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The relative contribution of financial and non-financial determinants to firm growth under high and low levels of information asymmetry

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The relative contribution of financial and non-financial determinants to firm growth under high and low levels of information asymmetry

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Abstract

Various financial decisions contribute to the success of firms including investment decisions, dividend policy and financing decisions (capital structure). Nevertheless, other variables such as the industry in which the firm operates, size of the firm and ownership structure can also play an important role in increasing overall corporate performance. Extant research utilises a number of proxies for estimating corporate success, including profitability, size, employment, to name a few. This thesis focuses on one of the most important drivers of corporate success - firm growth. Arguably, growth is an ultimate goal for all companies as it benefits all stakeholders. In this study, firm growth is proxied using the growth-in-sales indicator.

The financial and non-financial variables mentioned above can, in various circumstances, contribute or hinder firm growth. The three main corporate decisions (investment, dividends and financing), as reflected by the aforementioned financial measures, can contribute or hinder firm's growth as there is almost always a trade-off amongst them, owing to their complex inter-relationships. Similarly, a non-financial determinant such as ownership structure can contribute to firm growth. A major factor that affects these relationships is the presence of information asymmetry. The latter is considered as a mediator as it could explain the relationship between financial, non-financial decisions and firm growth. Information asymmetry is measured in this thesis using three proxies to distinguish between high- and low-levels of information asymmetry, namely Sensitivity of stock returns to expected Return on Equity (Beta ROE), Probability of default of Return on Equity (PD ROE), and the Q Ratio. This thesis contributes to the literature of corporate finance by examining the relative contribution of financial and non-financial variables to firm's growth, investigate the impact

of the level of information asymmetry and examine the suitability of further proxies for measuring information asymmetry.

The sample used in this study is all non-financial active companies listed in the S&P500 for the period from 1989-2014. The empirical investigation in this study involves tests for collinearity, linearity, normality, endogeneity, and fixed effects. To accommodate possible endogeneity issues, the regression analysis employed utilises a Generalised Method of Moments (GMM) framework alongside a standard linear regression, discriminate analysis, and Z-score modeling.

The results of the empirical analysis indicate a variation in the impact of financial and non-financial variables on firm growth at high and low levels of information asymmetry especially regarding investment and financing decisions. A similar picture emerges for the cases of firm size and industry variables. Furthermore, the impact of changes in ownership structure appears to vary according to the level of information asymmetry and the proxy used to measure it. In addition, corporate dividend policy (information that is monitored closely by the market) has a similar effect on firm growth across all asymmetric levels. These findings prove that information asymmetry plays a vital role in the relationship between corporate financial decisions and growth of the firm. Finally, the results contribute to the relevant methodological discussion in the vast literature on the estimation of information asymmetry by demonstrating that the classical and standard proxies for information asymmetry are not consistent in terms of the ability to differentiate between favorable or adverse selection (which corresponds to low and high level of information asymmetry). Therefore, future research is warranted in the identification of alternative proxies that can capture such effects across different market conditions and alternative firm characteristics.

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Dedication

I dedicate this work to my parents who were always there for me and to the late Dr. Wassef who always believed in me but fate didn't let him live to see this day coming. You will always be in my heart and mind.

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Table of Acronyms

Beta ROE	Sensitivity of stock returns to expected Return on Equity
BR	Business Risk
CAFA	Current Assets-to-Fixed Assets
DE	Debt-to-Equity Ratio
DeltaND	Change in Non-debt tax shield
DPR	Dividend Payout Ratio
DR	Debt Ratio
DY	Dividend Yield
ECTR	Effective Corporate Tax Rate
FATA	Fixed Assets-to-Total Assets
LnInv	Change in Inventory
MVE	Market Value of Equity
NDTAX	Non-debt tax shield
OIA	Operating Income-to-Assets
OIS	Operating Income-to-Sales
PD ROE	Probability of Default of Return on Equity
ROA	Return on Assets
ROE	Return on Equity
TA	Total Assets

Chapter One

Introduction

The agency problem has taken considerable attention of researchers from various disciplines including economics, management, and finance. Oliver Hart and Bengt Holmström won the Nobel Prize in Economics in 2016 for their work on contract theory. Contract theory is a section of agency theory that is related to designing contracts that reduce conflicts of interest between executive managers and shareholders. (Hart, 1995) There has been considerable attention given to the agency problem by many scholars such as Jensen and Meckling (1976), Ross (1977), and Fama and French (2002). Despite these attempts, the problem still prevails between managers and shareholders. One of the major causes of the disconnection between managers and shareholders is the existence of information asymmetry - where managers might intentionally or unintentionally disseminate incomplete information about various aspects of the business. (Akerlof, 1970)

The concepts of agency problem and information asymmetry are not interchangeable, however in some cases they could be linked to each other. For example, severe information asymmetry could cause more agency conflicts between managers and shareholders or shareholders and bondholders. Yet in other cases, the industry in which the firm operates requires keeping the information as private as possible like the case of R&D or pharmaceutical firms. In the context of this thesis, information asymmetry is considered in its unfavorable form as one of the main causes of agency conflicts between managers and shareholders. Information asymmetry has a severe impact on firms in general, and on share prices in particular. As far as investors are less or uninformed than insiders, the probability of facing adverse selection problems increases, especially as information dissemination can be perceived as either a good or bad signal to the market. Corporate finance decisions like capital structure decisions, taking on new investments, and dividend payout policies can act as such signals for market participants. Nonetheless, the presence of information asymmetry could disrupt the intended signal behind these decisions. Recent developments in the theories related to these decisions incorporated the effects of agency issues and information asymmetry (Li and Zhao, 2008; Morellec and Schürhoff, 2011) showing that these decisions could, in fact, be affected by the presence of information asymmetry. The argument of this thesis is that information asymmetry has a mediating role in explaining the relationship between dependent variable (firm growth) and independent variables (financial and non-financial decisions). All theoretical developments and empirical findings related to these types of firm financial decisions are discussed in detail in the next chapter. This chapter also covers in depth the issue of information asymmetry, its proxies, and causal effects.

Most firms share similar goals, such as wealth maximisation, profitability, and growth. This study focuses on one of these goals - firm growth – which is typically measured in terms of growth in sales, assets, employment, etc. (Delmar et al., 2003). According to Dobson (2004), growth should be the optimal goal of any firm as it benefits all stakeholders including managers and shareholders. Moreover, Geroski et al. (1997) found a significant positive impact of current growth rates on expectations of long run profitability and market value of the firm. This strengthens the propositions of Dobson (2004) that growth benefits stakeholders in general. The reason that firms should focus on growth rather than other proxies of performance such as share price stems from further practical consideration that share prices are highly volatile in the financial markets. Nevertheless, various firm events might severely affect prices in the short run despite the fact that the firm is performing well. For example, General Motors' share dropped from $40 to $1 within two years and Apple's share dropped by more than 5% after the news of Steve Jobs' death. Thus, firms should rather focus on growth in terms of sales, assets, profits etc. to measure performance.

Prior literature has shown (Chen et al., 2010) that all three main financial decisions (investment, financing, and dividend decisions) do interact together and can't be distinct or isolated from each other. Moreover, the three of them should contribute to firm growth, if properly used, or hinder growth if misused. Nonetheless, non-financial variables might affect firm growth as well such as the industry to which the firm belongs, the size of the firm, and changes in its ownership structure. A major factor that could affect the relationship between financial and non-financial variables on one side and firm growth on the other side is the existence of information asymmetry as it might hinder the ability of firms to benefit from such determinants in a way that best serves the interests of its stakeholders.

Previous literature, which will be discussed in the next chapter, has examined several of the above relationships. For example, firm growth, its determinants, phases, and proxies are all examined extensively (Ardishvili et al., 1998; Delmar et al., 2003; Hamilton, 2011; and Coad and Guenther, 2013). Financial decisions discussed above like capital structure, investment in long-term and current assets, and dividend policy are the core of research in finance and all of them are affected by information asymmetry. The latter, its proxies and impact are examined ever since Akerlof (1970) presented the idea of asymmetric information. Prior literature suggests that investment, financing, and dividend decisions are all independently influenced by information asymmetry (Bolton et al., 2011; Morellec et al., 2013; Li and Zhao, 2008; and Morellec and Schürhoff, 2011). Nonetheless, research on how these decisions contribute to firm growth is rather scarce with only a handful of studies in the literature (Fama and French, 2002; and Frank and Goyal, 2005). To the best of the researcher's knowledge, there is no literature examining the contribution of the three decisions to firm growth and how this contribution varies according to different levels of information asymmetry.

The importance of this relationship stems from three facts. Firstly, these decisions are not distinct from each other (Li, 2011). Secondly, information asymmetry could hinder firm growth through the introduction of false signals that lead to adverse selection and moral hazard problems that affect firm's reputation (Li and Zhao, 2008; Lambert et al., 2011) Thirdly, firms that are unable to grow might not be able to attract suitable equity capital or credit providers. Therefore, this thesis aims to fill the gap in knowledge by examining the financial determinants of firm growth at high and low levels of information asymmetry using three suitable proxies for different levels of information asymmetry. The three proxies include the sensitivity of stock returns to expected return on equity (ROE), probability of default of ROE (PD ROE) and Q ratio. The rationale of the three proxies is discussed in details in the methodology section.

In terms of firm growth, prior literature has demonstrated that various non-financially-related decisions can also contribute to firm growth, e.g. industry effects, ownership structure, and size. As such, this thesis also examines the impact of ownership structure on firm growth at high and low levels of information asymmetry in addition to controlling for industry type and size. A recent study by Al-Najjar (2015) provides inconclusive evidence on the impact of institutional ownership on firm performance in contradiction to the wide belief that ownership structure can play an important role in reducing information asymmetry (Fazlzadeh et al., 2011; and Judge, 2010). Hence, the conflicting findings on the role of ownership in reducing information asymmetry provide a suitable motivation for the examination of the impact of ownership structure on firm growth as it will help us to better understand the role of both financial and non-financial determinants of growth under high and low information asymmetry conditions.

Significance of the Thesis

The significance of this study stems further from practical considerations. As financing, investment and dividends decisions are all interrelated with each other, each decision should have a relative weight at any given time and should ultimately be linked to the overall goal of firm growth (otherwise they lose their significance). Similarly, any changes in ownership structure should affect firm growth positively or negatively, As such, it is very important to examine the relative contribution of each decision to the growth of the firm and whether or not this can be captured by both financial and non-financial determinants on an ex ante basis.

Objectives of the Thesis

The overall objectives of this thesis are as follows.

1. Investigate the key financial determinants of firm growth at high and low levels of information asymmetry.
2. Examine the impact of changes in ownership structure on firm growth at high and low levels of information asymmetry.
3. Measure the relative contribution of financial determinants, ownership structure, industry type, and size of the firm to firm growth.

Contribution of the Thesis

The contribution of this thesis could be divided into academic and practical considerations. From a practical consideration, the expected findings could help in designing suitable firm financial policies that minimise the impact of information asymmetry while maximising the relative contribution of each financial decision. For example, firms that suffer from high information asymmetry might decide to increase dividend payout ratio as a way to signal their profitability, whereas firms that face fewer information asymmetry problems could decrease their payout and invest their earnings within the business to achieve organic growth. It could also help firms reach higher growth rates by stressing on factors that contribute to growth and avoiding those that hinder it. Finally, it can help investors in selecting where to invest based on their understanding of firms' key policies and structures such as dividend policy, capital structure, investment style, and ownership structure. As for the academic contribution, this study helps in filling a gap in the literature as previous studies did not examine the contribution of financial and non-financial determinants on firm growth at high and low levels of information asymmetry. Also, it contributes to the literature on information asymmetry as it shows the differences associated with using various proxies for information asymmetry and how inconsistent they are.

This thesis is organised as follows: chapter two reviews relevant literature including theoretical developments and empirical studies that examine the investment, financing, and dividend decisions of the firm, the agency problem and the role of information asymmetry, including prior evidence on their implications for the aforementioned firm decisions. This chapter also reviews possible interrelationships and how these can determine firm growth at the theoretical and empirical level.

Chapter three is the first empirical chapter investigating the relative contribution of investment, financing, and dividend decisions to firm growth under high and low levels of information asymmetry. The chapter begins with the introduction of the data selection procedure and continues with the methodological framework adopted. The chapter concludes with the empirical examination and the presentation and analysis of the results.

Chapter four is the second empirical chapter, and presents the effect of ownership structure on firm growth at various levels of information asymmetry.

Chapter five is the third empirical chapter, and examines the relative contribution of financial and non-financial variables to firm growth using discriminant analysis.

Chapter six is a summary of all key findings, relevant policy implications as well as some open questions for future research.

Chapter Two

Literature Review

2.1 Introduction

Growth is a basic human characteristic that people exercise in almost every aspect of their lives. In a corporate context, firms follow humans in their need for growth as Penrose (1959) pointed out in her seminal book "*The Theory of the Growth of the Firm*" where she suggested that growth of firms is directly connected to a group of human beings trying to do or achieve something. Since then, numerous researchers have tried to understand how firms grow and develop proxies for measuring firm growth, for example, Miller (1987), McCann (1991), and Dunne and Hughes (1994) used the absolute growth in sales as a measure for firm growth. Other studies such as Zahra (1993), Cooper el al. (1994), Peters and Brush (1996) used the growth in relative employment as a proxy of firm growth. After reviewing extensive literature on firm growth, Ardishvili et al. (1998) came up with a list of the common measures that are used as possible growth indicators; sales, profit, employment, size, market share, and physical output. Regardless of the proxy used to measure firm growth, all firms tend to have the common goal of expanding their businesses, operations, and size.

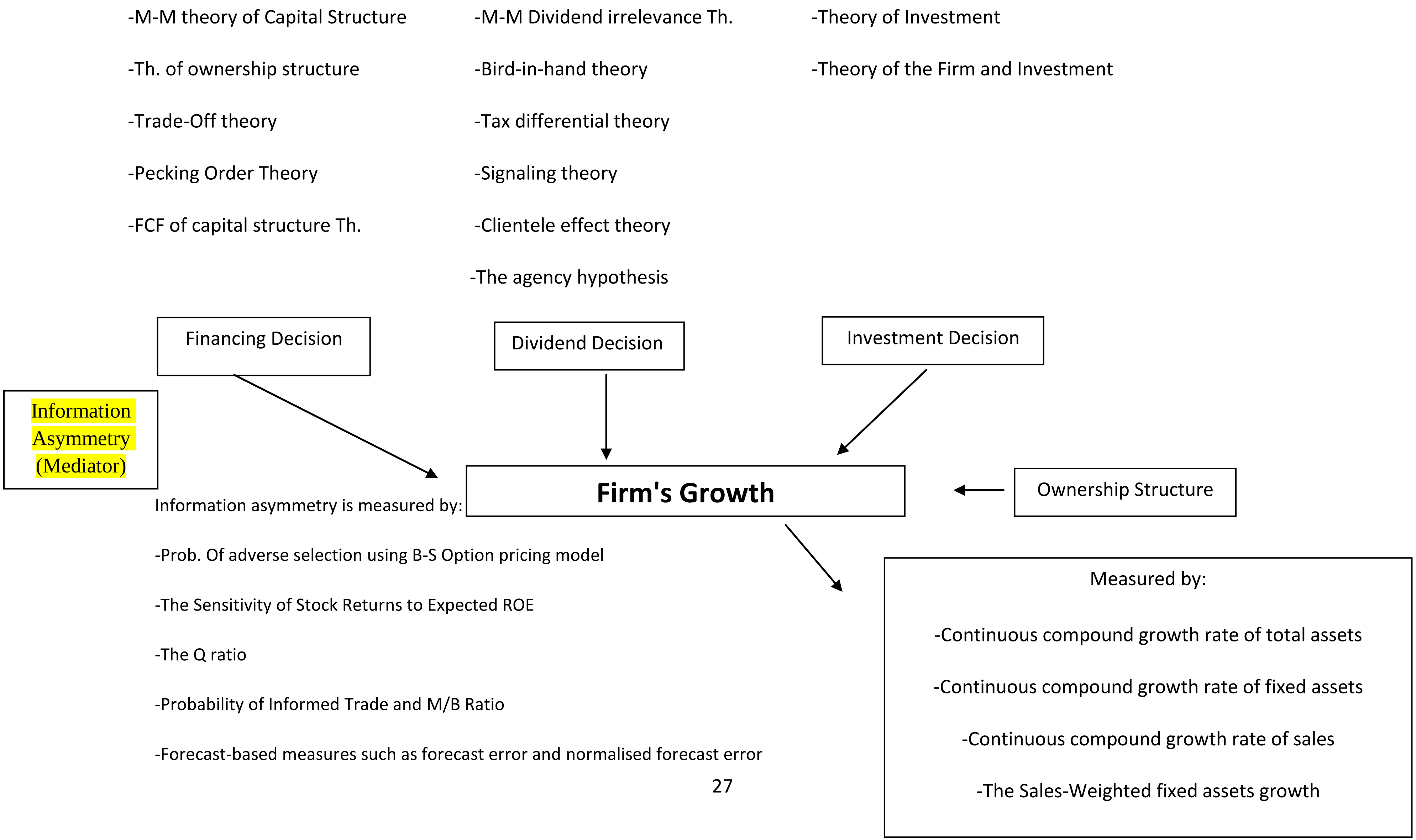
The firm is considered a legal entity so it has the capacity to engage in business agreements, sign contracts, and incur debts. Every major decision taken within the firm can impact its growth. It is argued that the primary activities of financial managers are investment and financing decisions (See for example Bolton et al., 2011; Morellec et al., 2013). Nevertheless, dividend decisions are what are monitored closely by the investors and are likely to have a significant effect on firms' stock prices (Gitman and Zutter, 2012, pp. 19, 561). These three areas of decision are not separate from each other; their interaction was examined by Dhrymes and Kurz, 1967, pp. 427-8 who were the first to find an explicit link between them. Using a sample of 181 industrial and commercial firms for the period 1950-60, they found a strong interdependence between the dividend and investment decisions. Moreover, the external finance decision is affected by both the investment and dividend decisions but does not affect them except during upswings and peaks. Consistent with this, Chen et al. (2010) suggested that each two of the three decisions interact together.

This study aims at examining how the three decisions; investment, financing, and dividend interact to affect firm growth. What hinders this interaction is the existence of information asymmetry between various stakeholders. Li and Zhao (2008), and Morellec and Schürhoff (2011) were among the most recent studies that examined how investment, financing, and dividend decisions are affected by the existence of information asymmetry. Additionally, several studies have examined how firm growth is affected by financing, investment, and dividend decisions; notably Rajan and Zingales (1995); Fama and French (2002); and Frank and Goyal (2005). This study presents an expansion of the existing literature as it brings these two research questions together and examines the relative contribution of the three decisions to firm growth under high and low levels of information asymmetry. Those previous studies attempted to investigate the contribution of each decision individually to firm growth or the impact of information asymmetry on one of the decisions; but none of them, to the best of the researcher's knowledge, measured the contribution of all three to firm growth under various levels of information asymmetry.

Figure 2.1 presents a cognitive map of the literature review with all the topics that are covered in this thesis. As mentioned above, three decisions have an impact on firm growth; financing, dividend, and investment. Additionally, the information asymmetry affects this relationship. Therefore, the cognitive map presents the theories that tackled the three decisions and also tackles the proxies used to measure information asymmetry. Moreover, firm growth -the dependent variable- and how is it measured is summarised as well. Another aspect that is examined in this thesis is the contribution of one of the major non-financial variables on firm growth - ownership structure - to understand the distinction between its impact and that of the financial decisions discussed above.

The organisation of this chapter is as follows: section two discusses the agency theory; its origins, developments, and proxies used to measure information asymmetry. Section three addresses the growth of the firm; why focusing on growth, patterns, proxies used is important, and how to select the appropriate proxy. The relationship between the agency problem and financing, dividend, and investment decisions is presented in section four including empirical analysis of each one. The interaction between the three decisions and how they affect firms' growth is discussed in section five. Finally, the effect of ownership structure on firm growth is discussed in section six.

Figure 2.1: Structure of Relevant Theories



This study aims to analyse the relative contribution of financing, dividend, and investment decisions to firms' growth under each high and low levels of information asymmetry.

The next section presents the origins of agency theory and information asymmetry. It is organised as follows; first, the origins of the agency problem and how the theory developed. Second, the measurement of information asymmetry and related empirical studies are presented. Lastly, the effect of the timing of the issue of securities is presented.

2.2 Agency problem and firm growth

2.2.1 Origins of agency problem

A principal-agent relationship exists when someone (the agent) acts on behalf of a person or a group (the principal). This relationship exists in many aspects of life; a lawyer, for example, acts on behalf of the client etc. In a business context, shareholders, who are the owners of the firm, are the principals and the managers who run the business are the agents. Managers are supposed to work and make decisions that are matching with the best interest of the shareholders. A problem would occur if the agents decide to work for their own best interest regardless of what is best for the principals, especially if the agents know more information about the business operations than the principals. In this case, there exists information asymmetry which was first introduced by Akerlof (1970). In this paper, he introduced the idea of buyers and sellers of used cars to deliver his idea about owners knowing more than the buyers of used cars. The idea is that sellers of used cars know about the condition of their cars and try to hide any unobservable drawbacks from the sellers. Thus, sellers might purchase the cars without noticing such drawbacks. By the time they discover them, the transaction would have already taken place. The situation where one party of a transaction knows information that the other party does not know is what was afterwards known as information asymmetry.

Soon after the introduction of information asymmetry by Akerlof, the Economic Theory of Agency was introduced by Ross (1973) where he emphasised the existence of a problem regarding the agents acting on behalf of the principals. Jensen and Meckling (1976), in a seminal paper, presented the theory of the firm where they considered the firm as a group of security holders with differing goals. According to their study, the two major conflicts arise between bondholders and shareholders, and shareholders and management. For the first conflict, firms might favor shareholders' interest on the expense of bondholders which creates what they called "*risk shifting*" problem. A second conflict might arise between management and the shareholders when managers are paid wages but are not giving their best effort to align with shareholders goals. This is called the "*effort problem*" (Jensen and Meckling, 1976).

Another agency problem was presented by Myers (1977) which he called "*debt overhan*g" that takes place when firms have a huge debt outstanding. If the firm works in the best interest of shareholders, it might forgo safe investments, even if they have positive net present value, because the proceeds from those investments will shift to bondholders. The agency problems proposed in the publications mentioned above would be costly for firms due to the inappropriate behavior of managers and the costs incurred for mitigating this behavior. This topic caught the attention of many scholars who tried to find solutions to reduce the effects of the agency problem; Grossman and Hart (1983) proposed that using debt issuance will force managers to work hard to avoid bankruptcy. Easterbrook (1984) suggested that dividend payment will reduce the amount of money available for managers to misuse. Weiss and Beckerman (1995) pointed out the role of institutional investors in reducing agency costs through effective monitoring while Murphy (1997) designed a structure for executives' compensation that would help aligning their goals with shareholders' interests through stock options and annual bonus plans. Hillman and Dalziel (2003) asserted that the board of directors can play an important role in reducing agency costs through effective monitoring and providing resources in a dependent manner.

More recently, Gamba and Triantis (2013) suggested that usage of debt covenants to alleviate the agency costs would reduce the problem. Despite all of these efforts, the asymmetry of information still exists. Anderson (2001) argues that the propositions of more government regulations as a solution to the information asymmetry problem are wrong because such regulations do not help to solve the problem but rather create more information asymmetry due to the excessive usage of regulations that hinders the ability of market participants from finding out or acting upon relevant facts. Thus, the information asymmetry between managers, who know more, and shareholders still exists despite increasing regulation.

This study argues that the reputation of firms that are known to have high levels of information asymmetry would be negatively affected because the network of shareholders, suppliers, creditors and other stakeholders would perceive such firms as more risky. Therefore, this riskiness of firms would result in higher required return by shareholders/creditors to compensate them for the higher risk, which in turn increases the cost of capital. Thus, the firms' ability to raise debt/equity needed to invest in assets will be hindered. Nevertheless, assets are required to generate more sales and promote growth. In other words, the research suggests that information asymmetry hinders the firms' growth in terms of losing sales and/or lack of ability to raise financing from financial markets at reasonable cost due to lack to investors' trust. It is important to understand first what proxies could be used to measure information asymmetry in order to assess its impact on firm growth.

