0120101
dof	.0000263	.0009669	0.03	0.978	-.0019236	.0019761
prof	-.0078522	.0036896	-2.13	0.039	-.015293	-.0004114
gw	.0409955	.0191939	2.14	0.038	.0022874	.0797036
_cons	.0409004	.0375211	1.09	0.282	-.0347682	.1165689

```
.
```

```
. xtset id year, yearly
       panel variable:  id (strongly balanced)
        time variable:  year, 2007 to 2014
                delta:  1 year

. reg  ltlb  cpx  dof  prof  gw  cxpgw  dofgw  progw

      Source |       SS       df       MS              Number of obs =      48
-------------+------------------------------           F(  7,    40) =    5.54
       Model |  .306257338     7  .043751048            Prob > F      =  0.0002
    Residual |  .315958691    40  .007898967            R-squared     =  0.4922
-------------+------------------------------           Adj R-squared =  0.4033
       Total |  .622216029    47  .013238639            Root MSE      =  .08888

------------------------------------------------------------------------------
        ltlb |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |   .0137859   .0087009     1.58   0.121    -.0037992    .0313711
         dof |   .0004396   .0015791     0.28   0.782    -.0027518     .003631
        prof |   .0249038   .0112295     2.22   0.032     .0022081    .0475996
          gw |   .1142829   .0231206     4.94   0.000     .0675545    .1610114
       cxpgw |  -.0049651   .0036013    -1.38   0.176    -.0122437    .0023135
       dofgw |  -.0011208   .0011683    -0.96   0.343    -.0034821    .0012404
       progw |  -.0175607   .0058317    -3.01   0.004     -.029347   -.0057744
       _cons |  -.1287773   .0607269    -2.12   0.040     -.251511   -.0060436
------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
       progw |      8.96    0.111591
       cxpgw |      8.46    0.118217
        prof |      8.32    0.120151
          gw |      4.98    0.200645
         cpx |      4.38    0.228186
       dofgw |      2.12    0.470717
         dof |      2.05    0.488448
-------------+----------------------
    Mean VIF |      5.61

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ltlb

         chi2(1)      =     1.30
         Prob > chi2  =   0.2539
```

```
. xtreg  ltlb  cpx  dof  prof  gw  cxpgw  dofgw  progw, fe

Fixed-effects (within) regression               Number of obs      =        48
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.4987                         Obs per group: min =         8
       between = 0.2501                                        avg =       8.0
       overall = 0.4601                                        max =         8

                                                F(7,35)            =      4.97
corr(u_i, Xb)  = -0.1138                        Prob > F           =    0.0006

------------------------------------------------------------------------------
        ltlb |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |   .0165866   .0153354     1.08   0.287    -.0145459     .047719
         dof |   .0005714   .0015834     0.36   0.720    -.0026431    .0037859
        prof |   .0263066    .011334     2.32   0.026     .0032974    .0493158
          gw |   .1290198   .0263083     4.90   0.000     .0756111    .1824285
       cxpgw |  -.0083037   .0042028    -1.98   0.056    -.0168358    .0002284
       dofgw |  -.0013282   .0011943    -1.11   0.274    -.0037527    .0010964
       progw |  -.0177763    .005972    -2.98   0.005    -.0299001   -.0056525
       _cons |  -.1403344   .1008011    -1.39   0.173    -.3449715    .0643027
-------------+----------------------------------------------------------------
     sigma_u |  .03981752
     sigma_e |  .08836802
         rho |  .16876488   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(5, 35) =     1.09                 Prob > F = 0.3819

. est store fixed
```

```
. xtreg  ltlb  cpx  dof  prof  gw  cxpgw  dofgw  progw, re

Random-effects GLS regression                   Number of obs      =        48
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.4865                         Obs per group: min =         8
       between = 0.5441                                        avg =       8.0
       overall = 0.4922                                        max =         8

Random effects u_i ~ Gaussian                   Wald chi2(7)       =     38.77
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
        ltlb |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |   .0137859   .0087009     1.58   0.113    -.0032675    .0308394
         dof |   .0004396   .0015791     0.28   0.781    -.0026553    .0035345
        prof |   .0249038   .0112295     2.22   0.027     .0028943    .0469133
          gw |   .1142829   .0231206     4.94   0.000     .0689674    .1595985
       cxpgw |  -.0049651   .0036013    -1.38   0.168    -.0120236    .0020934
       dofgw |  -.0011208   .0011683    -0.96   0.337    -.0034107     .001169
       progw |  -.0175607   .0058317    -3.01   0.003    -.0289906   -.0061307
       _cons |  -.1287773   .0607269    -2.12   0.034    -.2477999   -.0097548
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  .08836802
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store random
```

```
. hausman fixed random
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
cpx	.0165866	.0137859	.0028006	.012628
dof	.0005714	.0004396	.0001318	.0001172
prof	.0263066	.0249038	.0014027	.0015351
gw	.1290198	.1142829	.0147369	.0125525
cxpgw	-.0083037	-.0049651	-.0033386	.0021665
dofgw	-.0013282	-.0011208	-.0002073	.0002478
progw	-.0177763	-.0175607	-.0002156	.0012868

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 7.38
Prob>chi2 = 0.3906
(V_b-V_B is not positive definite)

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ltlb[id,t] = Xb + u[id] + e[id,t]

        Estimated results:
                     |       Var     sd = sqrt(Var)
             ---------+-----------------------------
                ltlb |   .0132386       .1150593
                   e |   .0078089        .088368
                   u |          0              0

        Test:   Var(u) = 0
                                 chi2(1) =     0.03
                              Prob > chi2 =     0.8640
```

```
. reg  ltlb  cpx  dof  prof  gw  cxpgw  dofgw  progw, robust

Linear regression                               Number of obs =      48
                                                F(  7,    40) =    3.71
                                                Prob > F      =  0.0035
                                                R-squared     =  0.4922
                                                Root MSE      =  .08888
```

ltlb	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
cpx	.0137859	.0058936	2.34	0.024	.0018745	.0256974
dof	.0004396	.0011161	0.39	0.696	-.001816	.0026953
prof	.0249038	.0097955	2.54	0.015	.0051065	.0447012
gw	.1142829	.0291474	3.92	0.000	.0553739	.173192
cxpgw	-.0049651	.0030348	-1.64	0.110	-.0110987	.0011685
dofgw	-.0011208	.0014122	-0.79	0.432	-.003975	.0017333
progw	-.0175607	.0051258	-3.43	0.001	-.0279202	-.0072011
_cons	-.1287773	.0594073	-2.17	0.036	-.248844	-.0087107

```
.
```

```
. xtset id year, yearly
       panel variable:  id (strongly balanced)
        time variable:  year, 2007 to 2014
                delta:  1 year

. reg stlib  cpx  dof  prof  gw
```

Source	SS	df	MS		
Model	.681256369	4	.170314092	Number of obs =	47
				F(4, 42) =	2.82
Residual	2.54008096	42	.060478118	Prob > F =	0.0370
				R-squared =	0.2115
				Adj R-squared =	0.1364
Total	3.22133733	46	.070029072	Root MSE =	.24592

stlib	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
cpx	-.0355732	.0122457	-2.90	0.006	-.060286	-.0108604
dof	.0037428	.0031241	1.20	0.238	-.002562	.0100476
prof	-.0096473	.0115109	-0.84	0.407	-.0328773	.0135827
gw	.0485802	.0294367	1.65	0.106	-.0108255	.1079858
_cons	.6485348	.110161	5.89	0.000	.4262209	.8708487

```
. vif
```

Variable	VIF	1/VIF
prof	1.14	0.877687
cpx	1.13	0.882788
gw	1.05	0.952178
dof	1.04	0.960294
Mean VIF	1.09	

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of stlib

         chi2(1)      =    10.00
         Prob > chi2  =   0.0016
```

```
. xtreg stlib  cpx  dof  prof  gw, fe

Fixed-effects (within) regression               Number of obs      =        47
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.0847                         Obs per group: min =         7
       between = 0.3923                                        avg =       7.8
       overall = 0.2037                                        max =         8

                                                F(4,37)            =      0.86
corr(u_i, Xb)  = 0.1880                         Prob > F           =    0.4991

------------------------------------------------------------------------------
       stlib |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0302853   .0357124    -0.85   0.402    -.1026455    .0420748
         dof |   .0025336   .0028735     0.88   0.384    -.0032887    .0083559
        prof |  -.0097646   .0110693    -0.88   0.383     -.032193    .0126639
          gw |   .0249518   .0365118     0.68   0.499    -.0490281    .0989317
       _cons |   .6633949   .2445867     2.71   0.010     .1678151    1.158975
-------------+----------------------------------------------------------------
     sigma_u |  .14118008
     sigma_e |  .22223923
         rho |  .28752471   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(5, 37) =     2.89                 Prob > F = 0.0268

. est store fixed

. xtreg stlib  cpx  dof  prof  gw, re

Random-effects GLS regression                   Number of obs      =        47
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.0819                         Obs per group: min =         7
       between = 0.4586                                        avg =       7.8
       overall = 0.2115                                        max =         8