2.2.2. Measuring the level of information asymmetry

The literature cites that the agency problem between firm managers and investors is associated with information asymmetry. Since the agency costs cannot be easily quantified, the presence of information asymmetry was employed to predict the severity of the agency issues. Various measures of information asymmetry are empirically employed. These measures can be categorised into market-based, firm-based, and forecast-based proxies. This section discusses the proxies in each category followed by empirical examination. Starting with the forecast-based measures, Krishnaswami and Subramaniam (1999) followed Christie (1987) in using the *forecasting error* in earnings as a proxy to measure the level of information asymmetry. This measure is based on the difference between analysts' forecast of earnings and the actual earnings realised during the period. The severer the information asymmetry, the higher the forecast error will be. A main criticism to the applicability of this measure is that the forecast error might be caused by volatility in the firm's earnings rather than due to information asymmetry. To avoid this problem, the authors used the *normalized forecast error* which is the ratio of forecast error in earnings to the earnings volatility of the firm. They also used standard deviation in forecasts, and the volatility in abnormal returns that was used by Dierkens (1991). Their last measure was residual volatility in daily stock returns following other studies that used this measure such as Bhagat et al. (1985) and Blackwell et al. (1990). Their analysis revealed that spin outs result in lower information asymmetry after their completion.

As for the market-based measures, the market-to-book ratio was used by McLaughlin et al. (1998) to examine the relation between information asymmetry and firm performance.[1] They found that firms with higher information asymmetry tend to have performance decline after seasoned equity offerings. Moreover, the direct trade spread was commonly used to measure the asymmetry between investors' price expectations and the actual stock price (Glosten and Harris, 1988; Madhavan et al., 1997; Huang and Stoll, 1997). The usage of direct trade spread faces some limitations in real life application. Callahan et al. (1997) and Heflin et al. (2005) suggest that the common and major critics to direct trade spread are the econometric problems associated with time series and price dependency that renders the trade spread biased. Also, Lee et al. (1993) suggested that market makers protect their interests from the effects of information asymmetry by simultaneously manipulating quoted bid and ask prices along with the quoted depths associated with those prices. This hinders the dependency on spread-based measures because they are incomplete and difficult to interpret.

Another market-based proxy for measuring information asymmetry is the Probability of Informed Trade (PIN) suggested by Brown and Hillegeist (2007) which is based on the imbalances between buy and sell spreads among traders in the secondary market. They assert that this indirect spread-based proxy of information asymmetry can overcome the difficulties facing direct trade spread. However, a major limitation to trade spread according to Madhavan et al. (1997) is that the costs of adverse selection decrease throughout the same trading day. Moreover, data about daily trade spread are hard to access through financial databases that normally offer quarterly or annual data. This suggests that, in practice, the

[1] Market-to-book ratio indicates the variation in share price relative to its book value. The higher this variation is, the more likely investors would be less informed about the firm's performance. That is why market-to-book ratio is used as a proxy for measuring information asymmetry by McLaughlin et al. (1998)

closing spread is relatively a weak proxy and a hard to access measure of information asymmetry.

Building on previously used proxies, Van Ness et al. (2001, p.5) mentioned that, "*variables such as market-to-book, volatility, and institutional ownership are often used to measure the asymmetric information present in a stock. Recent papers also use adverse selection components as a direct measure of information problems."* They examined the relationship between adverse selection and information asymmetry's variables, with their analysis suggesting that volatility is the major determinant of adverse selection, while market-to-book ratio and analyst forecast errors were unrelated to adverse selection. They concluded that there is no certain prescription to which model of adverse selection should be used, if any, to measure information asymmetry because adverse selection was mainly due to volatility of stock prices rather than asymmetry of information.

Finally, the well-known firm-based measure for information asymmetry is Q ratio (Adam & Goyal, 2000; Clarke and Shastri, 2000; Varici, 2013; Brainard and Tobin, 1968; Tobin, 1969).

The above mentioned measures are empirically examined in various studies in terms of their consistency and reliability. In this regard, Li and Zhao (2008) develops a link between information asymmetry and dividend policy. They followed the suggestions of Elton et al. (1984) and used two proxies to measure information asymmetry: analyst earnings forecast errors and the dispersion in analyst forecasts. Prior research suggests that both proxies are positively correlated with the amount of asymmetric information.

There is some criticism facing the usage of earnings forecast errors as the variation of returns may be due to uncertainty, with information asymmetry a less significant factor.

However, Li and Zhao (2008) are convinced that it still works as a proxy of information asymmetry as they suggest that, "*Other studies show that our measures for information asymmetry do capture dimensions beyond firm risk. Ajinkya, Atiase, and Gift (1991) and Lang and Lundholm (1993, 1996) show that as firms enhance information disclosure, analyst earnings forecast accuracy increases while forecast dispersion decreases. Bowen, Davis, and Matsumoto (2002) show that conference calls improve analyst forecast precision and reduce forecast dispersion, and Chen and Matsumoto (2006) find that better access to management is associated with more accurate analyst forecasts*."

Their analysis suggest that firms that are subject to increased information asymmetry problems are less likely to make dividend payments, to initiate dividends, and to increase dividends, and that these firms also distribute smaller amounts. This is in contrast to the signaling hypothesis of dividends that the higher the payout, the better the signal conveyed to the market. It also opposes the suggestions of Rozeff (1982) and Easterbrook (1984) that dividend payments can, in fact, reduce agency conflicts.

In contrast to the findings of Van Ness et al. (2001), another study by Armstrong et al. (2011) suggested using adverse selection measures to forecast the level of information asymmetry. This study tried to measure the effect of information asymmetry on firms' cost of capital in competitive markets. Five proxies were used to measure information asymmetry: i) the adverse selection component of the bid-ask spread, ii) the bid-ask spread, iii) R&D expenditure, iv) scaled accruals quality (SAQ), and finally v) analyst coverage. Nevertheless, the data for the other accounting-based measures are either less accurate or unavailable. The findings of this study suggested that when markets are imperfect, information asymmetry has a discrete effect on cost of capital. In perfect markets, however, there is no relation between information asymmetry and cost of capital. This is consistent with the suggestions of Lambert et al. (2011) that information asymmetry has no impact on firms' cost of capital when perfect competition settings exist.

Based on the above discussion of proxies of information asymmetry and the critiques facing some of them, this thesis utilises three proxies of information asymmetry to differentiate between observations that correspond to high or low levels of information asymmetry. A first forecast-based proxy is sensitivity of stock returns to expected ROE (Beta ROE). This proxy is in line with the prior studies in the field such as Krishnaswami and Subramaniam (1999), Christie (1987) and Dierkens (1991). A positive figure indicates that investors can correctly forecast earnings, corresponding to low levels of information asymmetry, while a negative figure indicates inability to forecast earnings correctly due to information asymmetry and thus corresponds to high level of information asymmetry.

This thesis suggests a new market-based proxy of information asymmetry that is based on adverse selection, as suggested by Van Ness et al. (2001). We suggest this proxy to overcome the drawbacks of market-based proxies discussed above such as econometric issues, volatility, and time cap of available information. This proxy is called the Probability of Default of ROE (PD ROE) which is a modification of the Black and Scholes (1972, 1973) option pricing model. The Probability of Adverse Selection using the Black-Scholes option pricing model (probability of occurrence $N(d_2)$ is the cumulative standard normal density function). The $N(d_2) = 0$ refers to favorable selection and $N(d_2) \geq 0$ refers to adverse selection, thus the existence of asymmetric information.

Finally, we use the conventional firm-based measure of information asymmetry; the Q-Ratio that was used by Varici (2013). This measure is applied by differentiating between Q ratio either higher or lower than one, where the lower the Q ratio, the severer the information asymmetry problem between management and market participants. This is mainly due to under-investment behaviour of management (Koch and Shenoy, 1999: Stein, 2003). Q ratios that are much higher than one might result in over investment problems like empire building, yet in most cases, higher Q-ratios mean that the firm is trying to utilise its capacities better and invest more.

Measuring the level of information asymmetry is important to determine its impact and the mediating role it plays in the relationship between financing, investment, dividend decisions, and ownership structure on one side and firm growth on the other side. A very important implication for information asymmetry in practice is how it affects corporate decision making. One of the major implications for information asymmetry is its impact on financing firms through debt and/or equity. A significant amount of research was devoted to the relationship between information asymmetry and the timing of securities' issues.

2.2.3 Information asymmetry and timing of the issue

This section presents the theory of market timing that assumes that the timing of equity issues plays a major role in reducing information asymmetry associated with the issue. The theory is presented first, then several empirical studies that examined whether timing of the issue is significant or not are presented.

2.2.3.1 Theory of timing effect on equity issues

A line of studies that emerged in the 1990s examined the relationship between financing decisions and agency problems and focused on the timing of securities' issue. The timing of an issue could be a signal of information asymmetry because managers know more than shareholders about their firm's value and could use this knowledge to issue securities when firm is overvalued. The first advocates of the timing effect were Lucas and McDonald

(1990) and Korajczyk et al. (1992) who presented dynamic models that assumed that firms must issue securities to invest in growth projects. The idea behind Lucas and McDonald (1990) was that managers have information one period ahead of the market and act according to this knowledge. They issue stocks to finance a new investment immediately if the stocks are overvalued. Nevertheless, if the stocks are undervalued and the investment could be delayed without incurring high costs, the managers will postpone the issue until stocks are fairly valued with a rise in its price. The authors assert that this timing factor is the reason why equity issues are normally followed by decrease in share price because most firms issue when their stock is overvalued. Moreover, they suggest that firms will have higher abnormal returns prior to the issue especially for undervalued firms.

An extension to this view was suggested by Korajczyk et al. (1992) who asserted that timing of the issue could reduce and control the informational disadvantages associated with stock issues. Their model assumed that information asymmetry is at its lowest level after information releases. Firms, therefore, try to time the new equity issues right after information releases to mitigate the negative price reaction. Moreover, they assert that the decline in stock price is positively related to the length of the period between the issue and last information release. The propositions of the two models have been examined by a number of studies over the last two decades. Some suggested that timing is an important factor in deciding whether to issue equity or not. The results of some of those studies were presented in a comprehensive review by Klein et al. (2002). Rajan and Zingales (1995) found that firms tend to time their equity issue according to when they have high market-to-book ratio, also supporting the timing hypothesis. However, there is by no means consensus on the subject, some studies have suggested a relationship between equity issues and a firm's business cycles, such as Choe et al. (1993); Bayless and Chaplinsky (1996); and Baker and Wurgler (2000).

Additionally, an alternative implication for the timing hypothesis was presented by Manuel et al. (1993) who found that firms that perform well, and plan to distribute dividends, time the equity issue exactly after the dividend announcement. Additionally, poorer performers time the equity issue just before the dividend announcement of less payout ratio which indicates their poor performance. Baker and Wurgler (2002) presented evidence that supports the timing hypothesis and rejects both the pecking order and trade-off theories that will be discussed later. They found that low-leverage firms are those that issued equity after an increase in their market-to-book ratios, while high-leverage firms are those that issue debt because their market-to-book ratios decreased at the time they needed funds to finance new growth opportunities. Furthermore, the authors suggested that their evidence supporting the timing hypothesis is mainly due to market inefficiencies rather than information asymmetry. They support their proposition by citing the results of a survey by Graham and Harvey (2001) whom found that two thirds of financial managers consider the over - or under - valuation of stocks as a very important consideration when issuing new equity. Morellec and Schurhoff (2011) suggested that firms facing information asymmetry tend to signal their quality to investors through the timing of corporate actions and their mix of debt and equity financing, further supporting the timing hypothesis.

However, in contrast to those findings, Jung et al. (1996) found that timing is not an important determinant for firms to issue equity based on their analysis of returns following equity issues. Their five-year sample revealed insignificant excess returns following the issuance indicating that timing was not a key factor. Moreover, Frank and Goyal (2009) examined the capital structure decisions in publicly traded American firms over more than fifty years from 1950-2003 and found that timing has no direct relation to the pattern that they observed.

The theory that information asymmetry could influence firm decisions, such as the timing of issuance of securities, provides evidence that information asymmetry affects firms' growth. Building on the propositions that information asymmetry plays a role in hindering or stimulating firm growth, it is important to understand why firms should focus on growth, understand the determinants and proxies for measuring firm growth, and empirically challenge the reliability of those proxies. Firm growth is discussed in the following context.

2.3 Origins of literature on Firm Growth

2.3.1 Why firm growth not shareholders' value

Before advancing to the theory of firm growth, its developments, and key measures for firm growth, it is important to understand why stakeholders should focus on measuring firm growth rather than using other measures like shareholders' wealth, share price etc. In the finance literature, for example, Breen and Lerner (1973); Shleifer and Vishny (1988); Lazonick and O'Sullivan (2000) among many, the researchers suggest that the goal of the firm is shareholders' wealth maximisation through continuous increases in share price. They argue that every decision within firms should be implemented only if it will add value to shareholders. Otherwise, managers might take decisions that serve their goals like empire building and prestigious benefits etc. Other goals such as profit maximisation, sustainability and market share are also valued by market participants but not as much as long-term shareholders' wealth. However, a broader view would show that firm growth would serve all of these goals simultaneously; Dobson (2004) illustrates why pursuing firm growth should be the optimal goal of managers even at the expense of shareholders' value. He suggests that managers recognise their obligations to *Stakeholders*, which includes employees, customers, society and regulatory bodies, as well as shareholders. Focusing on firm growth would best serve the interests of all of them.

The propositions of the author are explained in Dobson (2004) in light of both deontological and utilitarian theories. On the one hand, the deontological justification is that managers should take decisions that are consistent with the mission statement of the firm. The strategic goals of the firm would be achieved through focusing on firm growth as it serves employees' careers, market power and stability, diversity on boards of directors, and in turn, the long term shareholders' value. On the other hand, a utilitarian justification of firm growth would suggest that growth serves the aggregate welfare of all of society - growing firms contribute to the "*common good*" through creating jobs and higher GNP per capita. Thus, focusing on firm growth could be justified on the basis of one or both of these explanations. Similarly, Geroski et al. (1997) report a significant positive impact of current growth rates on expectations of long run profitability and market value of the firm. Another reason for focusing on growth is the suggestions of Aoki (1990) who asserts that employees might be willing to forgo current earnings if there are growth opportunities that might lead to future possible promotion in an expanding hierarchy. Moreover, maintaining a positive growth rate would result in more satisfaction and commitment for both managers and employees. Finally, on practical basis, as mentioned in chapter one, share prices do not always reflect firm performance as the high volatility in share prices could be due to various political, economic, or industrial reasons. This renders the share prices biased and inappropriate to measure overall corporate performance. However, Witt (2000) argues that growth has some disadvantages if not dealt with properly; bureaucracy and less motivation for initiation along with steady routine methods of production might hinder the attractiveness of growth as a measure of a firm's performance.

2.3.2 Definition and determinants of firm growth

A very early attempt to understand how firms grow was presented by Ashton (1926) who analysed the growth pattern of British textile firms. As the author concludes, "*In their growth they obey no one law. A few apparently undergo a steady expansion. With others, increase in size takes place by a sudden leap*." (Ashton, 1926, pp. 572 -573). Gibrat (1931) presented his theory "*law of proportionate effect*" which is academically referred to as Gibrat's law. According to his observations, a firm's expected growth rate is independent of its size; there is an equal probability of a proportionate change in size for all firms in a certain industry regardless of their size at the beginning of the examined period. Additionally, he explains the growth of firms on the basis of their history of multiplicative shocks, which might lead to infinite growth. Finally, Gibrat's law assumes a lognormal distribution of firm size across industries.

Nonetheless, many limitations to Gibrat's law were presented in the years that followed. Kalecki (1945) suggested that it is not reasonable to assume infinite variance in firm size; while, Chester (1979) refuted Gibrat's law due to the existence of autocorrelation structure in the growth shocks. In a similar manner, Reichstein and Jensen (2005) observed that the annual growth rates are not normally distributed as Gibrat proposed, and Bottazzi and Secchi (2006) and Hymer and Pashigian (1962) both reported finding a negative relationship between firm size and the growth rate variance.

Despite all the limitations facing Gibret's law, it opened the door for further research in the field of firms' growth. A major contribution to knowledge regarding this area was the seminal book by Penrose (1959) that presented the basis for the theory of the growth of the firm. In her book, Penrose differentiated between two forms of growth: in terms of amount, and in terms of size. Her analysis defined amount as referring to the output, sales, exports etc. of a firm. Growth in size refers to the process of development where serial interactions lead to changes in the size of the firm in terms of assets, personnel etc. Penrose argues that this view is different from the traditional view of size where firms move from one size to another. In her study, there is no optimal or most profitable size but size is a '*by-product*' of the growth process. Finally, Penrose considered the firm as a group of capabilities or productive resources that interact based on human decisions to create growth. Richardson (1972) expanded the work of Penrose to consider the firm as a network that coordinates capabilities in an industrial system. Thus, the growth of the firm depends on the activities it undertakes and the extent to which those activities synergise. Hart (1995) considered the firm to be a group of tangible assets and property rights that are under the same ownership and control. Consequently, firm growth focuses on growth of the assets.

Numerous scholars have built on the works of Penrose, Richardson, and Hart, studying the factors or determinants that either help or hinder firm growth. Scherer (1970) claimed that changes in firm size depend mainly on economies of scale. An increase in economies of scale would result in declining unitary cost which is reflected in growth of firms' sales and profits. Storey (1994) came up with a classification of three groups of growth determinants; the entrepreneurs' resources, features of the firm, and adapted strategy. The interaction of the three groups determines the speed of growth of the firm. Almus and Nerlinger (1999) stressed on the importance of external factors like wages or salary range that might hinder the ability of firms to hire new skilled employees and therefore negatively influence growth. Hoogstra and Dijk (2004) argue that factors related to the environment or location where the firm operates would affect its growth.

Besides economies of scale and the other economic factors, financial performance was viewed by researchers as one of the key determinants of firm growth; Coad (2005) found a significant relationship between financial performance and firms' growth for his sample of French manufacturing firms. This evidence was further corroborated by Bottazzi et al. (2006) who examined the same relationship using a sample of Italian firms. However, in both studies the magnitude of the effect of financial performance on firm growth was relatively small. Majumdar et al. (2014) examined the impact of a series of mergers from 1988-2001 on firms' performance. Their analysis revealed that firms that undertook one merger experienced zero or negligible growth. The second merger's effect was negative on firms' growth although the motive behind mergers was to grow in the first place.

Firms do not grow in the same pattern or at the same pace; some studies have considered the pattern of firm growth and whether it is affected by variables such as size and age. In a seminal study, Evans (1987) examined this relation on a sample of about 20,000 manufacturing firms in 100 manufacturing industries between 1976 and 1982 and found an inverse relation between firm growth and its size and age. This is consistent with the findings of Variyam and Kraybill (1992) and Geroski (2004) who found negative relationship between age and growth for US and European firms respectively. Das (1995) found that in a fast-growing industry like his sample of firms from the computer hardware industry in India, growth increases with age. This does not necessarily contradict Evans – It is likely that the firms in Das' sample were at an earlier stage in their life cycle than the ones in Evans', when rapid growth can be expected. Barron et al. (1994) observed a non-monotonic relation between age and growth in New York credit Unions, while Hamilton (2011) found that initial employment size rather than age can be attributed to a firm's growth path in his analysis of sixty firms over a period of fourteen years from 1994-2007.

In a ground-breaking study, Delmar et al. (2003) theorised that there are seven patterns of firm growth; super absolute growers, steady sales growers, acquisition growers, super relative growers, erratic one shot growers, employment growers, and steady over-all growers. Thus, firm growth is not a process that follows certain procedures as it might take any or some of those patterns. Hamilton (2011) showed that smaller firms tend to grow more often than larger firms. Also, smaller firms grow in a continual manner unlike large ones where growth occurs in what he called "large isolated steps". The theory that there are different patterns of growth suggests that firm growth is not affected simply by environmental factors. The literature variously suggests that managerial decisions; mergers, economies of scale, factors of production, financial performance, adapted strategies and other factors will also affect firm growth. This, along with the evidence that there is no certain pattern of growth that firms will follow, highlights the importance of decision-making in stimulating firms' growth. Effective decision-making evidently requires reliable metrics to inform it, however there is immense diversity with regards to the choice of an appropriate proxy for measuring firm growth.

2.3.3 Empirical studies on measuring firm growth

The dilemma of finding an appropriate measure for firm growth has been examined empirically by numerous scholars; this lead to a diversity of measures used that severely impairs the ability of researchers to compare results (Delmar, 1997, and Weinzimmer et al., 1998). Delmar (1997) and Ardishvili et al. (1998) came up with identical lists of commonly used growth indicators: growth in assets, sales, employability, market share, profit, and physical output. The usage of market share and physical output is not applicable because it can only be used within the same industry range, and moreover data on either of them can hardly be accessed according to Delmar et al. (2003). They also assert that using profit, although it is an important measure of success, is not reliable when compared to firm size because it is only evident over long term horizons. The author suggests that profits are not applicable because they might vary according to variable corporate expenditures from one period to another - a low profit in a certain period relative to prior ones does not imply a negative growth rate for the firm.

The other three measures of firm growth, namely, i) sales, ii) assets, and iii) employment are used widely in empirical studies. Kirchhoff and Norton (1992) examined all three of them and found that they are interchangeable as they produced similar results over a seven-year period. Kimberley (1976) suggested that growth in number of employees is the most widely used measure of size. Growth in employment was used by Cooper et al. (1994) to measure the performance of 1053 new ventures representing all geographical regions and each industry within the region. They found that their indicators of initial human capital could verify the performance pattern of the sample and forecast whether the new ventures would fail, survive, or highly grow. Donckels and Lambrecht (1995) used networks as a measure of small businesses' growth, finding that growth is influenced by a firm's network of domestic and international contacts. Vaessen and Keeble (1995) used a sample of 2,000 UK SMEs and found that skill shortage and labour recruitment difficulties were among the reasons behind low growth firms.

While these studies suggest that growth in employment or human capital in general is an appropriate measure of firm growth, Delmar et al. (2003, p.198) argue that it is inappropriate to rely solely on employment, suggesting that, "*obvious drawbacks of employment as a growth indicator are that this measure is affected by labor productivity* *increases, machine-for-man substitution, degree of integration and other make-or-buy decisions. A firm can grow considerably in output and assets without any growth in employment*." In short, this study agrees with the proposition that employment alone is an unsuitable proxy as the current state of technological advances allows periodic growth in sales, assets etc. to be achieved without being associated with a proportionate growth in employment. A recent study by Coad and Guenther (2013) on the impact of diversification through introducing new products on firm growth supports this argument: Their analysis found that the period prior to the introduction of a product was associated with a growth in employment, while diversification was associated with negative employment growth (but positive growth in assets).

With the shortcomings of employment as a measure of firm growth, only two measures are left to be considered; growth in assets and growth in sales. Growth in assets, as mentioned before, was considered by Hart (1995) as the appropriate measure for firm growth as he considered the firm to be a group of tangible assets and property rights that are under the same ownership and control. Despite the fact that total assets are widely used as a growth indicator, it faces a severe drawback: Assets are not a reliable measure for all types of industries; for example, service firms do not rely on the amount of assets they possess. Delmar et al. (2003) suggest that usage of assets is related to the intensity of a firm's capital and the industry in which it operates. Thus, growth in assets is sensitive to changes over time

The last proxy for measuring firm growth, and most widely accepted according to Hoy et al. (1992) and Ardishvili et al. (1998) is growth in sales or revenues. Numerous studies used growth in sales to measure firm growth; Barkham et al. (1995) argue that it is the favorite indicator even for entrepreneurs. Davidson and Wiklund (2000) assert that growth in sales is a highly suitable indicator across various dimensions of firms. Flamholz (1986) mentioned that growing demand is reflected by sales growth, thus, growth in sales is viewed as the natural choice for measuring growth. However, despite all of these advantages favouring growth in sales as a proxy for firm growth rate, there are still some limitations facing its usage in practice. Delmar et al. (2003) raised the issue of inflation and currency exchange rates: Sales growth is sensitive for changes in either rate which might cause misleading firm growth rate. Also, for newly established firms, growth in terms of sales might take some time to occur unlike growth in assets or employment.

The finding that every proxy for measuring firm growth faces some limitations encouraged advances in the field. Delmar et al. (2003) found that firm growth is a multi-dimensional rather than a uni-dimensional phenomenon. They came to this conclusion after examining nineteen different measures of growth on a sample of all Swedish firms that have more than 20 employees. Among the measures of growth they examined were both the relative and absolute growth of sales, and the relative and absolute growth in number of employees. This is consistent with Davidsson (1989) who suggested that using multiple indicators would reveal better empirical results. Nevertheless, Chandler and Hanks (1993) suggested that researchers should devise a single method or very limited number of indicators for measuring growth. Delmar et al. (2003) rejected this suggestion on the basis of the advantages of using various measures that provides more conclusive view of empirical relationships. They also argue that using multiple measures provides an opportunity to optimise specific measures for each study's purpose.

Various studies have stated that growth in sales and assets are the two conventional measures for firm growth; (Fairfield et al., 2003; Broussard, 2005; Cooper et al., 2008; Lipson et al., 2009; Gray and Johnson, 2011). Eldomiaty and Rashwan (2013) devised with a new measure of firm growth that considers the interaction between both fixed assets and sales. They argue that this interaction would reduce the limitations of using either measure individually. The authors explain their assertion on the basis that increases in sales may or may not indicate the efficiency of using the assets. Similarly, growth of assets may or may not be associated with increases in sales. For example, the additions to fixed assets may not necessarily be associated with increases in productivity. The same is true in case of current assets. Thus, they proposed using a sales-weighted fixed assets growth.

Finally, in most cases, growth in assets would normally lead to growth in sales because increased production capabilities (assets) results in a larger capacity to make sales. Thus, the key to growth is investing in assets and to do so firms need to finance these investments. If the firm is facing high level of information asymmetry, investors would not be willing to provide the funds needed to finance those investments. Even if they do, they would require higher expected returns than would be the case without the information asymmetry. The interaction between financing decisions and information asymmetry is discussed immediately below.

2.4 Financing, dividend, and investment decisions and information asymmetry

2.4.1 Financing decision and information asymmetry

Financing decisions are one of the major decisions that any treasurer or financial manager undertakes. As shown above, scholars consider the financing decision, as one of the two major decisions related to finance in any enterprise (along with investment decisions). In today's business environment where there are many financial tools, the formulation of firms' capital structure becomes a major issue. Capital structure is the mix of debt and equity issues that a firm employs when it needs to raise funds. Debt issuance can be categorised into loans and bonds, though different types of both exist. Equity refers to usage of retained earnings, common stocks, and preferred stocks. The strategic aim of any structure of corporate capital is to decrease the cost of capital while maintaining an appropriate level of risk. Information asymmetries do affect the choice of the financial instrument and the mix of debt and equity employed. For example, some recent empirical studies proved that lower information asymmetry decreases the cost of equity capital (Armstrong et al., 2011; Lambert et al., 2011).

Since the introduction of information asymmetry by Akerlof (1970), various studies considered the signal sent to investors from the financing instrument used, or in other words, the role of information asymmetry in determining the optimal capital structure of any firm. Financial managers try to formulate capital structures in a way that decreases information asymmetry and minimises agency costs. Various studies examined the relationship between financing decisions and agency problems in general and information asymmetry in particular. Among those studies are Jensen and Meckling, (1976); Ross, (1977); Myers and Majluf, (1984); Narayanan, (1988); Klein et al. (2002); Morellec et al. (2014) and many others. This section reviews the literature and the theoretical developments in the area of financing decisions and agency costs caused by information asymmetry and how they influence firm growth.

The traditional view of corporate finance was that the cost of debt is cheaper than the cost of equity. Thus, a higher gearing level and usage of debt rather than equity would result in lower Weighted Average Cost of Capital (WACC) up to a certain point beyond which the cost of debt starts to increase and the WACC increases in turn. At that point, the market value of the firm is maximised. In late 1950s, this traditional view was highly debated as Modigliani and Miller (1958) proposed their theory of capital structure (MM hereafter). The underlying perfect market assumption of MM theory is that there are no taxes, no transaction or bankruptcy costs, and a perfect market exists where information is available to all participants in the market and individuals and firms borrow at the same rate. Based on those assumptions, MM concluded that using either debt or equity financing would have no impact on firms' value.

The assumptions of MM theory and their conclusions were explained using three propositions. Firstly, the total market value of any firm is independent of its capital structure. Secondly, the expected rate of return on equity increases proportionally with the gearing ratio, as shareholders would require an additional risk premium to compensate them for the risk they bear at higher gearing levels- default risk or risk of financial distress- and this will offset the cheaper cost of debt. Thirdly, the cut-off rate of return for new projects is equal to the weighted average cost of capital which is constant regardless of gearing.

Because perfect markets do not exist in reality, MM developed a modified version of their model that takes taxes into consideration in a follow-up paper (Modigliani and Miller (1963)). Their modified version revealed different results that match the work of Durand (1958). Higher debt and lower equity would result in a lower cost of capital and a higher shareholders' value due to the effect of tax shield. Thus, the lowest WACC is at 100% debt level. In practice, a 100% debt financed firm never exists. At high levels of debt, borrowing capacity is limited, bankruptcy costs and costs of financial distress increase. Myers (1994, p. 575) stated that: "*Our theories don’t seem to explain actual financing behavior, and it seems presumptuous to advise firms on optimal structure when we are so far from explaining actual decisions*", nevertheless, the work of MM is considered a ground work in the area of capital structure.

At the time the MM theory was first published, the effect of information asymmetry had not yet been presented by researchers, so this factor was not considered. However, subsequent studies, from the mid-1970s onward, did consider this effect. The pioneering work of Jensen and Meckling (1976) was the first attempt to consider information asymmetry and agency costs as a key factor in firms' capital structures. They combined elements from theory of agency, property rights, and theory of finance to come up with what they called "theory of ownership structure of the firm" Their theory suggested that agency costs can be quantified as the sum of monitoring expenditures by the principal, the bonding expenditures by the agent, and the residual losses resulting from the divergence between agents' decisions and decisions that might have otherwise maximised the welfare of the principals. They suggested that the elimination of information asymmetry and agency costs could take place if the management of the firm owns 100% of it. However, as soon as outsiders begin to buy shares, which is the case in most firms nowadays, agency costs arise from the divergence of interests between outsider shareholders and insider managers. Finally, increasing debt financing would decrease agency costs as long as the remaining equity is owned by management only. Although the last point is not practical in real world because normally firms will have external shareholders, as opposed to insiders alone, it was a signal that agency costs and information problems could be reduced by using the appropriate capital structure. The study of Jensen and Meckling (1976) has opened the door for other studies to consider the agency costs and asymmetric information when designing the capital structure.

Three lines of thought regarding the relationship between capital structure and information asymmetry were presented over the following years that were differentiated in a comprehensive review by Klein et al. (2002) as (i) the leverage signaling with investment fixed, (ii) signaling and new investment, and (iii) leverage adjustments and market timing.

The first deals with the signal that is conveyed to investors through a firm's capital structure without raising new capital to finance a new investment. The second is concerned with how firms finance new investments using either debt or equity and how this decision is interpreted by the market. The third, which was earlier presented in the section on information asymmetry and timing of the issue, examined the effect of timing of the issue on the signal conveyed to the investors. Each of these lines of research is presented in the next sections along with the empirical studies that examined each of them.

First, the leverage signaling with fixed investment is presented. One of the early attempts to consider the signal conveyed to investors through the firm's capital structure was the model by Ross (1977) where the author illustrated how the choice of debt level can signal firm performance to investors. Ross pointed out that managers have more information about the firm than shareholders, and they use this informational advantage to send signals to the market. His idea was that firms would not use high debt levels unless they have high future expected cash flows to avoid bankruptcy risk. Thus, high-valued firms can use high amount of debt to send a signal about its expected future success. In other words, using debt rather than equity sends better signals to shareholders and using equity send the opposite signals.

In the same year, Leland and Pyle (1977) presented another fundamental model in which ownership structure provides a signal about the quality of firms. In their model, the authors argue that managers of high-quality firms distinguish their firms by retaining a large ownership stake. To do so also requires the use of a higher debt level and lower outside equity. Their verification was that managers who are risk-averse would not own a large stake of costly equity. Thus, managers of high-quality firms would own a large stake because they believe that their equity is less costly. This derives the compatibility of the signal that using higher debt by managers who own large stakes sends a good signal about the quality of the firm to the market. The authors' findings match the predictions of Ross (1977) that a positive correlation exists between using debt financing and quality of the firm.

A further study on the link between capital structure and asymmetry of information (Heinkel, 1982) showed that the capital suppliers (investors) will try to reduce the information gap and estimate prices of securities correctly. They do so by designing the financing mixture of debt and equity that eliminates insiders' adverse incentives. Heinkel (1982, p.1141) concluded that, "*Necessary conditions for a costless separating equilibrium are developed to show that the amount of debt used by a firm is monotonically related to its unobservable true value*." His conclusion was based on the assumption that information asymmetry is about the mean and variance of returns. He assumes that a positive relation exists between the mean and variance returns and that this relation drives his signaling equilibrium. At this equilibrium, higher-value firms, that are more risky, were found to use more debt to signal their quality. This finding is also consistent with findings of Ross (1977), and Leland and Pyle (1977). However, this theory did not consider the bankruptcy costs unlike Ross (1977), but assumed that managers own the firm and therefore try to design a capital structure to maximize their own benefit.

Subsequent studies were consistent with the findings of Ross (1977); Leland and Pyle (1977); and Heinkel (1982). For example Blazenko (1987), and Ravid and Sarig (1991) presented models that found a positive correlation between financial leverage and firm quality. The only model that suggested a different viewpoint was that developed by Brick et al. (1998). This model estimated that information asymmetry is only about variance of returns rather than the mean return. Their proposition was that when information is symmetric, the variance determines the optimal level of leverage, however, when information is asymmetric, a low level of leverage is associated with a low variance. Thus, they concluded that high-quality firms have low levels of debt; a finding that contradicts all previous models. This model assumed that investors are risk-neutral. As Klein et al. (2002, p.323) argued, *"Lower variance usually implies other differences in firm value under risk aversion."*

The empirical studies that examined the capital structure signaling models assumed that better quality is measured by higher profitability. Thus, based on most of the models discussed, more profitable firms tend to have higher leverage level to signal their quality and value to the market. However, empirical studies yielded opposite results. Titman and Wessels (1988) found a negative cross-sectional relation between leverage and firm profitability. This finding was empirically confirmed by subsequent studies (Rajan and Zinagales, 1995; Fama and French, 2002). Even when considering the firms' book values of assets rather than profitability, these studies still found a negative relation between leverage and market-to-book ratio. However, Klein et al. (2002) noted that cross-sectional analysis might not be the most appropriate method to test the signaling models as the signal might be lost in the noise of various factors determining the capital structure. They assert that using event studies might be a better alternative to evaluate signaling models.

One of the implications of signaling models is that if managers expect higher future profitability, they would instruct a capital structure with a higher debt level through a leverage-increasing transaction. Empirically, this would be reflected by a positive (negative) stock price reaction to a leverage increasing (decreasing) transaction. A leverage-changing transaction could take one of different forms according to Klein et al. (2002): exchange offers, forced conversion of bonds to stocks, seasoned equity offerings (SEOs), and share repurchases. This implication was examined by numerous event studies. Harris and Raviv (1991) reviewed various event studies from the 1980s and found that, on average, the announcements about leverage-increasing transactions result in higher share price while leverage-decreasing announcements resulted in a decline in share price. The exception was when public debt was used to increase leverage where the impact on share price was insignificant. This finding is consistent with the theory of capital structure signaling.

Among the event studies that examined leverage-changing transactions and their impact on share price were Copeland and Lee (1991) and Born and McWilliams (1997) who examined the effect of exchange D/E and E/D swaps and found a positive impact of leverage-increasing transactions on share price. Various studies examined share repurchases, a common debt-increasing corporate event. Share repurchases when investment is fixed means that the capital structure tends to have less equity and more debt. This is why scholars have viewed share repurchases as a capital structure signaling announcement.

Among the studies that examined share repurchase announcements were Lakonishok and Vermaelen (1991); Howe et al. (1992) and Maxwell and Stephens (2003). SEOs were tested by Brous (1992); Choe et al. (1993); and Clarke et al. (2001). Those studies among many others supported the hypothesis that announcements of leverage-increasing transactions such as share repurchase result in a positive share price reaction while leverage-decreasing transactions such as conversion of debt into equity and SEOs result in a negative price reaction. Furthermore, Erwin and Miller (1998) found a negative reaction for competitors' share price when the firm engages in leverage-increasing transaction. Vermaelen (1984) and McNally (1999) were among the studies that have examined share repurchases without introducing new investments. Both models used a managerial incentive structure similar to the one founded by Leland and Pyle (1977) and found that better-performing firms buy back shares so as to distinguish themselves from lower-quality ones. As McNally (1999, p.55) mentioned, "*firms that repurchase more have higher earnings; and holding proportion* *constant, firms where insiders have a greater ownership stake have higher earnings"* This finding matches all previous models except that of Brick et al. (1998).

Unlike the studies of leverage-increasing transactions that firmly supported the signaling hypothesis of debt, event studies that examined the impact of announcements about direct issuance of debt revealed mixed results. Some studies found insignificant impact on share prices after corporate debt announcements like Dann and Mikkelson (1984) and Shyam-Sunder (1991). Howton et al. (1998) found a negative reaction regardless of dividend or earnings announcements. These event studies indicated that debt issuance announcements might reveal information to the market, but they did not support the capital structure signaling models due to the variability of their results.

Nonetheless, capital structure transactions also affect long-term performance as well as the stock price reaction discussed before. Empirical studies indicated a positive long-term performance for leverage-increasing transactions, a finding that supports the theoretical assertions of Ross (1977); Leland and Pyle (1977); Heinkel (1982); and Ravid and Sarig (1991). Dann et al. (1991) found an increase in firms' earnings after share repurchases - a leverage-increasing decision. Moreover, Cornett and Travlos (1989) support the hypothesis that leverage-increasing events have a positive impact on earnings while leverage-decreasing events affect earnings negatively. Copeland and Lee (1991) found a decrease in systematic risk after leverage-increasing exchange offers. Unlike the previous studies, Born and McWilliams (1997) found no certain pattern subsequent to exchange offers. Although positive share price reactions cannot be attributed to firm growth directly, the positive long-term performance suggested by most of those studies could be directly linked to firm growth.

The empirical studies that examined the capital structure with fixed investment given the information asymmetry between managers and shareholders indicated that there is a signal conveyed to the market through the mix of debt and equity in firms' capital structure and changes in leverage level. On the one hand, many studies support the signal hypothesis that using more debt is considered a positive signal to the market and is reflected in higher share price, earnings, and operating profits. Among these studies are Copeland and Lee (1991); Born and McWilliams (1997); Lie et al. (2001). However, the existence of empirical evidence concerning negative reactions as described in Manuel et al. (1993), and Howton et al. (1998) hinders the reliability of the hypothesis. On the other hand, lower leverage, using more equity rather than debt, was found by most studies to have a negative impact on share price, earnings, and operating performance. For example, Hansen and Crutchley (1990); McLaughlin et al. (1996); Loughran and Ritter (1997) all reported a negative impact of equity-increasing transactions. The author has found studies that report no impact or insignificant changes, for example Healy and Palepu (1990), but has not found any literature reporting a positive impact.

The previous models and the empirical studies discussed above, considered changes in firms' capital structure without the need to raise funds to finance a new project. The following models and theories consider the mechanism of raising funds required for a new investment given the information asymmetry between managers and shareholders. In other words, the following models try to estimate which method of financing new investments is more effective given the existence of information asymmetry.

The difference between the following theories and empirical studies emerges mainly from the usage of new issues rather than rigid changes within the same amount of capital. This line of thought emerged through a number of theories and models that are presented in the following text, beginning with the Trade-Off theory first described by Kraus and Litzenberger (1973). The Trade-Off theory was originated according to Frank and Goyal (2005) to avoid the extreme proposition of 100% debt in the MM theory. Kraus and Litzenberger (1973) refuted the 100% debt by stating that firms have an optimal leverage level that reflects a trade-off between the tax shield benefits of debt and the bankruptcy costs associated with high leverage level. Myers (1984) asserted that firms try to gradually move towards this optimal leverage level where they balance the benefit and cost of debt.

Because firms survive for more than a single period, the process of moving towards an optimal leverage level takes a dynamic rather than a static phase. Thus, dynamic trade-off models by Kane et al. (1984) and Brennan and Schwartz (1984) analyse this continuous process by incorporating uncertainty, tax benefits, and bankruptcy costs. Their models included the effects of agency problems where they assumed that managers work for the best interest of shareholders. If this is the case, then lenders would have a valid reason to fear the existence of the agency problem as managers might take decisions that benefit the shareholders at the expense of lenders. Due to the fact that information asymmetry exists, lenders would require guarantee that their money is invested at an appropriate level of risk. This guarantee might take the form of monitoring the management performance. Furthermore, restrictive covenants might be mentioned in the lending agreement. For example, dividends should not exceed a certain amount to make sure that the firm maintains enough cash to meet future debt obligations. Other restrictions might be imposed on investment in risky projects or disposal of assets. Those covenants, along with monitoring costs, are considered an extra burden on firms and might hinder the ability of firms to invest in certain profitable projects. For this reason, firms may not increase debt financing beyond certain level due to increasing agency costs of debt.

Unlike the Trade-Off theory, the Pecking Order theory by Myers (1984) and Myers and Majluf (1984) favored the usage of debt rather than equity to promote firm growth. The theory proposed that investors believe that managers know better about the firm especially when it comes to the firm's value, future outlook, and sources of risk. Thus, when the firm tries to finance a new investment, it faces an adverse selection problem because the employed financing tool would always be conveyed to investors as a signal of management's perception towards the firm's future. On the one hand, when management decides to issue new equity, investors will think that management believes the firm is overvalued and that would lead to a drop in share price. On the other hand, issuance of debt would be perceived by investors as a signal of management's confidence in the profitability of the proposed investments and in the firm's ability to pay off its debt obligations.

Based on these propositions, the authors argued that firms typically follow a specific order when considering sources of financing. This order is: internal source to be used first to eliminate any interference, monitoring, or restrictive covenants from outsiders, then external sources. Thus, retained earnings are used first as an internal financing source then debt as a preferable external source and finally the last resort which is issuance of equity.

The work of Myers and Majluf (1984) proposed that firms with high information asymmetry should rely on debt financing. Only if the firm is facing low information asymmetry, it might use equity financing. The reason behind this order is the message that is conveyed to investors from the type of issue. The model illustrated that equity is issued only when it is overvalued, as a firm may pass up some growth opportunities if their equity is undervalued. Logically, if a firm is using equity financing, the likelihood is that it is overvalued at that point in time, conveying a negative signal to outside investors.

In support of the Pecking Order's hypothesis that favors debt financing over equity financing, a seminal theory was presented by Jensen (1986) that offered a different view of the agency costs of debt. Jensen proposed that debt financing has benefits in motivating management efficiency. He calls these benefits "*Control Hypothesis*" for debt creation. The author argued that firms with substantial free cash flow can either distribute dividends or repurchase stock. This is because the only other option is for the firm to invest in low return projects. The management control over free cash flow does not appeal to investors. Thus, even if management promises to pay permanently increasing dividends, investors would not trust such promises because dividends might be reduced in the foreseeable future. Dividends reduction is always punished in the stock market with large stock price reductions. What Jensen suggested as a solution to this dilemma was to issue debt instead of paying dividends as the former enables managers to effectively bond their promise to pay out future cash flows. In other words, unlike dividends, debt's principal and interest are legal obligations that make investors confident that the managers will have to pay out the excessive free cash and in turn decrease the amount of cash that managers have on hand available for spending at their discretion. Based on this idea, Jensen (1986) concluded that debt plays an important role in reducing the agency costs of free cash flow and narrow the gaps caused by information asymmetry.

Although the above concept, along with the tax shield effect (interest is tax deductible) would favour the use of debt over equity, which is consistent with the pecking order theory, Jensen did not ignore the costs of debt in his study nor the cases in which this effect of debt will be insignificant. For example, firms without large free cash flow and firms that have profitable investment opportunities or high growth rates will not endure the benefits of the control hypothesis. This is partially in alignment with the propositions of the trade-off theory in a sense that it offers a chance for reducing debt financing in certain cases, unlike the pecking order theory that favors debt regardless of other circumstances facing the firm. Thus, Jensen's theory could be considered as a middle point between the trade-off theory and the pecking order theory in a sense that it favors debt financing over equity but still leaves room for reducing debt and relying more on equity in certain circumstances.

Several models were presented on the basis of the pecking order theory that tried to relax its assumptions. For example, Bradford (1987) presented a model where managers can trade in the firm's shares. This allows the firm to engage in more investment opportunities as this trade might mitigate some of the undervaluation effects. Viswanath (1993) presented a model with multi-period financing. The proposition of the model was that firms might use equity in the first period and then shift to debt in later periods if needed depending on the information signaled by the market. Daniel and Titman (1995) assumed that no adverse selection will occur if firm variances are unequal while firm value is known by the market. In this case, issuing equity would not send a negative signal to the market. Those models examined the signal revealed by issuance of new equity to finance new investments.

Other models assumed that both equity and debt can be issued to finance the same investment opportunity. A study by Narayanan (1988) extended the work of Myers and Majluf (1984) and allowed the firm to issue risky debt to finance new investments. As the study demonstrates, issuing debt, even if it is risky, is favorable for high growth firms because it separates them from less quality firms. Hence, even if signaling effect is ignored, debt is still better than equity as a mean of separating high quality from low quality firms. Another model by Heinkel and Zechner (1990) went further to account not only for debt, but also for preferred stocks. In their model, debt is issued initially to mitigate the underinvestment behavior. Given the tax benefit, managers tend to issue more debt which creates an underinvestment problem. Issuing preferred stocks could solve this problem and allows issuance for more debt without creating underinvestment. Thus, the model is consistent with the pecking order theory that debt, preferred stocks, and common shares are used to develop an optimal capital structure.

Information asymmetry and adverse selection problems were emphasized in a study by Noe and Rebello (1996), in which they offered various scenarios for control and capital structure subject to information asymmetry. The proposition of the theory is that in absence of information asymmetry, shareholders would prefer debt financing to benefit from their control over earnings and the cash that management captures. However, managers prefer equity financing to maximise their rent appropriation. Introducing information asymmetry to this equation might change the preferences of both the managers and shareholders – suggesting that the shareholders would base their preference for either debt or equity on the tradeoff between costs of payments to management and costs of adverse selection. Thus, shareholders might prefer equity financing if the costs of adverse selection are greater than costs of cash paid to managerial staff. On the other hand, managers would prefer debt financing if the costs of adverse selection are high even on the expense of their benefit. With the given managerial control over firms, managers would prefer relying on higher debt financing as it conveys favorable information to the market. This theory suggests that information asymmetry can lead to debt financing being the favoured finance mechanism, supporting the patterns observed in Pecking Order theory.

Two studies advocate that there is a link between information asymmetry and the financing decision and found that it runs both ways. Boot and Thakor (1993) suggest that good firms will separate their securities so that some of them are information-sensitive, (e.g equity issues) to encourage investors to produce information. They suggest that equilibrium will be reached because bad firms follow this path of good firms so as not to be identified in the market. Similarly, a study by Fulghieri and Lukin (2001) expands on the previous work and consider the costs of information and its impact on the choice of financing tool. They also allow for noisy information from outsider investors. Their findings were that the choice of equity or debt depends on the costs of acquiring information, the information production technology, and the level of information asymmetry. Insiders might prefer equity to debt although it is a more sensitive security to increase informed trading in the market. Thus, debt is favored when the cost of acquiring information is high while equity is preferred when low and when acquiring the information is a precise process. They also suggested that growing firms and young firms tend to use equity financing while mature firms tend to be debt financed.