Random effects u_i ~ Gaussian                   Wald chi2(4)       =     11.26
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0237

------------------------------------------------------------------------------
       stlib |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0355732   .0122457    -2.90   0.004    -.0595743   -.0115721
         dof |   .0037428   .0031241     1.20   0.231    -.0023804     .009866
        prof |  -.0096473   .0115109    -0.84   0.402    -.0322083    .0129137
          gw |   .0485802   .0294367     1.65   0.099    -.0091147     .106275
       _cons |   .6485348    .110161     5.89   0.000     .4326232    .8644464
-------------+----------------------------------------------------------------
     sigma_u |           0
     sigma_e |  .22223923
         rho |           0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store random
```

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |    fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
         cpx |  -.0302853    -.0355732        .0052879        .0335472
         dof |   .0025336     .0037428       -.0012092               .
        prof |  -.0097646    -.0096473       -.0001173               .
          gw |   .0249518     .0485802       -.0236284        .0216007
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        1.42
                Prob>chi2 =      0.8408
                (V_b-V_B is not positive definite)

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        stlib[id,t] = Xb + u[id] + e[id,t]

        Estimated results:
                     |       Var     sd = sqrt(Var)
             ---------+-----------------------------
               stlib |    .0700291       .2646301
                   e |    .0493903       .2222392
                   u |          0               0

        Test:   Var(u) = 0
                             chi2(1) =     3.72
                          Prob > chi2 =     0.0537
```

```
. reg stlib  cpx  dof  prof  gw, robust

Linear regression                               Number of obs =      47
                                                F(  4,    42) =    3.07
                                                Prob > F      =  0.0263
                                                R-squared     =  0.2115
                                                Root MSE      =  .24592

------------------------------------------------------------------------------
             |               Robust
      stlib |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0355732    .013744    -2.59   0.013    -.0633098   -.0078366
         dof |   .0037428   .0016265     2.30   0.026     .0004604    .0070252
        prof |  -.0096473   .0108399    -0.89   0.379    -.0315232    .0122286
          gw |   .0485802   .0461161     1.05   0.298    -.0444858    .1416462
       _cons |   .6485348   .0986238     6.58   0.000     .4495039    .8475657
------------------------------------------------------------------------------

.
```

```
. xtset id year, yearly
       panel variable:  id (strongly balanced)
        time variable:  year, 2007 to 2014
                delta:  1 year

. reg  stlib  cpx  dof  prof  gw  cxpgw  dofgw  progw

      Source |       SS       df       MS              Number of obs =      47
-------------+------------------------------           F(  7,    39) =    1.87
       Model |  .810471752     7  .115781679            Prob > F      =  0.1007
    Residual |  2.41086558    39  .061817066            R-squared     =  0.2516
-------------+------------------------------           Adj R-squared =  0.1173
       Total |  3.22133733    46  .070029072            Root MSE      =  .24863

------------------------------------------------------------------------------
       stlib |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0087071   .0243565    -0.36   0.723    -.0579727    .0405586
         dof |   .0044837   .0044225     1.01   0.317    -.0044616     .013429
        prof |   .0003643   .0315537     0.01   0.991    -.0634591    .0641876
          gw |   .1303739   .0648584     2.01   0.051    -.0008145    .2615624
       cxpgw |  -.0119852   .0100747    -1.19   0.241    -.0323633    .0083928
       dofgw |  -.0011661   .0032687    -0.36   0.723    -.0077776    .0054454
       progw |  -.0043621   .0163544    -0.27   0.791     -.037442    .0287178
       _cons |   .4692685   .1711395     2.74   0.009     .1231061    .8154309
------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
       progw |      8.98    0.111379
       cxpgw |      8.43    0.118634
        prof |      8.38    0.119391
          gw |      4.99    0.200481
         cpx |      4.38    0.228089
       dofgw |      2.12    0.471180
         dof |      2.04    0.489836
-------------+----------------------
    Mean VIF |      5.62

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of stlib

         chi2(1)      =    23.23
         Prob > chi2  =   0.0000
```

```
. xtreg  stlib  cpx  dof  prof  gw  cxpgw  dofgw  progw, fe

Fixed-effects (within) regression               Number of obs      =        47
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.1623                         Obs per group: min =         7
       between = 0.3011                                        avg =       7.8
       overall = 0.2170                                        max =         8

                                                F(7,34)            =      0.94
corr(u_i, Xb)  = -0.1425                        Prob > F           =    0.4883

------------------------------------------------------------------------------
       stlib |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0111789   .0388816    -0.29   0.775    -.0901959    .0678381
         dof |   .0053846   .0039754     1.35   0.185    -.0026944    .0134636
        prof |  -.0117498   .0285491    -0.41   0.683    -.0697686     .046269
          gw |   .1043935   .0660738     1.58   0.123    -.0298847    .2386717
       cxpgw |  -.0139592    .010559    -1.32   0.195    -.0354177    .0074994
       dofgw |  -.0031615   .0029988    -1.05   0.299    -.0092559    .0029328
       progw |   .0020951   .0150521     0.14   0.890    -.0284944    .0326846
       _cons |   .5625973   .2555973     2.20   0.035     .0431612    1.082033
-------------+----------------------------------------------------------------
     sigma_u |  .15005173
     sigma_e |   .2217893
         rho |  .31399767   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(5, 34) =     3.00                 Prob > F = 0.0238

. est store fixed
```

```
. xtreg  stlib  cpx  dof  prof  gw  cxpgw  dofgw  progw, re

Random-effects GLS regression                   Number of obs      =        47
Group variable: id                              Number of groups   =         6

R-sq:  within  = 0.1349                         Obs per group: min =         7
       between = 0.4566                                        avg =       7.8
       overall = 0.2516                                        max =         8

Random effects u_i ~ Gaussian                   Wald chi2(7)       =     13.11
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0695

------------------------------------------------------------------------------
       stlib |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0087071   .0243565    -0.36   0.721    -.0564449    .0390307
         dof |   .0044837   .0044225     1.01   0.311    -.0041841    .0131516
        prof |   .0003643   .0315537     0.01   0.991    -.0614798    .0622083
          gw |   .1303739   .0648584     2.01   0.044     .0032538    .2574941
       cxpgw |  -.0119852   .0100747    -1.19   0.234    -.0317313    .0077609
       dofgw |  -.0011661   .0032687    -0.36   0.721    -.0075726    .0052403
       progw |  -.0043621   .0163544    -0.27   0.790    -.0364162     .027692
       _cons |   .4692685   .1711395     2.74   0.006     .1338412    .8046958
-------------+----------------------------------------------------------------
     sigma_u |           0
     sigma_e |   .2217893
         rho |           0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store random
```