This theory contradicts the Pecking Order theory as it suggests that under information asymmetry, usage of equity financing rather than risky debt is preferred. It also implies that growth opportunities are better financed by equity rather than by debt which is consistent with the Trade-Off theory. Numerous empirical studies have examined the suggestion of both viewpoints, some of which are presented in the following text.

The empirical studies that examined the different tools of financing a new investment when information asymmetry exists revealed mixed results. For example, early event studies that examined the Pecking Order hypothesis like Amihud et al. (1990) and Chaplinsky (1993) found supporting evidence for the pecking order, while Korajczyk et al. (1993) rejected the hypothesis. Rajan and Zingales (1995) found mixed evidence where some of their tests rejected the hypothesis while others could not reject it. Jung et al. (1996) reported significant negative returns associated with announcements of equity issuance while for debt the negative returns were insignificant. However, they did also find that some firms financed good investments using equity. Also, they found that firms with larger total assets; that are closely followed by financial analysts, tend to be financed by debt. This contradicts the Pecking Order that assumes that the lower the information asymmetry, the higher the dependence on equity financing.

Further support for the Pecking Order theory was suggested by McLaughlin et al. (1998), who reported larger post-issue declines in operating performance for equity issues than debt issues. This result holds even after controlling for other variables affecting long term performance like free cash flow and investment in tangible assets. D'Mello and Ferris (2000) support the pecking order because they found significant negative announcement returns for firms with high information asymmetry. Nevertheless, Helwege and Liang (1996) reject the pecking order as they found that small, high-growth firms do not infer from external financing but they tend to use equity as likely as they issue debt. However, they found that firms with surplus funds avoid capital markets in general, which is consistent with the pecking order that advocates internal financing to the external one.

Although the Pecking Order and the Trade-Off theories are not mutually exclusive, some studies tried to distinguish between them using the same data set. Shyam-Sunders and Myers (1999) compared them using the statistical power of variances in debt ratios over time. Their assumption was that changes in debt ratios are due to the need for external financing rather than a movement toward the optimal debt level. After testing both models independently using regression analysis, they found that both can verify the changes in debt level. However, the Pecking Order theory had the higher explanatory power. Further empirical analysis that they used found similar results for both theories. Thus, they found that both models cannot be rejected but more confidence is awarded to the Pecking Order hypothesis over the Trade-Off. Chirinko and Singha (2000) addressed what they saw as a shortcoming in the Shyam-Sunders and Myers model, including the debt capacity and net equity issues in their analysis. After including those variables, using the same model, their results did not reject the pecking order, but found that the order of preference for debt over equity is reversed implying the need for further tests to be conducted.

Using more recent data than Shyam-Sunders and Myers (1999), Frank and Goyal (2000) found that debt level is not determined by the financing deficit as the earlier proposed. In contrast to the asymmetric information implications of the Pecking Order, they found that large firms with moderate leverage were the most consistent with the Pecking Order. Using other samples, they found that none of the predictions of the pecking order were fulfilled. Nevertheless, they found supporting evidence for the trade-off hypothesis using a conditional and unconditional target adjustment framework that tests mean reversion in financing behavior. Therefore, this study favored the trade-off hypothesis and rejected the pecking order.

Another attempt to test the Pecking Order theory against the Trade-Off theory was presented by Hovakimian et al. (2001) who allowed the target debt ratio to change over time. Their results were consistent with the Pecking Order in the short term. However, they also found that profitable firms with low leverage tend to issue debt rather than equity, supporting the target debt hypothesis advocated by the Trade-Off theory. Thus, their analysis suggested that different conditions can either favour the Pecking Order or the Trade-Off theory. Fama and French (2002) also found mixed results after several comparisons between the two approaches using an extensive data set. Some of their tests support aspects from both theories while other tests reject both. Therefore, they did not draw any firm conclusions about either theories and proposed further investigation about the topic.

These propositions of Fama and French (2002) and the fact that the above studies revealed mixed results opened the door for more recent studies to examine both theories. Harvey et al. (2011) examined firms in different markets including both developed and emerging markets. The objective of their study was to examine whether debt can reduce the impact of the agency problems in emerging markets where agency costs were found to be considerably high. Their findings concluded that debt can reduce the impact of agency problems, especially for firms most likely to have overinvestment problems. The results also indicate that shareholders benefit from "intensively monitored debt" in firms where information asymmetry is severe and managers are more likely to exploit shareholders. Thus, this study favours the use of debt in emerging markets where agency costs are high, suggesting that the Pecking Order hypothesis holds under these circumstances. Nevertheless, Frank and Goyal (2009) examined the capital structure behavior for U.S firms over the period from 1950-2003 and found supporting evidence for some versions of the Trade-Off theory not the Pecking Order hypothesis.

Lemmon and Zender (2010) studied a large sample of firms over a 30-year period, examining the impact of debt capacity on financing behavior. They found that as long as firms have a capacity to issue more debt, that debt is preferred to equity issuance. Moreover, they reconcile the issuance of equity by small, high-growing firms with the Pecking Order propositions, concluding that the Pecking Order gives a good description of the financing behavior for their sample. Leary and Roberts (2010) concluded that the Pecking Order theory was verified in only part of their sample of financing decisions, claiming that decisions are not driven by information asymmetry but rather by incentive conflicts between managers, shareholders, and debt holders.

Morellec and Schurhoff (2011) examined investment and financing behavior under information asymmetry and demonstrated that the latter might not be translated into a hierarchy or a ‘pecking order’ for financing instruments. This finding contradicts the pecking order hypothesis. Gao and Zhu (2012) examined the relation between capital structure, information asymmetry, and the cost of capital in different countries. They found that firms with more information asymmetry tend to use more debt to finance investments but tend to avoid long-term debt. This finding is less common in countries with more disclosure requirements. Depending more on debt financing is consistent with the findings of Brav (2009) who found that private firms in the UK rely heavily on debt financing and have higher leverage ratios than public firms. Both studies supported the usage of debt over equity which supports, in part, the Pecking Order hypothesis.

A number of studies have been found that contradict the pecking order theory. In "*Pecking (dis)order*", Fulghieri et al. (2013) argued that equity financing dominates debt financing under information asymmetry. They proposed that firms prefer equity financing and then shift towards debt as they mature. Moreover, firms having debt in their capital structure find issuing equity more attractive than issuing more debt. The conclusion of the study suggests that the relationship between asymmetric information and the financing instruments is weaker than previously believed. However, those findings are not empirically tested to validate this argument or refute it.

From this survey of the literature, it appears that studies can be found that support both the Trade-Off and Pecking Order theories, depending on the assumptions (where a model is described) or the sample (in empirical studies). However, from this survey, a greater number of studies appear to support the Pecking Order hypothesis than the trade-off theory. The root of the pecking order theory is the existence of asymmetric information because management knows more than outsiders and makes the financing decision based on that knowledge. The researcher notes that if the Pecking Order theory can be used to partly explain corporate financing patterns, the use of internal financing may correspond to management's plan for sustainable growth rates. This depends on raising internal finance mainly through decreasing dividend payout in order to finance firm growth projects. This conclusion shows that for financing a new investment, management may use internal financing to avoid the complications of agency problems associated with information asymmetry as much as possible. If internal financing is depleted, debt financing - the financing option that is less information-sensitive - is preferred to equity especially at high level of information asymmetry.

To sum up, the development of theories and empirical studies that considered the debt signal under fixed investment presented in section 2.4.1 tends, in general, to support higher levels of leverage. Empirical findings by most studies surveyed here found a negative relation between equity announcements on one side, and share price reaction, earnings, and long-term operating performance on the other side. This finding suggests, in turn, a negative relation between equity financing and firm growth. However, the findings that presented the financing decision when a new investment is available varied greatly. Some studies support the Pecking Order hypothesis that advocates a hierarchy where debt financing is preferred to external equity financing. This theory focuses on the signal conveyed to the market from the type of issue where issuance of equity is an unfavorable signal about the firm being overvalued, while debt issue is a signal of management's confidence in the ability of the firm to repay debt obligations. Other studies support the Trade-Off theory that balances the benefits and costs of debt financing. It places much emphasis on tax benefits and bankruptcy costs rather than the asymmetry of information between managers and shareholders.

Existing empirical evidence could not select a more accurate or a "*better*" theory as some studies support some aspects of both or neither theories while other studies supported one of them and rejected the other. The theory of free cash flow by Jensen (1986) presented a moderator between both as it supported the Pecking Order's proposition that debt financing has a priority over equity financing because debt limits the cash available for managers to dispose. However, it still left room for equity financing to dominate in certain circumstances. Finally, the timing of equity issues was found by most studies to be an important element in reducing the impact of information asymmetry. Financing decision, like any major decision taken by firm's management, is believed to have an impact on the growth of the firm.

As shown in the previous section, various theoretical developments of the theory and a substantial number of empirical studies were dedicated to the information asymmetry and capital structure; financing decision. However, only the theory of free cash flow by Jensen (1986) suggested a relation between financing decision and firm growth. Jensen's proposition that free cash might affect firms' performance was strengthened later on by the findings of Brush et al. (2000) who found that firms with free cash flow gain less from sales growth than firms without free cash due to agency considerations. Thus, if Jensen's proposition holds, firms shall use free cash flow in raising debt financing to mitigate agency problems. This implies that debt financing helps firms to benefit more from sales growth under the existence of agency conflicts and information asymmetry.

Some of the empirical studies that examine financing decisions and firms' growth are summarised in Frank and Goyal (2005). They conclude that the effect of agency costs on debt financing can be extended to further effects on a firm’s future expansions and growth, explaining that:" *The static trade-off theory predicts a negative relation between leverage and growth. Growth firms lose more of their value when they go into distress. Several agency* *theories also predict a negative relation between leverage and growth. For example, the underinvestment problem is more severe for growth firms leading these firms to prefer less debt*." This assertion was built on the findings of several studies, including Long and Malitz (1985); Smith and Watts (1992); Barclay et al. (2003); and Frank and Goyal (2004) who used market value of assets to book value of assets as a measure of growth opportunities and found that, in general, market-to-book ratio is negatively related to leverage. Rajan and Zingales (1995) found that this negative relation exists in all G7 countries. Frank and Goyal (2005) and their supporting studies, who were advocates of the Trade-Off hypothesis, conclude that the higher the debt levels the lower the growth opportunities of firms.

Nonetheless, more recent empirical examinations by Lemmon and Zender (2010, p.1185) could not find a definite association between financing decision and firm growth, arguing that: "a*n issue left to future research is the interaction between the growth in assets, profitability, and financing. We have implicitly assumed that asset growth and profitability are exogenous to the financing decision in this analysis*." Thus, they do not support the previous finding that lower leverage is associated with higher firm growth.

As we have seen so far, most prior studies that examined the link between corporate financing behavior of firms and agency theory concentrated on the following issues i) the impact of the financing decision on share price, ii) the signal conveyed to investors, and iii) the effect on operating performance. This section extends the discussion by considering the impact of financing decisions on firm growth. Frank and Goyal (2005) and their supporting studies that predict a negative relation between a firm's leverage level and growth opportunities advocates the Trade-Off theory which places a lower emphasis on agency considerations and information asymmetry as much as tax considerations and bankruptcy costs. The gap in literature on the research topic is clear in the assertion of Lemmon and

Zender (2010) that future research should examine the interaction between financing and growth in assets. Thus, this research expands the work of Frank and Goyal (2005) which suggested that lower leverage level is associated with higher firm growth by including the impact of different levels of information asymmetry on the interaction between financing and firm growth.

The assertions of Frank and Goyal could hold for firms facing low level of information asymmetry where it has less impact on operating performance and earnings; however, it might not be the case for firms facing high level of information asymmetry. Using equity financing for firms with high information asymmetry might hinder their ability to raise capital or at least would increase their cost of capital as investors will require extra return owing to the higher perceived risk. This would hinder the abilities of such firms to invest in growth opportunities or at least decrease its benefits from growth options in comparison to firms facing low information asymmetry. To further understand the influences on financing decisions, corporate investment and dividend policies must also be considered (Dhrymes and Kurz, 1967; Lee et al., 2010).

2.4.2 Dividend decision and information asymmetry

At theoretical level, when firms make profits, they have two alternatives for the disposal of cash; retain it for further investment or distribute it to shareholders in the form of dividends. The amount kept for investment is the retained earnings, which is the first source of financing as proposed by the Pecking Order theory. The decision of whether to pay dividends or retain earnings is the second major decision examined in this research. Lintner (1956) presented a survey of management's preference for dividend policy and found that managers tend to prefer a consistent payout pattern and that dividends are tied to the long-term earnings of firms.

The dividend decision is directly linked to the financing decision discussed in the previous section as Easterbrook (1984, p.652) explains:" *Dividends exist because they influence the firms' financing policies, because they dissipate cash and induce firms to float new securities."* Therefore, paying out dividend to shareholders decreases the amount of cash available for financing and vice versa. The relevance of dividend decision in evaluating share price or the value of the firm was first proposed by Modigliani and Miller (1961), in their dividend irrelevance theory.

Before the introduction of the agency theory by Jensen and Meckling (1976), the role of the agency problem in corporate decisions was not considered. Thus, the theories that examined the dividend policy before this did not consider the agency costs or information asymmetry associated with the dividend decision. According to Modigliani and Miller (1961), the distribution of earnings to shareholders does not affect the value of the firm, which is rather affected by the firm's risk and earning power. Thus, investment decisions are the key to valuing firms rather than the dividend decisions. Also, according to this theory, the dividend decision has no impact on the firm's growth. MM validated their theory using the dividend yield model, showing that dividend decision was irrelevant in determining the value of firms. Their argument was based on several assumptions: there is no corporate or personal tax, a perfect market exists where no transaction costs, a firm's investment policies are independent from its dividend decisions, and the market is efficient in a sense that managers and investors have the same information about future investment alternatives.

The assumptions of the MM irrelevance theory have been criticised for ignoring taxes and transaction costs. Thus, development in the theory considered imperfect markets with taxes, transaction costs, and preferences of investors. The pioneer work of Gordon (1963) and Lintner (1962) resulted in Gordon/Lintner "*bird-in-hand*" theory that was the first "*relevant*" theory of dividend decision. The assumptions of this theory were that investors value firms that have higher payout ratios more than firms that pay lower dividends; where investors benefit from capital gains; the increase in market price of their shares. Therefore, firms that pay more dividends have higher market values than firms that do not pay dividends or pay less than its peers. Thus, unlike MM propositions, Gordon and Lintner suggested that dividend decision is relevant in a firm's valuation.

Further development in dividend relevance theories resulted in the "*tax differential theory*" first proposed by Brennan (1970) and advanced by Litzenberger and Ramaswamy (1979). This theory is consistent with the bird-in-hand theory in its proposition of the relevance of dividends. However, it contradicts the former in its assumptions. Tax differential theory assumes that firms that pay lower dividends are more valuable for investors due to tax considerations because in some countries the tax rate on dividend payments is higher than tax on capital gains. Thus, investors will be better off when they receive low dividends but are rewarded instead by capital gains. This is why the theory suggests that the highest valued firms are those that pay no or small dividends and retain all or most of the earnings for future investments.

A middle-ground approach between the tax differential theory and the bird-in-hand theory is the "*Dividend Clientele effect*" proposed by Pettit (1977) who found empirical evidence on investors' preferences of dividend payments. As the study suggests, different groups of investors have different dividend preferences. For example, low income investors might need a higher payout to support their consumption needs, whereas high income investors who pay higher tax rate might prefer low dividend payout ratio. This theory suggested that dividend policy is irrelevant; consistent with the propositions of MM and contradicting the bird-in-hand and tax differential theories. The reason behind this irrelevance according to Pettit (1977) is that investors normally shift their investments in or out of a firm based on their preference until equilibrium is reached at which the payout policy of any firm is consistent with the clientele or the preferences of its shareholders.

The above theories do not contradict but rather complement each other. The differences between their propositions result mainly from the corporate and personal tax treatment. Thus, in different countries with different tax systems the applicability of theories differs. For example, in countries with higher personal taxes relative to corporate taxes, firms would tend to pay smaller dividends and vice versa. This might be the reason why each of the above scholars was able to reconcile their empirical data with their respective theory. However, with the introduction of another two key factors: the agency problem and information asymmetry associated with it, the researchers of dividends behaviour shifted their attention from tax considerations to agency and signalling ones.

Following the introduction of agency theory and the information asymmetry concepts in early 1970s, dividend models started to incorporate such fundamentals when examining the dividend behaviour. Ross (1977) presented an early attempt to link information asymmetry with the dividend decision in inefficient markets. He argued that management could use the dividend policy to signal information to the less informed shareholders. For example, a higher payout ratio would signal higher anticipated profits. This good signal is reflected in higher share prices. Thus, Ross (1977) agrees with the bird-in-hand propositions that firms that pay more in dividends are valued higher in the market. However, the difference between both theories is that bird-in-hand focuses on the preferences of investors in receiving cash on hand, while the Ross model focused on the role of information asymmetry and signalling effect.

Development of the theory that contributed to Ross (1977) assumed that imperfect information exists and that taxes on cash dividends are higher than those implied on capital gains. Based on these propositions, if these conditions hold, the dividend policy can function as a signal for future cash flows (Bhattacharya, 1979). This is consistent with Ross (1977) model but incorporates the tax factor. Moreover, both models assume that the benefit from signalling would occur in current share prices or in case of liquidation, while the costs of the signal would take place in the future when the actual cash flows take place. Various models were developed in the 1980s that addressed the information content of changes in dividend policy and found supporting evidence for Bhattacharya's propositions (John and Williams, 1985; Miller and Rock, 1985; Ambarish et al., 1987).

Further developments in the theory tried to link the dividend policy to agency costs and mitigate asymmetry of information. Rozeff (1982) and Easterbrook (1984) presented two pioneering studies in the linkage between agency problem and dividend policy. Rozeff (1982) presented a model in which the payout ratio is a function of the fraction of equity held by insiders, a firm's past and expected growth, a firm's beta coefficient, and the number of common stockholders. He suggested that the percentage of equity held by outsiders and the number of common stockholders are used as proxies to measure the agency costs. The larger the ownership base is, the more conflicts of interest would occur and higher agency costs would be incurred. His empirical test found that the coefficients were all significant and all affect the payout policy. Among the findings was that firms with high experienced or anticipated growth in revenues would establish lower payout ratios. However, when insiders hold a low share of the firm, a higher payout ratio is used to reduce agency conflicts of the dissipation of cash on hand. Thus, Rozeff (1982) suggested that the dividend policy could be used to mitigate agency conflicts caused by information asymmetry.

Subsequently, Easterbrook (1984) presented new insights on how dividends could be used to reduce agency costs of managements' behaviour. He suggested that paying out more dividends to shareholders would reduce the funds available for managers. Thus, managers would regularly seek funds from financial markets where monitoring of managers' behavior is available at lower cost. Such monitoring could reduce the significance of information asymmetry. Easterbrook asserted that this could be the reason why firms in reality keep paying dividends and raise funds from the market. It is noted that while both Rozeff (1982) and Easterbrook (1984) suggested that dividend policy could be used to reduce agency conflicts, each suggest different reasons (reducing the cash available at management's discretion; and using external markets to monitor management's behaviour, respectively).

A different aspect of the usage of dividend policy to reduce the impact of agency problems and information asymmetry was developed by Jensen (1986), and was discussed in the previous section. Jensen (1986) highlighted the role of debt issues rather than dividends in reducing agency conflicts. His idea was that dividend is not a binding agreement by managers to disgorge cash as they might decrease the payout ratio in the future. Whereas debt is a binding contract to dissipate cash and thus reduce the amount of free cash available at management's discretion. This suggestion by Jensen (1986) presented a major challenge to the propositions of Rozeff (1982) and Easterbrook (1984) about the importance of dividend policy in reducing agency conflicts. Subsequent studies tried to empirically support either viewpoint.

Studies that examined the dividend behaviour focused on either the information signal or the agency considerations of the dividend policy. Empirical studies that examined the importance of dividend signalling in conveying information to the market revealed mixed results. Some of the studies that found significant role of dividend signalling include Beer

(1993); Brook and Hendershott (1998); and Balachandran and Nguyen (2004). These studies supported the Bhattacharya (1979) and Miller and Rock (1985) models. However, some other studies reject the assertion that information content in dividend signalling is important, such as Yoon and Starks (1995); Bernhardt et al. (2005); and Brav et al. (2005) who found no evidence that the information content of dividend signaling matters in the market. Unlike both approaches, DeAngelo et al. (1996) found that there is no evidence that dividend policy could distinguish firms that are more profitable. This is verified by the fact that dividend policies are normally stabilized whereas profitability varies from period to another. Thus, there is no definite conclusion about the importance of information content in dividend signaling due to the mixed empirical findings.

Studies that have focused on dividend policy as a method of mitigating agency costs and/or reducing information asymmetry effects, include Borokhovich et al. (2005, p.42) who asserted that: "*The results of studies on dividends and agency costs generally suggest that the dividend payout decision is significantly related to the degree of the agency costs within the firm."* They supported their argument using the finding of Dempsey and Laber (1992) who found dividend payout to be negatively related to the level of insider stockholding and positively related to the number of common stockholders. Both insider stockholding and number of shareholders were used in their study as proxies for agency costs and severity of information asymmetry. Similarly, Noronha et al. (1996) who examined the relation between agency variables and payout ratios, found a positive relation for low growth firms among the payout ratio on the one hand, and the level of executive compensation and the presence of outside block holders on the other hand. The latter two were used as proxies for agency costs in this study.

Building on the work of Rozeff (1982), Lloyd et al. (1985) offered an insight on the role of firm size in the payout policy. They found a significant relationship between the payout ratios on the one hand, and firm size and several agency variables (such as percentage of common shares held by insiders, number of shareholders, and number of shares per shareholder) on the other hand. Their analysis resulted in supporting evidence for the Rozeff (1982) theory that agency costs directly impact the payout ratio and that payout policy could be used to reduce agency conflicts, but added the understanding that firm size is important as well in determining the payout policy of firms.

In a similar vein, Schooley and Barney Jr. (1994) presented an assumption that dividend policy and chief executive officer (CEO) stock ownership can interrelate together to reduce agency costs. They found a parabolic relation between payout and CEO ownership. Schooley and Barney Jr. (1994, p.372) concluded that, "*Over low levels of CEO ownership, the observed negative relation between dividend yield and the CEO ownership percentage supports the agency cost explanation of corporate dividend policy. However, over high levels of ownership, the dividend yield begins to increase with further managerial stock ownership, implying there is a point beyond which CEO ownership fails to align CEOs' goals with the interests of other shareholders."* The empirical findings of this study presented a new insight on the role of CEO ownership, especially that the results shifted beyond a certain point at which CEOs hold an intensive amount of shares. This implies that changes in ownership of CEOs affect the dividend policy. In this study, wherein CEO ownership was used as a proxy for measuring agency costs, this finding that ownership and dividend policy are interrelated supports the Rozeff (1982) and Easterbrook (1984) propositions.

Similarly, Moh'd et al. (1995) supported the relevance of the agency problem in designing the payout policy. Their regression analysis found that dividend policy is a function of firm size, growth rate, ownership structure, operating/financial leverage mix, and bankruptcy risk. Moreover, firms act in order to minimise agency cost and transaction cost toward an optimal level of dividend payout. This holds across time as well as across firms. Finally, firms adjust their payout policy to respond to dynamic shifts in agency/ transaction costs. Crutchley et al. (1999) also found that dividend policy, among other variables such as leverage, insider ownership and institutional ownership, could work as control mechanisms for agency costs.

Two agency models of dividend policy were outlined by La Porta et al. (2000); the outcome model and the substitute model. The outcome model of dividend behaviour suggests that dividend payments are a direct result of shareholders' pressure on the management to dissipate cash. The substitute model suggests that management distributes dividends to build a reputation for treatment of shareholders that would help in raising equity in the future. Both models are built on the agency concept but with different point of view. Empirical analysis of 4000 firms from 33 countries with different level of shareholders' influence supported the outcome model that shareholders can affect the decision of insiders and enforce the distribution of dividends. Thus, this study supports the Rozeff (1982) and Easterbrook (1984) theories.

A major contribution of La Porta et al. (2000) was introducing the concept of shareholder protection which depends on the country's legal regime and its index of anti managerial rights. They used those two variables as proxies of the agency problem where high protection countries suffer less from agency issues and vice versa. Building on this proposition, Bartram et al. (2007) expanded this view and added a firm level agency variable and share repurchases as a possible substitute for paying dividends. Using a larger sample of 29,610 firms from 43 countries from 2001-2006, they found that in high protection countries, where the effect of agency problems is relatively lower, investors are able to enforce cash distribution. However, the ability of investors to do so is hindered when the firm level agency costs are high. Nevertheless, in low protection countries, firm level protection substitutes the low country protection in mitigating agency conflicts. Finally, they found empirical evidence that dividend payments tend to be favoured over share repurchases, especially in high protection countries. These findings are consistent with the findings of La Porta et al. (2000). However, it adds new insights on the use of firm level protection as well as the country level protection to reduce agency conflicts and severity of information asymmetry.

The dividend behavior of firms in the Indian stock exchange was examined by Manos (2003). His analysis revealed that government ownership, debt, growth opportunities, and insider ownership have a negative impact on dividend payout. However, institutional, foreign, and dispersed ownership have a positive impact on payout ratios. The findings of the relation between dividend and the agency proxies; insider, institutional, and dispersed ownership support the findings of Rozeff (1982) and Easterbrook (1984) in the assertion that dividend policy is affected by agency variables. Nikolov and Whited (2009) examined the relation between agency costs and cash holding decisions. They used three agency cost variables: bonuses for managers that are based on profits, limited ownership of managers, and preference of managers for size of the firm. Their analysis indicated that firms with low institutional ownership hold similar amounts of cash to firms with high institutional ownership. This indicates that institutional ownership is not a key factor for the level of cash holding, and in terms in the dividend policy of firms. Moreover, there is a non monotonic relation between size preference and cash holding, which again indicates no certain relation between dividend policy and size preference. Finally, managers who seek empire-building hold higher amounts of cash, as they require cash for investment and expansion. This tends to result in lower payout ratios.

Some studies tackled another aspect of dividend policy i.e. the effect of legal changes in dividend treatment on dividend policies in practice. A characteristic example is the US's 2003 dividend-tax reform and its impact on corporate dividend policy. Various empirical models of dividend policy tackled the tax effect along with the agency considerations by showing that lower taxes on dividend payments leads to an increased number of firms paying dividends, especially those whose top executives hold larger amounts of shares and/or those where large shareholders are members of the board of directors. These findings suggest that both the tax effect and agency considerations hold for the dividend behaviour (Nam et al., 2004; Chetty and Saez, 2005; Brown et al., 2007).

An explanation of the evidence found on the effect of dividend taxation was presented by Chetty and Saez (2010) using an agency model where shareholders and managers have conflicting goals. They suggested that dividend taxation gives an excuse to managers not to pay dividends but rather invest the money in unproductive projects. This creates a deadweight cost. Nevertheless, corporate taxation does not create this dilemma of whether to pay dividends or invest in unprofitable projects. Thus, the authors suggest that dividend taxation generates higher costs when firms face more agency conflicts.

To summarize the empirical evidence, there is strong support to the Rozeff (1982) and Easterbrook (1984) propositions that paying out more dividends reduce agency conflicts either by increasing monitoring by financial markets or by decreasing the cash on hand available for management to use in unproductive ways. The evidence on the signaling role of dividend policy in conveying information to investors suggested mixed results. Some studies like Beer (1993); Brook and Hendershott (1998); and Balachandran and Nguyen (2004) support the signaling hypothesis, while other studies like Yoon and Starks (1995); Bernhardt et al. (2005); and Brav et al. (2005) reject this hypothesis. Finally, some studies found evidence that both dividend tax and agency considerations can interact together to determine the payout policy like Nam et al. (2004); Chetty and Saez (2005); and Brown et al. (2007).

With regards to the link between dividend policy and firm growth, few studies have examined the relation between a firm's growth and its dividend policy. Much emphasis was placed on the impact of dividend policy on share price rather than on firm growth. Studies that examined dividend policy and firm growth focused on the impact of firm growth on dividend policy not the opposite. For example, Amidu and Abor (2006) found a negative association between sales growth and dividend policy. Similarly, findings of Lloyd et al. (1985) and Collins et al. (1996) were consistent with this view as they found a negative relationship between historical growth in sales and dividend payout ratio.

More recently, Skinner and Soltes (2011) examined the relation between dividend policy and the quality of a firm's earnings. Earnings are widely used as a proxy for firm growth as mentioned before. The findings of this study indicated that dividend-paying firms have more persistent earnings than firms that do not pay dividends frequently and that this finding was stable over time. Additionally, dividend-paying firms were found to be less likely to incur losses, the reported losses were mainly due to special events or transitory losses. These findings support the argument that dividend policy and growth are related to each other.

The above studies did not consider the information asymmetry factor, whereas the first to suggest a negative relation between expected growth and dividend payout ratio was

Rozeff (1982). Yet he suggested that with increasing agency conflicts and higher information asymmetry a higher payout ratio would mitigate their effects. Bartram et al. (2007) did consider the level of agency conflicts. Among the findings of their study that examined firm level agency conflicts and country protection level were findings related to firm growth; at low levels of agency costs, at both firm level and country level, high growth firms have significantly lower dividend payout ratios. However, the strength of the relationship between payout ratios and firm growth is lower when either firm level agency costs increase or country protection levels decrease. This presents strong evidence that a relationship exists between dividend policy and firm growth and that agency costs and information asymmetry affect this relationship.

This study notices that the previous scholars that examined dividend behavior and firm growth focused on historical growth and its impact on dividend policy. Moreover, the effect of information asymmetry and/or agency costs on the relationship between dividend policy and firm growth was presented only by Rozeff (1982) and Bartram et al. (2007) who both suggested a negative relationship between dividend payout and firm growth. However both suggested increasing payout ratios to decrease agency costs. The evidence that historical firm growth and dividend policy are related and that agency costs affect this relation (Borokhovich (2005); Amidu and Abor (2006); and Skinner and soltes (2011)) suggest that the dividend policy may contribute to firm growth. This contribution differs according to the level of agency conflicts and information asymmetry on firm level or/and country protection level (La Porta et al. (2000); Bartram et al. (2007))

This relationship between dividend policy and firm growth under different levels of information asymmetry is not separate from the firms' financing decisions. Chetty and Saez (2010) suggested that an area for future research is the decision to pay dividends while issuing new equity. Thus, the contribution of dividend decision to firm growth is not separate from the capital structure of firms and their investment policies. The investment decision is the third decision tackled in this study.

2.4.3 Investment decision and information asymmetry

A major decision taken by financial managers is corporate investment. For firms to grow they need to invest in assets, either current or long-term, to increase production, reduce costs, expand operations etc. This investment needs to be financed either internally or externally. Thus, corporate investment in not separate from the financing policy or the dividend payout discussed before as Manso (2008, p. 437) asserted that," *The relationship between financing and investment decisions of a firm has occupied the finance literature for the last 50 years*" Corporate investment is a rich research area, however, this study focuses on the relationship between corporate investment and information asymmetry and how corporate investment can affect firm growth.

The theory of investment has developed significantly years before the agency theory was introduced in the 1970s. Among the early models of investment behavior was the acceleration model that focused on the timing of investment and how firms can reach their desired level of investment that align with their long term view (Chenery, 1952). Developments in the theory of corporate investment behavior had two alternative aspects; the profit models of investment and capacity utilisation approach, as described by Jorgenson and Siebert (1968): "*Much effort has been devoted to comparison of profits and capacity utilization theories of investment behavior*."

The profit models of corporate investment behavior, first advocated by Tinbergen (1938), suggested that capital expenditures depend on firms' current and future profits. The assertion was that the more profitable the firm is, the more likely it would invest in the future. Various empirical examinations refuted this suggestion as Kuh (1963) who examined the profit model against the acceleration model using a time series approach and found that the latter is superior in describing the investment behavior. This finding matches the results obtained by Grunfeld (1960) that an insignificant relation exists between profit and investment. The existence of a correlation between profit and investment was verified by Grunfeld (1963, p.219) who concluded," *Our results do not confirm the hypothesis that profits are a good measure of those expected profits that will tend to induce investment expenditures. The observed simple correlation between investment and profits seems to be due to the fact that profits are just another measure of the capital stock of the firm."*

The capacity utilisation models found in literature are derived mainly from the acceleration models that relate investment expenditures to the level of output. The theory assumes that higher investment expenditures should be associated with high level of output to capital, whereas low level of output to capital results in lower investment expenditures (Chenery, 1952; Koyck, 1954). However, the empirical evidence did not support the capacity utilisation approach although Kuh (1963) found it more superior than the profit models. The weakness of both capacity utilisation and profit models of investment in explaining the behaviour of corporate investment resulted in more theoretical advances such as the neoclassical theory of optimal capital accumulation that builds upon both the acceleration and profit models by adding more variables such as interest rates and commodity prices as determinants of investment behaviour.

The neoclassical theory of corporate investment found little success in earlier studies such as Tinbergen (1938); Klein (1950); and Roos (1958). However, later studies like that of Jorgenson and Stephenson (1967) re-examined the theory by taking into consideration other factors like the cost of capital, price of capital goods, tax treatment, and changes in desired capital. Their findings provide further support to the neoclassical theory over the profit and capacity utilisation models.

Further developments in the field of corporate investment by Brainard and Tobin (1968) and Tobin (1969) presented Tobin's Q that is used to measure the ratio of market value to book value of equity and liabilities on a firm level. The more relevant use of Tobin's Q is its usage on aggregate level to measure the ratio between values in stock markets to corporate net worth. Firms with Q-ratio greater than one have a market value greater than the value of their assets. Thus, they are encouraged to invest more in capital (long-term assets) to be fairly valued. Firms with Q-ratio lower than one are undervalued by the market as they have a market value less than their recorded assets.

The impact of the agency problem and information asymmetry was obviously not considered in any corporate investment theory prior to their discovery in the mid-1970s. Thus, none of the studies listed above considered the difference in corporate investment behavior based on availability of information and/or agency considerations but rather focused on availability of funds for expenditure and the optimal use of capital based on the given prices, profitability measures, interest rates, tax rates etc.

With the introduction of agency problems and information asymmetry, different models tried to measure the impact of such problems on corporate investment behaviour. Agency conflicts related to both dividend policy and corporate financing are limited in comparison to those linked to corporate investment. For example, in the theory of agency and financing, the main conflicts arise between shareholders and management and between shareholders and bondholders (Jensen and Meckling, 1976). The problem is limited to the formulation of capital structure and the usage of different sources of financing and how they are perceived by investors. Similarly, in the theory of agency and dividend policy, the conflict arises between management and shareholders over the amount of cash holding and the payout policy and how the dividend policy could signal the performance of management to the market (Jensen, 1986).

Unlike both theories, the development of agency theory and corporate investment revealed different types of conflicts that arise between managers and principles, due to information asymmetry, that are directly linked to corporate investment decisions. Among these conflicts are the cases of over-investment and empire building, reputational problems, under-investment and the tendency of managers to avoid involvement in risky investments or the so called "quiet life" approach, and management's over-confidence (Stein, 2003). All of these problems have different implications for corporate investment. For example, the first agency problem that arises between managers and shareholders is when managers overinvest in risky projects or investments with negative net present value (NPV) to enlarge the assets under their discretion, or what is called ‘empire-building’ behaviour. The preference of managers in running large firms for their own benefit would become problematic if managers spend all available funds on new investments regardless of their profitability (Baumol, 1959; Williamson, 1964; Donaldson, 1984; and Jensen, 1993). Nevertheless, a negative relation between leverage and investment exists because debt payments will force managers to payout cash and decrease the cash available for overinvestment (Jensen, 1986; 1993)

Along similar lines, the tendency of managers to over-invest aiming at building corporate empires was formalised in different models such as that of Amihud and Lev (1981) who suggest that managers who over-invest tend to diversify their investments to make sure that their empire stays in the business, and that of Shleifer and Vishny (1989) who assert that managers would invest in projects that need their human knowledge and capabilities to increase the likelihood of maintaining and securing their jobs. Furthermore, Hart and Moore (1995) assumed that managers' personal benefits from overinvestment will be proportionate with the amount the firm invests, thus, they tend to invest more to increase this benefit.

Further support on the above theoretical propositions was provided by the empirical examination of alternative corporate investment behavior such as mergers and acquisition decisions. Roll (1986) surveyed various studies and found that in many cases the acquirer firm's stock price decreased after an acquisition announcement. Other studies linked acquisition events to agency problems by reporting a link between negative effects and firms where management has low equity shares. This finding appears to be indicative of empire building behavior (Lewellen et al., 1985). Similarly, Morck et al. (1990) found that firms that engage in diversification in unrelated investments tend to suffer more from severe negative announcement effects. Furthermore, Richardson (2006) found a strong relation between investment decisions and the amount of cash available, which indicates an overinvestment behavior.

While some studies have related overinvestment agency problems solely to empire building behavior, others have found a separate agency conflict related to overinvestment. Bertrand and Mullainathan (2000) assert that managers who seek a "quiet life" would continue investing in negative NPV projects because otherwise it would indicate failure of their managerial abilities. They also found that such managers, when they do not face threats of takeovers, would neither discontinue negative NPV projects nor invest in new profitable ones. This quiet life agency issue was also discussed by Baker (2000) who found that managers of young venture capital firms that are mostly concerned with reputation are the most likely to continue investing in negative NPV projects to maintain their image.

To sum up, based on these findings the overinvestment agency problem could be induced by management's behavior of either empire building preference or a desire for quiet life. However, the quiet life scenario could also result in an opposite investment-related agency problem: underinvestment behavior. As Agaarwal and Samwick (1999) demonstrate, managerial laziness or a desire for quiet life could defer managers from entering new lines of business or investing in new investment opportunities. As long as managers are more informed than shareholders (more information asymmetry) the severity of such investment-related agency problems increases.

Another agency problem that has implications for corporate investment is the ‘career concerns' issue which is also related to reputation of managers among investors and market participants. Fama (1980) highlighted the impact of career concerns on managers' behavior as either a cause of agency conflicts or a motive to perform better. Agency problems associated with reputation and career concerns include the tendency of managers to focus on the short term, induce herding behaviour, and act reluctantly towards new investments.

Short-termism refers to managers' behavior when they focus on short term operating performance rather on the long-term shareholders' value maximisation principle (Narayanan, 1985). Such short-term view might result in investments that generate current benefits even if they will not generate future benefits. This could take place when managers overinvest in projects to impress shareholders about their personal performance (Bebchuk and Stole, 1993). An opposite view is when managers try to cut current costs to signal their performance to shareholders. For example, managers could decrease spending on maintenance or training of employees etc. to generate higher current earnings regardless of the consequences of this underinvestment behaviour on the firm's long term earnings. (Stein, 2003)

Another reputational problem that has a direct implication for corporate investment is the so-called herding behaviour of managers towards investment decisions. This is where managers tend to copy or imitate their predecessors or competitors' decisions to avoid being signaled as risk takers or as acting for their own interest (Scharfstein and Stein, 1990; Zwiebel, 1995). Such herding behavior might result in investment decisions that do not necessarily result in firm growth but only signal that managers are risk averse. Avery and Chevalier (1999) suggest that herding behaviour is more likely among younger managers than older ones to build their reputation in the market.

Overall, the empire building approach suggested that an overinvestment problem exists, however, the reputational concern to management could result in either over- or under-investment. The occurrence of either behavior depends on the tendency of managers to invest more to impress shareholders or reduce investment funding to boost current earnings.

Finally, the last investment-related agency problem is a direct result of managers' overconfidence (Stein, 2003). Managers are sometimes optimistic about the future performance of their firm and act based on this belief. Such overconfidence could result in investment decisions that induce over-investment behavior, such as takeovers (Roll, 1986). Similarly, Heaton (1998) suggests that overconfident managers typically believe that their stock price is unfairly low and tend to issue new equity. Thus, overconfidence might be a valid explanation for over-investment and empire building behaviour. The problem with overconfident managers is that they believe that their actions are in the best interest of shareholders. Prior research suggests that controlling such behavior is a much harder task than the cases of empire building or herding behavior (Heaton, 1998)

The investment-related agency problems discussed above, which could be attributed to information asymmetry, do not eliminate the well-established agency problem of asymmetric information and signaling effect when it comes to corporate investment decisions. Among the recent studies that suggested the existence of a relationship between corporate investment and information signaling is Li (2011, p.722), stating that "*managerial investment decisions likely contain information about earnings quality because managers make many decisions based on future profitability, and arguably have more precise and complete information about their firm’s profitability than do other stakeholders.*" However, as the author suggests, the information content or the signal effect of investment decisions is not as severe as in other corporate decisions such as the dividend payout, for example. His argument is based on the findings of Skinner and Soltes (2009) who examined the earnings quality based on dividend decisions and concluded that investment in capital and labour are less sensitive to information signaling than dividend decisions.

This finding by Skinner and Soltes (2009) is in a similar vein with the suggestions of Lang and Litzenberger (1989) and Koch and Shenoy (1999) who found that dividend decisions have larger information signaling effects and agency costs for firms that overinvest, i.e. those firms with a Tobin's Q lower than one compared to those with a Tobin's Q closer to or higher than one. Moreover, a U-shaped relationship exists between the amount of information asymmetry and Tobin's Q where firms that have a Q-ratio close to or higher than one have the least information problems. This implies that both over- and under-investing firms, especially those that over-invest, suffer more from information asymmetry that is relevant to their investment strategies.

The investment decision varies widely across firms due to the nature of the business, its riskiness, ownership structure, availability of cash flows, firms' capital structure, etc. This study focuses on the agency problems and information asymmetry associated with corporate investment strategies and how they might affect firm growth. Therefore, the impact of corporate investment on firm growth under the above mentioned agency problem is discussed in the following text.

Unlike a firm's capital structure and the dividend policy, corporate investment can directly be linked to firm growth when measured in terms of growth in fixed assets. Thus, the more the firm invests in assets, the larger its assets' growth will be. However, when measuring the firm growth in terms of sales, profits, market share etc. as suggested by Ardishvili et al., (1989) and Delmar et al. (2003), investments in long term assets might not necessarily result in firm growth. Nevertheless, under the various agency problems associated with corporate investment, further investments might hinder firm growth. After a comprehensive review, Stein (2003) suggested that managers might overinvest seeking empire building, which maximises the size of the firm but not necessarily result in sales' growth. On the other hand, managers might be incentivized to invest in negative NPV projects or in risky investments that would result, on the long run, in lower or insignificant growth rates, for reputational reasons.

The problems associated with investment in long term assets; plant and equipment, capital investments, machinery, building etc. opened the door for studies that examined investment in current assets such as that of Carpenter et al. (1994) who examined investing in inventory (a current asset), and its impact on operations. Their conclusions matched the propositions of Cheatham (1989, p.20) who suggested that, "*Once a firm has acquired the necessary buildings and fixtures to begin operations, most of its cash flows are the result of investing in and selling of current assets. The bulk of a firm's cash expenditures are for the purpose of either purchasing or adding value to inventories. All of a firm's cash inflow from* *normal operations is generated from sales. Sales occur as the eventual result of the liquidation of inventories."* This implies that firm growth, in terms of sales, could be a direct result of investment in current assets rather than long term assets. Thus, firms that invest more in current assets could have higher growth rates than those who invest less in current assets and keep accumulating long term assets.

The agency problems associated with investing in long term assets are mainly related to firms that have Q-ratio that deviates from one (Koch and Shenoy, 1999). Thus, the more the deviation from one is, the severer the agency conflicts. Hence, it would be inappropriate for the firm to invest in long term assets because this investment is likely either an empire building behaviour or continuing negative NPV projects to maintain reputation. In both cases, the firm's growth would be hindered in terms of sales or profits.

Based on the above discussion, the researcher suggests that on the one hand, at high levels of information asymmetry, for firms that suffer from agency problems of corporate investment and whose Q-ratio is lower than one, investment in current assets could have a positive impact on firm's sales growth. On the other hand, such firms should not primarily invest in long term assets because those investments would be associated with higher agency costs due to empire building behavior or continuing in negative NPV projects. Conversely, firms that have a Tobin's Q higher than one and suffer less from information asymmetry and agency costs of corporate investment could invest in long term assets and still contribute to firm growth because those investments are more likely to be expenditure in corporate expansion or exploiting profitable investment opportunities.

2.5 Interaction of investment, financing, and dividend decisions and firm growth

In the previous sections, the impact of each major corporate finance decision: financing, dividend, and investment on firm growth is discussed. Therefore, the review of relevant literature suggests the existence of a relationship between each of the three decisions and firm growth and how this relationship can be affected by the issue of information asymmetry. This section expands this discussion by exploring how the three decisions are not separate from each other but rather interact together and how this interaction will affect the growth of the firm.

On practical and theoretical levels, a firm that depends more on internal financing would normally pay out less in dividends. Moreover, the lower the dividend payments, the higher the available funds for investment expenditures and vice versa. Thus, it is obvious that each of the three decisions could not be taken in isolation from the other two. Some studies presented a relationship between each two of the three decisions while other studies combined all three of them. Chen et al. (2010) suggested a relationship between each two of the three decisions; investment and dividend, dividend and financing, and investment and financing, suggesting that the three decisions are not separate from each other. Yet, Chen et al. (2010) did not consider the role of this interaction in helping/hindering firm growth or in mitigating agency conflicts and asymmetry of information.

Dividend policy and corporate investment are related according to Chen et al. (2010, pp. 23-24) as they suggest that, "*Retained earnings are most often the major internal source of funds made available for investment by a firm. The cost of these retained earnings is generally less than the cost associated with raising capital through new common-stock* *issues. The availability of retained earnings is then determined by the firm's profitability and the payout ratio, the latter being indicative of dividend policy."* Therefore, firms that rely more on internal financing tend to have lower payout ratios when they have profitable investments. This implies that a relationship exists between dividend policy and corporate investments. Moreover, financing decision is not distinct from this relationship because firms that regularly pay dividends will have to rely on external financing (new equity or debt issues) to finance their investments. This explains why a direct link exists between financing decisions, or the capital structure in general, and dividend policy. Firms that have high payout ratios will have limited internal funds to finance new investments and vice versa.

Similarly, a relationship exists between corporate investment and financing decisions. Firms should invest as long as its cost of capital is reasonable, or what is known as capital budgeting decision (Myers, 1974). Prior studies examined whether firms should rely on risky debt to finance new investments or rely only on low-risk financing instruments (Rendleman, 1978; Chambers et al., 1982). Moreover, the optimal capital structure and the acceptable level of risk for financing new investments has been a considerable research area in the finance literature (See for example Miller (1991)). Recent studies went further to suggest that not only the financing decision affects investment strategy but even the type of debt financing affects the investment decision. By analysing financing investments using US bank loans and bond data, Morellec et al. (2014) found evidence that appears to support this proposition.

Other than the above relationships between each two of the three decisions, some studies examined the interaction between the three decisions. A close study that examined the interaction between the three decisions and the amount of information available is Koch and Shenoy (1999). The authors conclude: "*our results indicate that dividend and capital structure policies interact to provide significant predictive information about future cash* *flow. We also find a U-shaped relation between the amount of information and Tobin's q. The minimum of this relation occurs near a q-value of one. This outcome implies a stronger information effect for both over-and under investing firms than for value-maximizing firm".* These findings suggest an impact for dividend and financing policies on investment decisions. It also implies that this interaction could differ according to the amount of information available.

Similarly, Bolton et al. (2011) proposed a model that combines corporate investment, financing decisions, and risk management for firms suffering from liquidity problems. Their findings support the existence of a relationship between investment and financing policies for such firms because the relation between investment and liquidity is found to differ according to the source of financing. The latter is affected by the dividend payout ratio as mentioned before. Thus, the study suggests that the relationship between the three decisions and how they interact together to affect firm growth could differ according to the level of information asymmetry or agency conflicts in general.