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |    fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
         cpx |  -.0111789   -.0087071       -.0024718        .0303075
         dof |   .0053846    .0044837        .0009009               .
        prof |  -.0117498    .0003643        -.012114               .
          gw |   .1043935    .1303739       -.0259804        .0126152
       cxpgw |  -.0139592   -.0119852       -.0019739        .0031612
       dofgw |  -.0031615   -.0011661       -.0019954               .
       progw |   .0020951   -.0043621        .0064572               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =    -2.92    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
cpx	-.0111789	-.0087071	-.0024718	.0361469
dof	.0053846	.0044837	.0009009	.0005499
prof	-.0117498	.0003643	-.012114	.0053507
gw	.1043935	.1303739	-.0259804	.035774
cxpgw	-.0139592	-.0119852	-.0019739	.0062139
dofgw	-.0031615	-.0011661	-.0019954	.0007856
progw	.0020951	-.0043621	.0064572	.0041538

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 11.94
Prob>chi2 = 0.0356
(V_b-V_B is not positive definite)

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        stlib[id,t] = Xb + u[id] + e[id,t]

        Estimated results:
                     |       Var     sd = sqrt(Var)
             ---------+-----------------------------
                stlib |   .0700291       .2646301
                    e |   .0491905       .2217893
                    u |          0              0

        Test:   Var(u) = 0
                             chi2(1) =     4.54
                          Prob > chi2 =     0.0331
```

```
. reg  stlib  cpx  dof  prof  gw  cxpgw  dofgw  progw, robust

Linear regression                               Number of obs =      47
                                                F(  7,    39) =    2.10
                                                Prob > F      =  0.0666
                                                R-squared     =  0.2516
                                                Root MSE      =  .24863

------------------------------------------------------------------------------
             |               Robust
      stlib |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cpx |  -.0087071   .0175696    -0.50   0.623    -.0442449    .0268308
         dof |   .0044837   .0030431     1.47   0.149    -.0016715    .0106389
        prof |   .0003643   .0291238     0.01   0.990    -.0585442    .0592727
          gw |   .1303739   .1309584     1.00   0.326    -.1345144    .3952622
       cxpgw |  -.0119852   .0096037    -1.25   0.219    -.0314105     .00744
       dofgw |  -.0011661   .0024469    -0.48   0.636    -.0061153    .0037831
       progw |  -.0043621    .017144    -0.25   0.800    -.0390391    .0303149
       _cons |   .4692685   .1945766     2.41   0.021     .0757001    .8628369
------------------------------------------------------------------------------

.
```