Two similar studies are Lang et al. (1996) and Brush et al. (2000), which both examined firm growth taking into consideration the investment and financing decisions or firm growth when accounting for agency conflicts. Lang et al. (1996, p. 28) suggest that a negative relation exists between leverage and firm growth for firms with low Q ratios, but not for firms with high Q ratios. They reason that "*the negative effect of leverage on growth affects only those firms with good investment opportunities that the market does not recognize and those firms that do not have good investment opportunities."* (i.e. low-q firms). This finding supports the argument that leverage level, the financing decision, and investment opportunities do indeed interact to affect firm growth. Brush et al. (2000) investigates the profitability of firms having free cash flow from sales growth at different monitoring levels, with different levels of agency conflicts. They conclude that *"consistent with agency theory, firms with free cash flow gain less from sales growth than firms without free cash flow. But different governance conditions affect sales growth and performance in different ways. Having substantial management stock ownership mitigates the influence of free cash flow on performance, despite allowing higher sales growth."* The finding that management's stock ownership and governance mechanisms affect sales growth supports the argument that information asymmetry do have an impact on firm growth (if sales growth is used as a proxy).

Combining the findings of Lang et al. (1996) and Brush et al. (2000) with the above evidence that the three corporate finance decisions (financing, dividend, and investment) do interact together, we can conclude that each of the three decisions is affected by information asymmetry. Moreover, firm growth is affected by the level of corporate governance and is a direct result of decisions taken within the firm. Thus, a relationship between financing, dividend, and investment decisions and firm growth exists and this relationship may differ according to the level of agency conflicts, corporate governance, and information asymmetry. An identified gap in the existing literature is how these three decisions contribute to firm growth at each level of information asymmetry; high and low, which is the objective of this study. This question is answered in the following chapter.

2.6 The effect of changes in ownership structure on firm growth at various levels of information asymmetry

The assertions of Brush et al. (2000) that ownership matters to this relationship opened the door for another set of the determinants of firm growth: the non-financial variables. Although the financial variables discussed above might be important contributors to firm growth, other factors could not be ignored. Variables like ownership structure, board composition, internal audit unit, and committees of both executives and non-executives are all used to enhance firm performance and reduce the informational gap between managers and shareholders. More recent studies on the roles of such variables exist, for example Fazlzadeh et al. (2011); Judge (2010); and Aguilera et al. (2008). Recent financial scandals have drawn extensive attention to corporate governance and its impact on efficiency and effectiveness of managers' decisions.

The scope and range of these variables and their impact on firm performance is too broad to address in one study. This study, therefore, due to availability of data, focuses on the most common variable that is believed to have a direct impact on firm growth, or firm performance in general: changes in ownership structure. In a recent study examining the impact of institutional ownership on firm performance; Al-Najjar (2015, p. 98) claimed that, "*The review of literature for the impact of institutional ownership on the firm's performance shows no agreed relationship, and delivers strong debate on the topic among various studies in different countries from developed to developing countries."* Regarding the impact of institutional investors versus individual investors on firm performance prior research has shown that institutional investors, such as investment managers, insurance firms, and brokerage firms possess more knowledge, skills, and capital than individuals. As large shareholders, they are encouraged to monitor the behavior of managers and therefore, they are believed to have an influence on corporate governance (Grossman and Hart, 1980).

A considerable number of studies have examined the impact and scope of this effect on firm performance. For example, Shleifer and Vishny (1986) claimed there is a greater incentive for institutional shareholders to monitor managers' behavior than board members who possess little or no shares in the firm. In addition, Cornett et al. (2007, pp. 1773) stated that, "*McConnell and Servaes (1990), Nesbitt (1994), Smith (1996) and Del Guercio and Hawkins (1999) all have found evidence consistent with the hypothesis that corporate monitoring by institutional investors can result in managers focusing more on corporate performance and less on opportunistic or self-serving behavior.*" This confirms that institutional shareholders have a direct impact on firm performance.

Other studies favoured an opposite view, suggesting that not all institutional shareholders hold huge amount of shares in firms and care about the long-term survival of the firm. In fact, many institutional shareholders care more for liquidity of their shareholdings and short-term profitability rather than spending money, time, and effort on monitoring and they are reluctant to spend significant amounts on monitoring while other shareholders enjoy "a free ride" (i.e. they benefit from the efforts and investment of the institutional shareholder for free). More detailed explanations of disincentives to effective monitoring by institutional shareholders can be found in the literature, for example Bhide (1994); Demirag (1998); and Maug (1998).

Despite the mixed evidence on the impact of institutional shareholders on corporate governance and monitoring schemes, empirical evidence suggests that ownership structure can sometimes affect firm performance as McConnell and Servaes (1990); Del Guercio and Hawkins (1999); Cornett et al. (2007); and Chen et al. (2008) found a positive relation between the percentage of institutional ownership and various performance measures. This finding is consistent with results from studies from different countries and different time horizons such as Manawaduge and De Zoysa (2013) in Sri-Lanka, an emerging Asian market, and Thomsen and Pedersen (2000) in European countries. However, other studies have found an insignificant impact, such as like Agrawal and Knoeber (1996), Faccio and Lasfer (2000), and Fazlzadeh et al. (2011). These mixed empirical results are consistent with the assertions of Al-Najjar (2015) that no certain conclusion can be drawn about the effect of institutional ownership on firm performance.

More recent studies tried to integrate various governance variables such as ownership structure, and board composition and independence together into a ranking system in order to better understand the impact of corporate governance mechanisms on firm performance (Aguilera et al., 2008; and Judge, 2010), yet using these complex measures rather than individual measures resulted in contradictory and ambiguous results (Bhagat et al., 2008). To the best of the researcher's knowledge, none of the previous studies examined the effect of ownership structure on firm growth under various levels of information asymmetry. The only close study was that of Thomsen and Pedersen (2000) who used sales growth as a proxy for firm performance and found that firms whose largest shareholder is a family or another firm have higher sales growth.

Hence, prior research reports mixed results regarding the impact of institutional ownership, or ownership structure in general, on firm growth. In the following empirical chapters, the roles of both financial and non-financial determinants on firm growth are investigated under high and low levels of information asymmetry, with chapter three examining the relative contribution of investment, financing, and dividend decisions to firm growth along with the integrated role of the three of them in hindering or stimulating firm growth. Chapter four examines the contribution of changes in ownership structure to firm growth under alternative conditions of information asymmetry; while, chapter six examines the relative weight of financial variables, ownership structure, industry and size effects in achieving such firm growth.

Chapter Three

An Empirical Investigation of the relative contribution of investment, financing, and dividend decisions to firm growth.

3.1 Hypotheses Development

The relevant literature includes a number of relationships that are examined in this thesis. Financing decision is found to be affected by agency problems due to information asymmetry that causes possible conflicts between shareholders and management and/or due to the signal conveyed to the market from the issuance of debt or equity (Jensen, 1986; Myers and Majluf, 1984; Klein et al. 2002). Frank and Goyal (2005) argue that the relationship between debt financing and firm growth is negative. They further advocate the trade-off theory which places little emphasis on agency considerations and information asymmetry and focus instead on tax considerations and bankruptcy costs. The gap in the related literature has been highlighted by Lemmon and Zender (2010) who concluded that future research should examine the interaction between financing and growth in assets.

The assertions of Frank and Goyal (2005) could hold for firms facing a low level of information asymmetry, which could have a lower impact on operating performance and earnings. However, this might not be the case for firms facing a high level of information asymmetry, as using equity financing for firms with high information asymmetry might hinder the ability of such firms to raise capital from stockholders or at least would increase their cost of capital as investors will require extra return to invest in such firms. This would hinder the abilities of such firms to invest in growth opportunities or at least decrease its benefits from growth options in comparison to firms facing low information asymmetry.

A testable hypothesis can be derived based on this proposition and the above mentioned empirical findings that higher debt (lower equity) financing is positively associated with earnings and operating performance, i.e.

H1: "A positive relationship exists between debt financing and firm Sales growth at high level of information asymmetry"

Another testable hypothesis could be developed from the relationship between dividend policy, information asymmetry, and firm growth. Empirical studies suggest that dividend payouts do signal firm performance to the market. Rozeff (1982) and Bartram et al. (2007) both suggest a negative relationship between dividend payout and firm growth. However both suggest increasing payout ratios to decrease information asymmetry. There is evidence that historical firm growth and dividend policy are related and that agency costs and information asymmetry affect this relation, with several studies (Borokhovich, 2005; Amidu and Abor, 2006; and Skinner and Soltes, 2011) suggesting that the dividend policy may contribute to firm growth. This contribution varies according to the level of agency conflicts on firm level or/and country protection level (La Porta et al., 2000; Bartram et al., 2007). Therefore, firms that suffer from a high level of information asymmetry should pay more in dividends to signal their performance to the market. This type of signaling would enable easy access to sources of financing and might stimulate future growth. Nevertheless, firms that have low information asymmetry problems do not have to pay as much in dividends to signal their performance because investors are already well-informed about the firm's performance. A testable hypothesis to examine this relationship could be drawn as follows:

H2: "A positive relationship exists between dividend payouts and firm growth at high level of information asymmetry"

Although cash dividends is the most common form of profit distribution, a limitation to the above relationship is the existence of several types of dividends such as stock dividends, special dividends, and stock repurchases. Due to the availability of data about only cash dividends and payout ratios in terms of the amount of cash distributed versus the amount of retained earnings, the above hypothesis is related only to cash dividends.

Investment decisions have the most direct relationship with firm growth, especially when measured in terms of growth in assets. However, investment decisions face various forms of agency conflicts due to information asymmetry as discussed above. These forms are over- and under-investment, overconfidence, short-termism, and career concerns (Stein, 2003). The agency problems are mainly related to firms that have Q ratios that are lower than one (Koch and Shenoy, 1999). In this case, further investment in long-term assets might be a result of one of these agency conflicts. Thus, investment in long-term assets might imply higher growth in terms of assets. However, it might not imply higher growth in terms of sales, profitability and market share. Cheatham (1989) suggests that firms tend to invest in current assets after they acquire the necessary long-term assets and use such investment to grow their sales and profits. Thus, it could be predicted that for firms facing a high level of information asymmetry and more investment-related agency conflicts, investment in current assets could stimulate growth. However, investment in long-term assets would appear to hinder firm growth except when measuring firm growth in terms of growth in assets. More specifically, Carpenter et al. (1994) suggested investment in inventory in particular. Three testable hypotheses could be drawn as follows:

H3: "A negative relationship exists between investments in long-term assets and firm growth at high level of information asymmetry."

H4: "A positive relationship exists between investments in current assets and firm growth at high level of information asymmetry"

H5: "A positive relationship exists between investments in inventory and firm growth at high level of information asymmetry"

These three hypotheses apply only when measuring firm growth using proxies other than growth in assets because if tested using growth in assets both investment in current and long-term assets would directly result in positive impact on firm growth.

Finally, the relative contribution of financing, dividend and investment decisions to firm growth under each level of information asymmetry (high and low) should be tested to examine the various determinants of growth at high and low levels of information asymmetry. This thesis develops the above mentioned hypotheses that, due to the existence of information asymmetry, determinants of firm growth might vary from one level to another.

3.2 Data and Methodology

The sample for this study includes the S&P 500 non-financial firms. The dataset comprises of accounting and financial data (stock prices) covering a period of twenty-five years (1989 to 2014). All data used are of a panel structure (cross-sectional and time-series) and are unbalanced due to the variability in listing date for each firm and the availability of its data items. Data include determinants of investment, financing, and dividend decisions like payout ratio, debt ratio, dividend yield, current-to-fixed assets etc. All data are obtained from Thomson's DataStream database. The following table shows the distribution of sample firms across the 9 industries that represent the constituents of S&P 500 during the time of data download. Financial firms are excluded from the sample due to the differences in their financial statements relative to the rest of the firms.

Table 3.1: The distribution of sample firms across industries

Industry Name	Number of firms	Abbreviation of Industry
Industrials	65	Industry1
Health Care	53	Industry 2
Information Technology	63	Industry 4
Utilities	30	Industry 5
Materials	30	Industry 6
Consumer Staples	40	Industry 7
Consumer Discretionary	84	Industry 8
Energy	44	Industry 9
Telecommunications Services	5	Industry 10

The sample includes financial data for the non-financial active firms listed in S&P 500 as shown in the above table. A total of 414 firms are included in the sample. The data for the missing items are excluded. The variables are categorised according to the standard determinants of investment, financing, and dividend decisions. The descriptions of the variables are discussed is further details in the next section.

3.2.1 Dependent Variables

This study measures the contribution of financing, dividend, and investment decisions to firm growth at different levels of information asymmetry. Therefore, the dependent variable in the empirical analysis is firm growth. The literature cites different proxies for measuring firm growth: growth of employment, market share, profit, sales, assets etc. (see for example Delmar et al., 2003). Empirically, two conventional measures for firm growth are growth of fixed assets and growth of sales (Fairfield, 2003; Broussard, 2011; Cooper et al., 2008; Lipson, et al. 2009; Gray and Johnson, 2011; Yao, et al. 2011).

A new measure of firm growth that considers the interaction between fixed assets and sales was introduced by Eldomiaty and Rashwan (2013). They argue that the conventional measures of firm growth may not be good representative of firm growth. Since sales revenue is measured in monetary units, sales may grow due to successive increases in prices rather than increases in volume. Furthermore, increases in sales may or may not indicate the efficiency of using the assets. The second measure (growth of assets) is an indication of successive increases in assets that may or may not be associated with increase in sales. For example, the additions to fixed assets may not necessarily be associated with increases in productivity. The same is true in case of current assets. Therefore, they suggest using sales-weighted fixed assets growth as a measure for proportionate increase in both sales and assets. Lastly, growth in total assets was used as a proxy for firm growth in various studies (see for example Delmar et al., 2003). Thus, this study suggests four proxies to measure firm growth, namely:

- The continuous compound growth rate of fixed assets (Hart, 1995; Delmar et al., 2003).
- The continuous compound growth rate of sales (Hoy et al., 1992; Ardishvili et al., 1998; Davidsson and Wiklund, 2000).
- The sales-weighted fixed assets growth (Eldomiaty and Rashwan, 2013)
- The continuous growth rate of Total assets. (Hart, 1995; Delmar et al., 2003)

To select one of the above four measures to be used in the empirical analysis as the dependent variable (Y), descriptive statistics are used to determine which proxy is associated with the least standard error. The following results are obtained:

Table 3.2: Descriptive statistics for the proxies of firm growth

	Sales-weighted fixed assets	Growth in total assets	Growth in sales	Growth is Long-term assets
Mean	0.123	0.135	0.045	0.112
Standard Error	0.018	0.018	0.004	0.018
Median	0.000	0.001	0.001	0.001
Mode	0.002	0.000	0.001	0.002
Standard Deviation	2.789	2.864	0.680	2.798
Sample Variance	7.781	8.207	0.462	7.829
Kurtosis	5122.830	5117.590	1912.680	5060.600
Skewness	57.023	56.981	33.160	56.490
Range	317.822	300.329	56.708	317.570
Minimum	-26.213	-0.878	-9.138	-25.960
Maximum	291.609	299.451	47.570	291.609
Sum	2972.819	3274.138	1090.061	2704.052
Count	3612	3612	3612	3612

According to the above descriptive statistics, growth in sales shall be used as the proxy for firm growth in this thesis as it was associated with the least standard error among the four proxies of firm growth. The reason behind selecting growth in sales as a proxy for firm growth stems from two arguments. First, the literature cites growth in sales as the most conventional financial statements-based measure (Hoy et al., 1992; Ardishvili et al., 1998; Davidsson and Wiklund, 2000). Second, the nature of the analysis of this thesis accounts for investments in current, fixed and total assets (Investment decision) as contributors to firm growth. Thus, the other three proxies that incorporate any kind of assets (growth rate of fixed assets, sales-weighted fixed assets growth, and growth rate of total assets) will be misleading in the analysis.

3.2.2 Independent Variables

This thesis examines the contribution of financing, dividend and investment decisions to firm growth. The independent variables are the determinants of each of three decisions as cited in the literature. The financing decision is measured using either debt ratio or debt-to-equity ratio (Stonehill et al., 1975; Bhandari, 1988). The corporate dividend decision is measured by payout ratio and dividend yield (La Porta et al., 2000; Gugler, 2003). The corporate investment decision is measured in this thesis using the change in fixed assets, change in current assets, change in inventory, and ratio of current-to-fixed assets (Sundararajan, 1987; Lam, 1997). The author suggests adding other variables that are widely used as determinants of firm performance such as effective corporate tax rate, operating income-to-assets, operating income-to-sales, non-debt tax shield, bankruptcy risk, and probability of default.

3.2.3 Proxy Measures of Information Asymmetry

This study measures the contribution of the three corporate decisions to firm growth under different levels of information asymmetry. Several sources in the literature suggest that the agency problem between corporate managers and investors is associated with information asymmetry. The outcome of the problem of information asymmetry is an adverse selection. Accordingly, the trade spread is commonly used to measure the asymmetry between investors' price expectations (Glosten and Harris, 1988; George et al., 1991; Lin et al., 1995; Madhavan, Richardson, and Roomans, 1997; Huang and Stoll, 1997). The common and major critics to traded spread are the econometric problems associated with time series and price dependency that renders the trade spread biased. In this regard, the author considers the use of proxies of information asymmetry that incorporate corporate data and recognise the possibility of adverse selection directly. These proxies are as follows:

1) The Sensitivity of Stock Returns to Expected ROE. In this case, the beta algorithm can be utilised operationally. The negative beta refers to adverse selection and positive beta refers to favorable selection. This proxy is in line with the prior studies in the field such as Krishnaswami and Subramaniam (1999), Christie (1987) and Dierkens (1991). The rationale of this proxy is that positive betas indicate that the investors are able to expect the firm's ROE and the stock prices are associated with changes in ROE positively. Negative betas indicate that the investors' reaction, in terms of stock price changes, goes against the expected ROE which is viewed as an adverse selection.

2) The Probability of Adverse Selection using the Black-Scholes option pricing model (probability of occurrence $N(d_2)$ is the cumulative standard normal density function). The $N(d_2)$= 0 refers to favorable selection and $N(d_2)$≥ 0 refers to adverse selection, thus the existence of asymmetric information. The Black and Scholes (1972, 1973) option pricing model offers a stochastic method for calculating the expected value of an option when the inputs (current stock price and strike price) are expected as well. The standard linear stochastic Black-Scholes model is as follows:

$$Call\ price = S \times N(d_1) - X \times e^{R_f \times (T-t)} \times N(d_2) \qquad \text{(Equation 3.1)}$$

$$d_1 = \frac{\ln\left(\frac{S}{X}\right) + \left(R_f + 0.5\sigma^2\right) \times (T-t)}{\sigma \times \sqrt{T-t}} \qquad \text{(Equation 3.2)}$$

$$d_2 = \frac{\ln\left(\frac{S}{X}\right) + \left(R_f - 0.5\sigma^2\right) \times (T-t)}{\sigma \times \sqrt{T-t}} \qquad \text{(Equation 3.3)}$$

$$= d_1 - \sigma \times \sqrt{T-t}$$

Where S = current stock price, X = strike price, (T-t) = time to maturity, σ = standard deviation, R_f = risk-free rate of interest, N (.) is the cumulative standard normal density function.

The rationale of using the Black-Scholes model in the context of this thesis is that the expected stock return and ROE are subject to stochastic processes. Therefore, the option pricing model can be adapted as follows:

$$Intrinsic\ return = E(\mathrm{ROE}_t) \times N(d_1) - R_t \times e^{R_f \times (T-t)} \times N(d_2) \qquad \text{(Equation 3.4)}$$

This equation shows that the information asymmetry between financial managers and the investors creates a disconnection between stock returns and a firm's profitability. The former might be far higher or lower than the latter. In this case, the favorable selection of a stock occurs when the stock return is equal or less than firm's expected profitability. Since investors are expecting future price, the stock return is associated with a probability of occurrence. Therefore, the probability of default (PD) = 1- $E(\mathrm{ROE}_t)$. In this case, the PD is associated with an adverse selection. The probability of occurrence $N(d_2)$ calculates as follows.

$$d_2 = \frac{\dfrac{E(ROE_t) - R_t}{R_t} + (R_f - 0.5\sigma^2) \times (T - t)}{\sigma \times \sqrt{T - t}} \qquad \text{(Equation 3.5)}$$

The probability of occurrence $N(d_2)$ is the cumulative standard normal density function.

These equations offer two advantages. The first advantage is that they allow for price correction when the stock return goes higher or lower than the firm profitability. The second advantage is that they guarantee the investors an expected return $E(\mathrm{ROE}_t)$ when prices do not change (return = zero)

3) Another measure for information asymmetry that was used by Varici (2013) is the Q ratio presented by Brainard and Tobin (1968) and Tobin (1969). This measure is applied by differentiating between Q ratio either higher or lower than one, where the lower the Q ratio, the severer the information asymmetry problem between management and market participants. This is mainly due to under-investment behaviour of management (Koch and Shenoy, 1999: Stein, 2003). Q ratios that are much higher than one might result in over investment problems like empire building, yet in most cases it means that the firm is trying to utilise its capacities better and invest more. The calculation of Q ratios in this study follows the approximate calculation of Q developed by Chung and Pruitt (1994) who used available balance sheet items to calculate Q ratios and successfully tested it empirically against values calculated using the Lindenberg and Ross (1981) model, that employs a more sophisticated approach. Chung- Pruitt (C-P) Q Ratio is calculated as follows:

$$\begin{aligned} \boldsymbol{Chung - Pruitt\ Q} &= [\boldsymbol{MV}\ (\boldsymbol{CS}) + \boldsymbol{BV}\ (\boldsymbol{PS}) + \boldsymbol{BV}\ (\boldsymbol{LTD}) + \boldsymbol{BV}\ (\boldsymbol{INV}) \\ &\quad + (\boldsymbol{BV}\ (\boldsymbol{CL}) - \boldsymbol{BV}\ (\boldsymbol{CA})] \,/\, [\boldsymbol{BV}\ (\boldsymbol{TA})] \qquad \text{(Equation 3.6)} \end{aligned}$$

Where: [1] MV (CS) = Market value of common stocks; [2] BV (PS) = Book Value of Preferred stocks; [3] BV (LTD) = Book Value of Long Term debt; [4] BV (INV) = Book Value of Inventory; [5] BV (CL) - BV (CA) = Book Value of Current Liabilities – Book value of Current Assets; [6] BV (TA) = Book Value of Total Assets.

The data, as mentioned above, was downloaded from DataStream Database. The following three tables summarise which variables were downloaded and which ones were calculated, the chosen variables, and the key descriptive statistics for them.

Table 3.3: Downloaded and calculated variables:

Variable	**Downloaded**	**Calculated**
Sales-Weighted Fixed assets growth		Using Net Sales and Fixed Assets
Growth in total assets	√	
Sales Growth (Y)	√	Using Net Sales
Growth in fixed assets	√	Using Property, Plant, and Equipment (PPE)
Debt-to-Equity (DE)	√	
Debt-to-Equity t-1 (DE t-1)		Using D/E
Expected Debt-to-Equity (Expected DE)		Using D/E
Debt Ratio (DR t)	√	
Debt Ratio t-1 (DR t-1)		Using DR
Delta Debt Ratio (Delta DR)		Using DR
Fixed Assets-to-total Assets (FATA)		Using PPE and Total Assets
Non Debt Tax shield (NDTAX)		Using Total Debt and Taxes
Delta Non Debt tax shield (DeltaND)		Using Total Debt and Taxes
Effective Corporate tax rate (ECTR)		Using Total Taxes and EBT
Bankruptcy risk (BR)		Using EBIT, Interest paid, and SD EBIT
Operating income-to-sales (OIS)		Using EBIT and Sales
Operating income-to-assets (OIA)		Using EBIT and Total Assets
Dividend payout ratio (DPR)	√	Using Dividends per share and Earnings per share
Current Assets-to-Fixed assets (CAFA)		Using Total Current Assets and PPE
Dividend Yield (DY)	√	
Change in Inventory (LNInventory)	√	
Probability of Default (PD)		Using TD, MVE, and, asset volatility
Market Value of Equity (MVE) Dummy in USD	√	Using Market value of Equity
Total Assets (TA) Dummy in USD	√	Using Total Assets

Table 3.4: Definition of Variables

	Firm Growth	Proxies:	References
Dependent Variable	Growth in Sales	Continuous compound growth rate of Sales	(Hoy et al., 1992; Barkham et al. ,1995; Ardishvili et al., 1998; Flamholtz, 1986 Davidsson and Wiklund, 2000)
	Growth in Fixed Assets	Continuous compound growth rate of Fixed Assets	(Hart, 1995; Delmar et al., 2003)
	Growth in Total Assets	Continuous compound growth rate of Total Assets	(Delmar et al., 2003; Hart ,1995)
	Sales-weighted fixed assets growth	Sales growth and fixed assets growth	(Eldomiaty and Rashwan, 2013)
	Regressors related to financing, dividend, and investment decisions	**Proxies:**	**References**
Independent Variables	Financing	Debt/Equity Ratio, Debt Ratio, Delta Debt Ratio, Expected Debt Ratio	(Kim and Sorensen, 1986)
	Dividend	Dividend yield,	(Schooley and Barney Jr., 1994)
		Dividend payout Ratio	(Dempsey and Laber, 1992; Noronha et al., 1996; Manos, 2003; Borokhovich et al., 2005)
	Investment	Ratio of Current assets-to-fixed assets Ratio of fixed assets–to-Total assets	(Cheatham, 1989) Stein (2003)
		Investment in Inventory	(Carpenter et al. ,1994)
	<u>Other Contributing variables</u>	ECTR, BR, OIS, OIA, PD	Author's Contribution
	Information asymmetry	**Proxies:**	**References**
Role of agency problems	Deviation of Q-Ratio from one	Q-Ratio	(Chung and Pruitt, 1994; Koch and Shenoy, 1999: Stein, 2003)
	Sensitivity of stock returns to expected ROE	ROE and stock prices	(Krishnaswami and Subramaniam ,1999; Christie ,1987; and Dierkens, 1991)
	Probability of Adverse selection	The probability of default using Black-Scholes Option Pricing model	Author's Contribution
Control Variables			
Firm Size (Small, medium, Large)	Ln (Total Assets) Ln (MVE)	Dummy variables (dichotomous 0,1)	(Evans, 1987; Bottazzi and Secchi, 2006; and Hart (1995)
Industry Type		Dummy variables (dichotomous 0,1)	Rajan and Zingales (1995)
Time		Time chronological order	(Lucas and McDonald, 1990; and Korajczyk et al., 1992)

Table 3.5: Key Descriptive Statistics for the chosen variables

Variable	Mean	Median	Mode	Minimum	Maximum
Sales-Weighted Fixed assets growth	0.089	0.054	0.080	-3.248	1.055
Growth in total assets	0.105	0.068	0.000	-0.826	2.246
Sales Growth (Y)	0.088	0.073	0.000	-1.763	1.380
Growth in fixed assets	0.088	0.055	-0.025	-3.248	1.055
Debt-to-Equity (DE)	0.460	0.760	0.740	-30.360	24.430
Debt-to-Equity t-1 (DE t-1)	0.675	0.517	0.737	-35.703	24.914
Expected Debt-to-Equity (Expected DE)	0.775	0.527	0.231	-41.053	72.978
Debt Ratio (DR t)	0.558	0.550	0.722	0.128	1.465
Debt Ratio t-1 (DR t-1)	0.558	0.551	0.722	0.128	1.465
Delta Debt Ratio (Delta DR)	-0.001	0.000	0.000	-0.514	0.972
Fixed Assets-to-total Assets (FATA)	0.448	0.398	0.591	0.006	0.944
Non Debt Tax shield (NDTAX)	0.050	0.046	0.040	0.004	0.269
Delta Non Debt tax shield (DeltaND)	0.000	0.000	0.000	-0.080	0.183
Effective Corporate tax rate (ECTR)	0.350	0.360	0.500	-14.075	15.571
Bankruptcy risk (BR)	-55.540	-8.012	-6.941	-48282.582	13.511
Operating income-to-sales (OIS)	0.147	0.124	0.171	-2.255	0.784
Operating income-to-assets (OIA)	0.111	0.107	0.201	-1.048	0.430
Dividend payout ratio (DPR)	0.330	0.210	0.000	0.000	29.000
Current Assets-to-Fixed assets (CAFA)	1.922	0.978	0.209	0.035	139.530
Dividend Yield (DY)	0.014	0.011	0.000	0.000	0.136
Change in Inventory (LNInventory)	12.819	13.040	13.456	5.937	17.574
Probability of Default (PD)	0.000	0.000	0.000	0.000	0.086
Market Value of Equity (MVE) Dummy in USD	18,727,317	7,291,980	742,925	12,534	536,481,277
Total Assets (TA) Dummy in USD	18,410,876	7,401,000	20,192,000	16,857	797,769,000

The data are divided into two groups according to each proxy of information asymmetry independently. According to the first approach (Sensitivity of Stock Returns to Expected ROE), the two groups address the cases of favorable (adverse) selection where stock returns are positively (negatively) associated with ROEs. According to the second approach (Probability of Default), the two groups address the cases of favorable (adverse) selection where PD = zero (1). Finally the distinction of Q ratio above (below) one addresses the likelihood of management to invest (under-invest) and therefore corresponds to low (high) levels of information asymmetry. Observations are grouped in terms of firm size and industry type to understand the variation in results across both factors. Two dummy variables are used for firm size; Total assets (TA) and Market value of Equity (MVE) and the data are distributed among small, medium, and large size of firms according to each of them.

3.2.4. Model Estimation

Since the data are a cross section-time series panel, the Hausman specification test (Hausman, 1978; Hausman and Taylor, 1981) is required to determine whether the fixed or random effects model should be used. The test looks for the correlation between the observed x_{it} and the unobserved λ_k, thus is run under the hypotheses that follow.

$$\mathrm{H}_0 : \mathrm{cov}(x_{it}, \lambda_k) = 0$$
$$\mathrm{H}_1 : \mathrm{cov}(x_{it}, \lambda_k) \neq 0$$

Where x_{it} = regressors, and λ_k is the error term.

The issue of linearity versus nonlinearity is addressed and examined as well. Regression Equation Specification Error Test, RESET (Ramsey, 1969; Thursby and Schmidt, 1977; Thursby, 1979; Sapra, 2005; Wooldridge, 2006) is employed to test the two hypotheses that follow.

$$\begin{aligned} H_0 &: \hat{\gamma}^2, \hat{\gamma}^3 = 0 \\ H_1 &: \hat{\gamma}^2, \hat{\gamma}^3 \neq 0 \end{aligned}$$

The null hypothesis refers to linearity and the alternative refers to nonlinearity.[2] The estimating equation of the random effect nonlinear partial adjustment model takes the form of the Least Squares Dummy Variables (LSDV) that follows.

$$\mathbf{y}_{tk} = \boldsymbol{\alpha}_k + \lambda_k \mathbf{y}^*_{t,k} + (1-\lambda)_k \mathbf{y}_{t-1,k} + \sum_{i=1}^{k} \beta_{ik} \mathbf{X}_{itk} + \lambda_k + \upsilon_{tk} \qquad \text{(Equation 3.7)}$$

Where t = 1, …..,n; k is the number of firms in each group; $\mathbf{y}$ is the Firm growth; $\mathbf{y}^*$ is the Target firm growth; $(1-\lambda)$ is the Speed of adjustment; X is the determinants of investment, financing and dividend decisions; β is the coefficient of estimated predictors; λ is the Random error term due to the individual effect; and υ is the Random error.

[2] $F-\text{statistic} = \dfrac{(\text{SSE}_R - \text{SSE}_U) \div J}{\text{SSE}_U \div (T-K)}$ where SSE_R and SSE_U are the sum squared errors for the restricted and unrestricted models respectively, J refers to the two hypotheses under consideration, T is the number of observations, and K is the number of regressors.

3.2.5 Statistical Tests and Estimation Methods

The estimation of the parameters required addressing four econometric issues; the normality versus non-normality, the linearity versus nonlinearity, fixed versus random effects estimation, and endogeneity.

1) Normality versus Non-normality

The Anderson-Darling test (1952, 1954) is used to examine the normality of the data. This test examines the closeness of the variables distribution to the assumptions of the normal distribution. The test assumptions are:

H_0: The data are drawn from normal distribution.

H_1: The data are drawn from non-normal distribution

The results indicate that the dependent as well as the independent variables are not normally distributed as the P-value is less than 5%. (Graphs showing normality testing are available in Appendix 1). The variables are converted into normal values using the Van der Waerden method (Van der Waerden, 1927, 1930, 1931).

2) Multicollinearity

As various proxies are used to measure one set of decisions, for example multiple variables are used to test for financing decisions, it is necessary to test for multicollinearity of variables in order to make sure that there is no high correlation between independent variables. The variables that are associated with Variance Inflation Factor (VIF) above 5 are excluded. The following table shows the results of the VIF test. The results show that none of the variables are free from multicollinearity.

Table 3.6: Multicollinearity Testing

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.000	0.000		13.594	0.000		
	DE	0.000	0.000	-0.036	-2.632	0.008	0.995	1.005
	DRt	-0.001	0.000	-0.086	-5.827	0.000	0.895	1.116
	DeltaDR	-0.001	0.000	-0.007	-0.479	0.631	0.920	1.086
	FATA	-0.003	0.000	-0.075	-4.773	0.000	0.778	1.285
	NDTAX	-0.065	0.040	-0.036	-1.616	0.106	0.385	2.594
	deltaNDTAX	1.814	0.159	0.250	11.385	0.000	0.403	2.479
	ECTR	0.000	0.000	0.001	0.084	0.932	0.999	1.000
	BR	0.000	0.000	0.009	0.676	0.499	0.999	1.000
	OIS	-0.001	0.000	-0.011	-0.790	0.429	0.859	1.163
	OIA	0.006	0.001	0.078	5.092	0.000	0.817	1.223
	DPR	0.000	0.000	0.004	0.279	0.779	0.976	1.023
	DY	-0.597	0.101	-0.087	-5.915	0.000	0.889	1.123
	CAFA	0.000	0.000	0.358	25.656	0.000	0.999	1.000
	LnInventory	0.000	0.000	-0.032	-2.183	0.029	0.876	1.140
	PD	1.728	0.123	0.196	14.049	0.000	0.996	1.003

a. Dependent Variable: SG

3) Fixed Versus Random effects

The Hausman specification test is used to identify whether the fixed or random effects model should be used (Hausman, 1978; Hausman and Taylor, 1981). The test examines the correlation between the observed x_{it} and the unobserved λ_k, hence is run under the hypotheses that follow.

$$H_0 : \text{cov}(x_{it}, \lambda_k) = 0, \text{ or random effect}$$
$$H_1 : \text{cov}(x_{it}, \lambda_k) \neq 0, \text{ or fixed effect}$$

Where x_{it} = independent variable (regressor), and λ_k =error term.

The results of the test show that the random model fits the distribution of the data. Therefore, Lagrange Multiplier is used for standardising the variances across firms for the dependent and independent variables (Briand and Carter, 2011).

Table 3.7: Results of LM used for testing fixed versus random effects

Decision Platform: Chi square-test			
Data Input			
	N	number of subjects	355
	T	number of time series	4
	α	Significance level	5%
	M	Degree of Freedom	1
Computed Values	x^2 – critical value	CHIINV(m, alpha)	3.842
LM test	x^2	LM equation	35.787
	conclusion	IF(Chi square>= Chi square critical, "Reject Ho,"Do Not Reject Ho"	Reject Ho
	p-value	CHIDIST(Chi square, degree of freedom)	0.000
	conclusion	IF(p-value<= Alpha, "Reject Ho,"Do Not Reject Ho"	Reject Ho

4) Linearity versus Non-Linearity

The issue of linearity versus nonlinearity is addressed and examined as well. The Regression Equation Specification Error Test, RESET (Ramsey, 1969; Thursby and Schmidt, 1977; Thursby, 1979; Sapra, 2005; Wooldridge, 2006) is used for testing the two hypotheses that follow.

$$\mathrm{H}_0 : \hat{\gamma}^2, \hat{\gamma}^3 = 0$$
$$\mathrm{H}_1 : \hat{\gamma}^2, \hat{\gamma}^3 \neq 0$$

The null hypothesis refers to linearity and the alternative refers to nonlinearity. The results of F test $(\alpha = 1\%)$ show that the F statistic is greater than the critical value leading to the rejection of the null hypothesis, thus a nonlinear model is appropriate. Table 3.8 shows the results of the RESET used for examining the issue of linearity versus non-linearity of variables.

Table 3.8: Results of RESET for testing linearity versus non-linearity

Hypothesis Testing Using the F distribution	
Data Input	
J	2
T	3,612
K	15
SSE-restricted	5,977,101,797
SSE-Unrestricted	4,678,141,535
Alpha (Prob)	0.05
Computed Values	
df-numerator	2
df-denomerator	10328
F	1433.866
Right Critical Values	2.996
Decision	Reject Ho
p-value	0.000

It is worth noting that the algorithm of testing linearity uses the *F* test to compare between two model specifications using the sum of squared errors. The restricted form specifies the regression model assuming that the association between dependent and independent variables is linear. The regression run of the restricted form results in sum of squared errors (SSE-restricted). The unrestricted form specifies the regression model assuming that the dependent variable is non-linear that takes polynomial forms such as square or cubic powers. The run of the unrestricted form results in another sum of squared errors

(SSE-unrestricted). The results in table 3.8 show a comparison between the linear (restricted) and the non-linear (unrestricted) using the *F* test. As far as the SSE-unrestricted is less than SSE-restricted, the data fit a non-linear specification. The computed value of *F* test is carried out as follows.

$$F-\text{statistic}=\frac{\left(\mathrm{SSE}_{\mathrm{R}}-\mathrm{SSE}_{\mathrm{U}}\right)\div \mathrm{J}}{\mathrm{SSE}_{\mathrm{U}}\div\left(\mathrm{T}-\mathrm{K}\right)}$$

where $\mathrm{SSE}_{\mathrm{R}}$ and $\mathrm{SSE}_{\mathrm{U}}$ are the sum squared errors for the restricted and unrestricted models respectively, *J* refers to the two hypotheses under consideration, *T* refers to the number of observations, and *K* refers to the number of regressors.

5) Endogeneity

A statistical test that should be performed is the Hausman specification test (Hausman, 1978), which can be used to check for endogeneity of variables to measure the effects of a two-way relationship between dependent and independent variables. In panel data analysis it is rather difficult to establish exogeneity between the regressors and error term especially in firm financial data. This causes the direction of causality between variables to be ambiguous due to potential endogeneity. Firm and individual effects are primarily treated by first differencing the variables while use of dummies for each year accounts for time effects (Hansen, 1982).

Consider the following model:

$$y_{it}^{3}=\alpha y_{i,t-1}^{3}+\beta X_{it}+\gamma f_{i}+\upsilon_{it} \qquad \text{(Equation 3.8)}$$

Where

$u_{it=}\ \eta_{it} + v_{it}\ \ and\ E(v_{it}/x_{i0}\ \ , \ldots\ldots\ldots x_{iT,}\eta_{i)} =\ \ 0$ (Equation 3.9)

f_i is an observed individual effect and η_i is an observed individual effect. In this model, unrestricted serial correlation in v_{it} implies that $y^3_{i,t-1}$ is an endogenous variable.

The results reported in table 3.9 show that all the variables are endogenous except for the change in non-debt tax shield, DeltaND (Complete outcomes of Hasuman test for Endogeneity are reported in Appendix 2).

Table 3.9: Results of Hasuman Test for Endogeneity

Variable	Residual	t- statistic	F-statistic
Lagged Sales Growth	1.044	269.259***	3920.77***
Bankruptcy risk	0.076	7.385***	224.72***
Delta Non-debt tax shield	-0.017	-1.45	224.72***
Delta Debt Ratio	0.045	3.991***	224.72***
Debt-to-Equity	0.153	10.877***	224.72***
Dividend Payout Ratio	0.158	8.849***	224.72***
Debt Ratio	-0.098	-6.589***	224.72***
Dividend Yield	-0.479	-24.847***	224.72***
Effective Corporate Tax Rate	-0.137	-13.263***	224.72***
Fixed Assets-to-total Assets	-0.163	-11.915***	224.72***
Ln Inventory	-0.036	-3.436***	224.72***
Non Debt Tax shield	0.140	11.723***	224.72***
Operating Income-to- Assets	0.030	2.182**	224.72***
Operating Income-to- Sales	0.101	7.819***	224.72***
Probability of Default	0.024	1.727*	224.72***

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Thus, it is needed to use an instrumental variable (IV) estimation method such as the Generalized Method of Moments (GMM) or the Two Stage Least Square based on simultaneous equation systems (Brooks, 2002). GMM is an instrumental variable estimation method widely used for models with random regressors. It has the advantage of solving problems of simultaneity bias between the firm growth measure and the explanatory variables, and the measurement error issue. It also allows for controlling unobserved individual effects present in static model.

An unbalanced panel model is used on e-views software and the PVAL is calculated using the Sargan test (Sargan, 1975) to check the strength of the instruments used. It is calculated manually as follows: scalar pval=@chisq(J-Statistic, instrument rank-number of regressors in the model). A PVAL that is higher than 0.1 indicates that better instruments are used.

Moreover, the use of GMM models would allow the possibility of simultaneous determination and reverse causality of sales growth with the other explanatory variables. Thus, the assumption that all explanatory variables are strictly exogenous is relaxed. Under the GMM, instrumental variables that are uncorrelated with the unobservable effects to the function that these effects are not included in the error term are being used. The researcher uses Arellano and Bover's (1995) system estimator which they called *the GMM-in-system.* The reason behind using GMM-in-system is to overcome the shortcomings of *GMM in difference* suggested by Arellano and Bond (1991). Although GMM in difference solves the potential problem of unobserved individual effects, Blundell and Bond (1998) show that when the dependent and explanatory variables are persistent overtime, lagged levels of these variables are weak instruments for the regression equation in differences.

Finally, using the GMM-in-system estimator for dynamic panel data models combines moment conditions for the model in first differences with moment conditions for the model in levels. Arellano and Bover (1995) show that when there are instruments available that are uncorrelated with the individual effects η_i these variables can be used as instruments for the equations in levels. This means using lagged differences of endogenous variables as instruments. The GMM-in-system estimator makes an additional assumption that differences of the right-hand side variables are not correlated with the unobserved individual effects and precision of the coefficient estimates.

The GMM-in-system estimator is used to control for unobserved firm-specific effects that might be correlated with other explanatory variables causing OLS estimators to be biased and inconsistent.

The basic testable model in the paper is based on equation (3.10):

$$y^3_{it} = \alpha_i + ß_1 x_{1it} + ... + ß_k x_{kit} + Time + \eta_{it} + \nu_{it}$$

(Equation 3.10)

where, $y^3_{i,t}$ = is the dependent variable, sales growth at time t, x_{kit} is the explanatory variables at time t, Time (with t=1,…..,T) are time dummies that control for the impact of time on the firm growth of all sample firms, η_{it} is a firm specific effect to allow for the unobserved influences on the growth rate of each firm and is assumed to remain constant over time, and, υ_{it} is the disturbance term.

Following Arellano and Bover (1995) and Blundell and Bond (1998), this thesis proposes a linear GMM estimator in a system of first-differenced and level equations. This linear estimator uses lagged differences of the series as instruments for the equations in first differences. Specifically, it uses ($x_{i,t-1}$ - $x_{i,t-2}$) and ($x_{k,t-1}$ - $x_{k,t-2}$) in addition to lagged levels of the series dated (t-2), (t-3) and (t-4) under the assumption that these differences are uncorrelated with the firm-specific effect, (η_{it})even though the levels of the series are correlated with (η_{it}).

3.3 Results and Discussion

This section presents the outcome of the GMM models and analyses the results obtained from each of them. Each of the corporate finance decisions (financing, investment and dividends) is presented separately, and also presented is the combined effect of all three of them on growth of the firm. For one of the proxies of information asymmetry, Beta ROE, adverse observations were too few to fit in a model that requires using instrumental variables. Thus, only favorable results using Beta ROE as a proxy for information asymmetry are reported.

Table 3.10 presents the contribution of financing decisions to the growth of the firm, among other variables such as operating income-to-assets and operating income-to-sales, probability of default and bankruptcy risk.. The dependent variable (Y) is the sales growth and the Xs are the determinants of financing policy (capital structure).

All proxies are assessed under both favorable and adverse selection indicating low and high levels of information asymmetry. Three proxies for information asymmetry are used: Beta ROE, PD ROE, and Q ratio. It is worth mentioning that upon using each proxy, the number of favorable and adverse observations varied significantly as various observations were classified as adverse or favorable differently according to the proxy used.

Table 3.10: The association between financing decision and growth of the firm

Variables	Proxies of Information asymmetry (Favorable selection)			Proxies of Information asymmetry (Adverse selection)		
Dependent	**Sales Growth**			**Sales Growth**		
	Beta ROE	**PD ROE**	**Q Ratio**	**Beta ROE**	**Q Ratio**	**PD ROE**
Constant	0.006	-0.008	0.006		0.001	-0.007
Debt-to-Equity	-0.029	-0.019	-0.01		0.048	0.097***
Debt Ratio	-0.045*	-0.007	-0.068***		0.143***	-0.185***
Delta Debt Ratio	0.059***	0.053***	0.045***		0.052	0.074***
Non-Debt Tax Shield	-0.037	-0.051*	-0.131***		0.029	-0.012
Delta Non-debt	0.048	-0.078	0.217*		-0.03	-0.230*
Effective Corporate Tax Rate	0.012	0.004	0.01		-0.033	0.037*
Business Risk	-0.041***	-0.006	0.006		-0.125***	-0.108***
Operating income-to-sales	-0.060***	-0.029	-0.107***		-0.021	-0.262***
Operating income-to-assets	0.139***	0.234***	0.138***		0.158***	0.229***
Probability of Default	-0.084***	-0.095***	-0.135***		-0.115***	-0.096***
Industry 1	0.201	0.099	-0.157		0.144	-0.121
Industry 2	0.238	0.138	-0.268	No Results	0.099	0.138
Industry 4	-0.378**	-0.373***	-0.761***		0.025	-0.19
Industry 5	-0.023	-0.038	-0.363		0.033	-0.123
Industry 6	-0.034	-0.16	-0.278		-0.175	-0.308**
Industry 7	0.096	-0.113	-0.535***		0.111	-0.164
Industry 8	0.121	0.105	-0.350**		0.099	-0.267*
Industry 9	-0.446**	-0.004	-0.491**		-0.278	-0.450**
Total Assets Small	0.058	0.202***	0.220***		0.265***	0.000
Total Assets Medium	-0.029	0.134***	0.06		0.127***	-0.169***
N	2607	1573	2209		1202	1612
J-Statistic	22.513	21.952	21.488		21.021	22.23
$\overline{R}^2$	0.092	0.132	0.044		0.081	0.107
SE	1.355	1.282	1.311		1.32	1.361
P-VAL	0.21	0.23	0.25		0.27	0.22
D-W test	3.032****	2.963****	2.931****		2.884****	2.898****

Notes:

Debt-to-equity = total debt/total equity; Debt ratio = total debt/total assets; Delta DR= DRt-DRt-1; Non-Debt Tax Shield = DDA/total assets; DeltaND = NDTAXt-NDTAX t-1; Effective corporate tax rate = taxes paid/EBT; Bankruptcy risk = (Interest paid – EBIT)/ σEBIT; Operating income-to-sales = EBIT/sales; Operating income-to-assets = EBIT/total assets; Probability of Default = 1- N(d2)ROE; Industry 1-9 corresponds to industry dummies as classified in table 3.1 and total assets small, medium corresponds to size of the firm dummies.

**** D-W test significant at 5% two-sided level of significance.

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

In the hypotheses development section, *H1* proposes a positive relation between debt financing and firm growth at high level of information asymmetry. The empirical findings in the adverse models (High level of information asymmetry) support this hypothesis in the Q model where debt ratio has a significant positive impact on growth while findings of the PD model contradicts this hypothesis as debt Ratio has a negative impact on growth. Debt-to-Equity Ratio was positively significant in the PD model whereas it is insignificant in the Q model. These findings are critically discussed in the following sections.

Table 3.10 shows that in the favorable models (firms face low information asymmetry) the three models are consistent in the impact of change in debt ratio (Delta DR), while the debt ratio itself (DR) showed less consistent results. Nevertheless, the Debt-to-Equity (DE) was insignificant for the three models. The finding that Delta DR is always significant at 1% significance level and has a positive impact on sales growth is crucial to this study. It supports previous findings by Dann et al. (1991); Hertzel and Jain (1991); Lie and McConnell (1998); and Nohel and Tarhan (1998) that leverage-increasing transactions have positive impact on operating performance. Moreover, this finding supports the Pecking Order theory by Myers (1984) and Myers and Majluf (1984) that favors financing new investments using debt rather than equity after consuming internal sources of funding.

The DR had a significant negative impact on firm growth for two of the three models while it was insignificant only for the PD model. This finding is important as it implies that existing capital structures of the firms should not rely heavily on debt as it hinders growth. This aligns with previous assertions by Frank and Goyal (2005) that there is a negative relation between debt and firm growth. It is also in line with the findings of Fulghieri et al. (2013) that firms prefer equity financing and then shifts towards debt as they mature. This verifies that Delta DR had a significant positive impact on growth while the DR has a negative impact.

Other variables in the models that were significant were the operating income to assets and the probability of default whereas other variables such as effective corporate tax rate, operating income-to-sales, and bankruptcy risk were insignificant or significant in one or two models only. As for the dummy variables for industry and size, the only consistent significant impact was on the information technology industry (IND 4) while the effect of size varied from one model to another. For the PD model, size was significant for both small and medium sized firms while for the Q model it was significant only for small firms.

For the adverse models, for firms facing high level of information asymmetry, only two models are presented because the Beta ROE model, as mentioned before, had too few observations to fit in a GMM model that uses instrumental variables. As for the other two models, inconsistent results were obtained: for the Q ratio, only DR was significant among the variables that measure financing decisions while for the PD model all three were significant. These conflicting results prove that firms facing high level of information asymmetry grow in different ways and that investors might face lots of uncertainties when they invest in them. The DR had a positive impact on firm growth in the Q model and a negative impact in the PD model. Moreover, the Delta DR had a positive impact in the PD model, consistent with the favorable models, while it was insignificant for the Q model. Finally, the DE ratio was positively significant for the PD model and insignificant for the Q model.

The results are somewhat similar to what Noe and Rebello (1996) proposed regarding capital structure under information asymmetry, as they suggested that shareholders would prefer debt financing to benefit from their control over earnings and the cash that management captures. However, introducing information asymmetry to this equation might change the preferences of both the managers and shareholders. On one hand, the latter would base their preference for either debt or equity on the trade-off between costs of payments to management and costs of adverse selection. Thus, shareholders might prefer equity financing if the costs of adverse selection are greater than costs of cash paid to managerial staff. On the other hand, managers would prefer debt financing if the costs of adverse selection are high even on the expense of their benefit. With the given managerial control over firms, managers would prefer relying on higher debt financing as it conveys favorable information to the market. This might explain why the DE and DR ratios resulted in different outcomes under the adverse models.

The adverse models also show a more significant contribution for another variable that was insignificant for two of the favorable models: bankruptcy risk. This finding also emphasises the uncertainties that are associated with financing firms with severe information problems. Still, the operating income to assets and probability of default were significant while industry effects were mostly insignificant. As for the size effect, the relationship is significant for medium sized firms and for small firms in the Q model only. The variations in size effect among the five models (the three favourable and the two adverse ones) show that those firms grow in different patterns. The finding that large firms are not affected by these relationships might be due to their level of maturity and stable income streams that allow them to rely less on external financing.

The following table presents the contribution of investment decisions to firm growth.

Table 3.11: The association between investment decision and growth of the firm

Variables	Proxies of Information asymmetry (Favorable selection)			Proxies of Information asymmetry (Adverse selection)		
Dependent	**Sales Growth**			**Sales Growth**		
	Beta ROE	**PD ROE**	**Q Ratio**	**Beta ROE**	**PD ROE**	**Q Ratio**
Constant	0.007	0.023	0.023		-0.018	0.007
Fixed Assets-to-total assets	0.01	-0.025	-0.072		0.149***	0.14
Non-debt tax shield	0.004	-0.089***	-0.188***		-0.050*	0.064
Delta non-debt	-0.322*	0.122*	0.262**		-0.422***	-0.216*
Effective corporate tax rate	0.025	0.008	-0.008		0.031*	-0.042**
Bankruptcy risk	0.017	-0.034	0.014		-0.114***	-0.117***
Operating income-to-sales	-0.072**	-0.061**	-0.145***		-0.229***	-0.014
Operating income-to-assets	0.161***	0.227***	0.191***		0.177***	0.071*
Current assets-to-fixed assets	-0.169	-0.045	-0.165***		-0.028	0.209***
Change in Inventory	0.039	0.038	0.033*		-0.008	-0.038**
Probability of Default	-0.148***	-0.120***	-0.197***		-0.110***	-0.018
Industry 1	0.516***	-0.134	-0.192		-0.18	0.091
Industry 2	0.607***	-0.034	-0.215		0.260*	0.084
Industry 4	-0.1	-0.617**	-0.623***	No Results	0.049	-0.169
Industry 5	0.278	-0.272	-0.426**		-0.407**	0.111
Industry 6	0.263	-0.353	-0.322*		-0.328**	-0.235
Industry 7	0.306	-0.334	-0.649***		-0.182	0.115
Industry 8	0.498***	-0.162	-0.360**		-0.181	-0.043
Industry 9	-0.086	-0.222	-0.504***		-0.609***	-0.29
Total assets small	0.151**	0.336***	0.350***		0.06	0.03
Total assets medium	0.008	0.192***	0.129***		-0.125**	0.011
N	2522	1575	2210		1612	1202
J-Statistic	20.77	21.654	21.616		20.78	15.648
$\bar{R}^2$	0.008	0.122	0.011		0.016	0.057
SE	1.422	1.297	1.333		1.435	1.341
P-VAL	0.29	0.24	0.24		0.29	0.61
D-W test	2.996****	2.925****	2.934****		2.913****	2.889****

Notes:

Fixed assets-to-total assets = total fixed assets / total assets; Non-Debt Tax Shield = DDA/total assets; DeltaND = NDTAXt-NDTAX t-1; Effective corporate tax rate = taxes paid/EBT; Bankruptcy risk = (Interest paid – EBIT)/ SDEBIT; Operating income-to-sales = EBIT/sales; Operating income-to-assets = EBIT/total assets; current assets-to fixed assets = total current assets / total fixed assets; change in inventory = inventory t- inventory t-1; Probability of Default = 1- N(d2)ROE; Industry 1-9 corresponds to industry dummies as classified in table 3.1 and total assets small, medium corresponds to size of the firm dummies.

**** D-W test significant at 5% two-sided level of significance.

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

In the hypotheses development section, three hypotheses are suggested for firms that are facing high level of information asymmetry; a negative relationship between investment in long-term assets (Fixed assets) and firm growth, and a positive relationship between investments in current assets, inventory and firm growth. The empirical findings contradict these hypotheses in the PD model where investment in fixed assets has a significant positive impact on growth while both current assets and inventory are insignificant. The Q model supports one of the hypotheses as the current assets investments has a significant positive impact on growth while fixed assets investment is insignificant and inventory has a negative impact on growth. These results are critically discussed as follows.

Table 3.11 shows the contribution of investment decisions to the growth of a firm at both high and low levels of information asymmetry. The three proxies used to differentiate adverse and favorable observation are Beta ROE, PD ROE, and Q ratio. The Q ratio is the most relevant measure for investment in particular as it shows whether the firm is under-investing or not. In addition, the problems associated with investment decisions are related more to managerial behaviour rather than asymmetry of information. As Li (2011) suggests that the information content or the signal effect of investment decisions is not as severe as in other corporate decisions like the dividend payout for example. His argument is based on the findings of Skinner and Soltes (2011) who examined the earnings quality based on dividend decisions and concluded that investment in capital and labour are less sensitive to information signaling than dividend decisions. Results obtained from the various models are discussed in the following paragraphs.

In the favorable models, firms experience low information asymmetry and do not suffer from underinvestment problems (in the Q model), the consistent result is related to the amount of fixed assets to total assets (FATA) that was insignificant in the three models. Current assets-to-fixed assets (CAFA) was only significant in the Q model, and similarly the change in inventory level (LNINV) was significant only in the Q model. CAFA was found to have had a negative impact on firm growth while inventory level had a positive impact. The latter finding is consistent with suggestions of Carpenter et al. (1994) that firms should invest in inventory to promote growth. However, the results were not found to be consistent with the theory of Cheatham (1989) that firms tend to invest in current assets after they acquire the necessary long-term assets and use such investment to grow their sales. Nevertheless, FATA was consistently insignificant, indicating that the amount of fixed assets does not matter when it comes to promoting growth in sales for firms that already have sufficient assets to function well (i.e. for firms that acquired the necessary long term assets, with Q above one).

Industry effects varied across models, however size effect was found to be the most significant. Specifically, the relationship for size effect was significant for small firms in the three models and for medium sized firms in two of the three. Other significant variables that contribute to or hinder growth were operating income to sales, operating income to assets, and probability of default.

In the adverse models, firms face a high level of information asymmetry (PD ROE) or have a Q Ratio lower than one (Q) and thus suffer from underinvestment problems. The results of the two models varied significantly, strengthening the argument that firms suffering from higher levels of information asymmetry grow in different ways. However, the assumption is that the PD model focuses on firms facing information problems whereas the Q model focuses on firms suffering from managerial-related considerations.

Starting with the PD model, the FATA was found to have a significant positive impact on firm growth, suggesting that firms should invest more in fixed assets to grow their sales revenues. However, the CAFA and the change in inventory were insignificant. This is the opposite of what Cheatham (1989) and Carpenter et al. (1994) suggested regarding investment in current assets and inventory to grow rather than long term assets. This outcome also suggests that firms that suffer from high level of information asymmetry still can grow by investing more in assets to produce and sell more etc. Other significant variables in this model were non-debt tax shielding, the change in non-debt tax shielding, bankruptcy risk, effective corporate tax rate, operating income to sales, operating income to assets, and probability of default. The large number of contributing variables in this model, in comparison to favorable models, shows that understanding and predicting growth for firms suffering from information problems is more difficult as. As for the industry and size dummies, the relationship was only significant for medium sized firms and for four of the industries.

In the Q model, the one that matters the most when it comes to investment and agency problems, different outcomes are found. First, the FATA is insignificant, consistent with the all the favorable models. Second, the CAFA and LNINV are significant, opposing to the Q model, yet they had opposite signs when compared with Favorable Q model. This time the

CAFA had a positive impact on firm growth while the change in inventory had a negative impact on it. The finding that investing in current assets is better for firms with severe agency problems is consistent with those of Cheatham (1989) that suggested that firms should focus more on investing in current assets. This is supported by the implication that these firms suffer from underinvestment problems, meaning that an investment in current assets is needed to address the issues hindering growth. However, the negative impact of inventory, (in contradiction to the theory of Carpenter et al. (1994)), despite it being a current asset, implies that accumulating inventory for firms that already suffer from underinvestment problems hinders their abilities to grow.

This model showed no impact for size and industry dummies while other variables were mostly in line with the PD model. Again, the adverse models place much emphasis on sources of risk, unlike favorable models, such as bankruptcy risk and probability of default which proves that firms suffering from information asymmetry problems or underinvestment agency considerations could still grow but they need to focus on the "whole picture" and try to mitigate sources of risk more than firms with low information asymmetry problems.

Table 3.12: The association between dividend decision and growth of the firm

Variables	Proxies of Information asymmetry (Favorable selection)			Proxies of Information asymmetry (Adverse selection)		
Dependent	**Sales Growth**			**Sales Growth**		
	Beta ROE	**PD ROE**	**Q Ratio**	**Beta ROE**	**PD ROE**	**Q Ratio**
Constant	-0.002	-0.007	-0.005		-0.014	0.009
Non Debt tax shield	-0.027	-0.097***	-0.168***		-0.048**	0.068**
Delta non-debt	0.04	0.011	0.298**		-0.037	-0.231**
Effective corporate tax rate	-0.009	-0.018	-0.03		0.052***	-0.048***
Bankruptcy risk	-0.059***	-0.024	0.001		-0.092***	-0.121***
Operating income to sales	-0.048*	-0.049**	-0.055**		-0.150***	-0.058*
Operating income to assets	0.132***	0.225***	0.197***		0.142***	0.201***
Dividend payout ratio	0.202***	0.124***	0.213***		0.204***	0.249***
Dividend yield	-0.455***	-0.380***	-0.570***		-0.474***	-0.362***
Probability of default	-0.096***	-0.080***	-0.244***		-0.156***	0.007
Industry 1	0.186	-0.253***	-0.508***		-0.392***	0.353**
Industry 2	0.137	-0.211***	-0.614***		-0.224**	0.323*
Industry 4	-0.469**	-0.460***	-1.075***	No Results	-0.325***	0.126
Industry 5	0.301	-0.068	-0.480**		-0.031	0.580***
Industry 6	-0.043	-0.315***	-0.514***		-0.577***	-0.09
Industry 7	0.074	-0.312***	-0.697***		-0.381***	0.361**
Industry 8	0.098	-0.230***	-0.584***		-0.522***	0.259
Industry 9	-0.488*	-0.235***	-0.838***		-0.934***	0.022
Total assets small	-0.024	0.103***	0.055		0.086**	-0.032
Total assets medium	-0.099***	0.064***	-0.01		-0.111***	-0.037
N	2607	1571	2295		1610	1113
J-Statistic	20.495	23.296	22.699		17.322	18.541
$\overline{R}^2$	0.137	0.185	0.045		0.175	0.095
SE	1.324	1.239	1.298		1.282	1.304
P-VAL	0.24	0.22	0.16		0.43	0.35
D-W test	3.041****	2.939****	2.914****		2.908****	2.908****

Notes:

Non-Debt Tax Shield = DDA/total assets; DeltaND = NDTAXt-NDTAX t-1; Effective corporate tax rate = taxes paid/EBT; Bankruptcy risk = (Interest paid – EBIT)/ SDEBIT; Operating income-to-sales = EBIT/sales; Operating income-to-assets = EBIT/total assets; dividend payout ratio = total dividends / net income; Dividend yield = dividend per share / market price per share; Probability of Default = 1- N(d2)ROE; IND1-9 corresponds to industry dummies as classified in table 3.1 and total assets small, medium corresponds to size dummies.

**** D-W test significant at 5% two-sided level of significance.

*** Significant at the level 1%, ** Significant at the level 5%, * Significant at the level 10%

In the hypotheses development section, the hypothesis regarding the dividend payout suggests a positive impact of dividend payout on firm growth at high level of information asymmetry. The empirical findings support this hypothesis in both favorable and adverse models where dividend payout ratio has a significant positive impact on firm growth in all the empirical models. These findings are the only consistent ones across all favorable and adverse models. In the following context, the impact of dividend policy on firm growth is critically discussed.

Table 3.12 shows the association between dividend policy and growth of the firm. Dividend policy, as mentioned before, is what each investor can easily understand, interpret, and act upon, unlike the financing and investment decisions that are only interpreted by experienced and professional investors. Using the three proxies of information asymmetry; Beta ROE, PD ROE, and Q ratio, and by dividing the observations into favorable and adverse selections, the above results were obtained. It is obvious that for all the models the determinants of dividend policy; payout ratio (DPR) and dividend yield (DY) had the same sign, significance level, and even very close coefficients.

In the favorable models, all three showed a significant positive contribution of DPR and a significant negative contribution of DY to firm growth. This finding is in contrast with suggestions of Rozeff (1982) and Bartram et al. (2012) that both suggested a negative relationship between dividend payout and firm growth. However both suggest increasing payout ratios to decrease agency costs. Nonetheless, this finding aligns with other studies that suggested that increasing dividend payments signal higher earnings for the firm like Beer (1993); Brook et al. (1998); and Balachandran and Nguyen (2004). These studies support Bhattacharya (1979) and Miller and Rock (1985) models that suggest that firms signal their superior operating performance through increase in dividends. Moreover, these results support previous findings by Skinner and Soltes (2011) who examined the relation between dividend policy and the quality of firms' earnings. Earnings are widely used as a proxy for firm growth as mentioned before. The findings of this study indicated that dividend-paying firms have more persistent earnings than firms that do not pay dividends frequently.

The effect of other variables matched the favorable models for financing and investment decisions to a significant extent. The size effect, was found to vary from one model to another, contradicting the findings of Lloyd et al. (1985) who examined the role of size in the payout policy and found significant relation between the payout ratios and firm size. As for the industry effect, the relationship was significant for most of the industries yet the three models yielded similar results for two industries: information technology and energy. For both, the effect was negative which might be due to the fact that both industries require large spend on research and development and large capital investments, thus, investors in such firms prefer less payout and more retention for future expansion. Other variables such as operating income to sales, operating income to assets, and probability of default were significant for the three models and showed similar results to those of favorable models for financing and investment decisions.

In the adverse models, unlike the financing and investment models, the favorable and adverse models yield similar results; the DPR has a significant positive effect and the DY has a significant negative effect on firm growth. The difference is only in other variables such as bankruptcy risk that is significant in the adverse models, as it was in those for the financing and investment ones. The consistent impact of dividends proves that firms care most about dividend payments to signal their performance to investors. This is consistent with previous studies such as Beer (1993); Brook et al. (1998); and Balachandran and Nguyen (2004) who supported the signaling hypothesis, while it opposes studies like that of Yoon and Starks (1995); Bernhardt et al. (2005); and Brav et al. (2005) that rejected this hypothesis.

The most important finding in these models is that dividend decisions do not differ in terms of its impact on firm growth from firms that suffer from high or low information asymmetry. This contradicts the studies that suggested a relationship between payout policy and agency problems such as Nam et al. (2004); Chetty and Saez (2006); and Brown et al. (2007). In addition, the close results obtained from both adverse and favorable models defies the Rozeff (1982); Easterbrook (1984); and Borokhovich et al. (2005) propositions that paying out more dividends reduces agency conflicts either by increasing monitoring by financial markets or by decreasing the cash on hand available for management to misuse. However, it does align with their propositions that the payout of increased dividends can be beneficial, not for agency considerations, but rather to promote firm growth. This finding shows that firms, regardless of their level of information asymmetry, focus on their dividend policy as it is monitored closely by market participants.

Finally, the early attempt by Ross (1977) to link information asymmetry with the dividend decision in inefficient markets is somewhat supported by the results of these models. He argued that management could use the dividend policy to signal information to the less informed shareholders. For example, a higher payout ratio would signal higher anticipated profits. However, it emerged that even the firms with low information asymmetry follow the same policy of signalling their performance through dividend payments. This provides support to the traditional bird-in-hand theory that investors prefer to receive dividends rather than wait for future benefits. Surprisingly, paying out more in dividends contributes to firm growth rather than hinders its ability to invest the cash in alternative investments. However, this could also be explained by the fact that firms that grow in terms of sales, in most cases, are likely to have higher profits and thus are able to pay more dividends.

A final table in this chapter presents the impact of the three financial decisions on firm growth at high and low levels of information asymmetry. Although the previous models examined the impact of each of the three decisions (Financing, Investment, and Dividend) on firm growth, and despite the fact that the literature does not cite any interactive terms between the three of them, the motive behind this model is to examine the synergy effect of financial decisions and firm growth as those decisions are inseparable from each other. Therefore, table 3.13 presents the relative contribution of investment, financing, and dividend decisions to firm growth at both high and low levels of information asymmetry.

Table 3.13: The association between financing, investment, and dividend decisions and growth of the firm

Variables	Proxies of Information asymmetry (Favorable selection)			Proxies of Information asymmetry (Adverse selection)		
Dependent	**Sales Growth**			**Sales Growth**		
	Beta ROE	**PD ROE**	**Q Ratio**	**Beta ROE**	**PD ROE**	**Q Ratio**
Constant	-0.002	0.009	-0.012		-0.003	0.018
Debt-to-Equity	-0.059***	0.024	-0.034**		0.034	0.017
Debt Ratio	0.009	-0.022	-0.051***		-0.069*	0.169***
Delta Debt ratio	0.044***	0.070***	0.084***		0.042*	0.058**
Fixed assets-to-total assets	-0.018	0.01	-0.126**		-0.039	0.057*
Non-debt tax shield	-0.01	-0.122***	-0.198***		-0.354***	-0.139
Delta non-debt	-0.109	0.170**	0.302**		0.031**	-0.037**
Effective corporate tax rate	-0.021	-0.021	-0.039*		-0.115***	-0.117***
Bankruptcy risk	-0.024	-0.016	0.021		-0.258***	-0.006
Operating income to sales	-0.034	-0.009	-0.113***		0.235***	0.187***
Operating income to assets	0.119***	0.194***	0.251***		0.223***	0.250***
Dividend payout ratio	0.187***	0.148***	0.249***		-0.484***	-0.401***
Dividend yield	-0.429***	-0.433***	-0.614***		0.017	0.102
Current assets to fixed assets	-0.07	------	-0.205***		-0.131***	0.174***
Change in Inventory	0.071***	0.064***	0.075***		0.034**	-0.032
Probability of Default	-0.089***	-0.116***	-0.239***	No Results	-0.077***	-0.087***
Industry 1	0.285	-0.332***	-0.617***		-0.387***	0.194
Industry 2	0.247	-0.326***	-0.712***		-0.184	0.049
Industry 4	-0.424**	-0.527***	-1.033***		-0.424***	-0.064
Industry 5	0.410**	-0.174**	-0.133		-0.136	0.449***
Industry 6	0.078	-0.344***	-0.710***		-0.562***	-0.191
Industry 7	0.131	-0.433***	-0.860***		-0.390***	0.388***
Industry 8	0.232	-0.316***	-0.790***		-0.537***	0.126
Industry 9	-0.350*	-0.300***	-0.936***		-0.924***	-0.109
Total assets small	0.083	0.194***	0.193***		0.037	-0.018
Total assets medium	-0.012	0.136***	0.076**		-0.146***	0.002
N	2521	1657	2201		1611	1113
J-Statistic	26.084	24.154	27.13		24.14	26.26
$\bar{R}^2$	0.139	0.173	0.064		0.101	0.152
SE	1.327	1.236	1.28		1.356	1.279
P-VAL	0.29	0.28	0.25		0.39	0.28
D-W test	3.016****	2.925****	2.919****		2.933****	2.883****

Notes:

Debt-to-equity = total debt/total equity; Debt ratio = total debt/total assets; Delta DR= DRt-DRt-1; Fixed assets-to-total assets = total fixed assets / total assets; Non-Debt Tax Shield = DDA/total assets; DeltaND = NDTAXt-NDTAX t-1; Effective corporate tax rate = taxes paid/EBT; Bankruptcy risk = (Interest paid – EBIT)/ SDEBIT; Operating income-to-sales = EBIT/sales; Operating income-to-assets = EBIT/total assets; dividend payout ratio = total dividends / net income; Dividend yield = dividend per share / market price per share; current assets-to fixed assets = total current assets / total fixed assets; change in inventory = inventory t- inventory t-1; Probability of Default = 1- N(d2)ROE; IND1-9 corresponds to industry dummies as classified in table 3.1 and total assets small, medium corresponds to size dummies.

**** D-W test significant at 5% two-sided level of significance.

*** Significant at 1%, ** Significant at 5%, * Significant at 10

Table 3.13 shows the combined effects of the three main corporate finance decisions on firm growth. The importance of this relationship is derived by previous studies that suggested an existing relation between each set of two, or all three of them such as Koch and Shenoy (1999); Chen et al. (2010); Bolton et al. (2011); and Morellec et al. (2014). To the best of the researcher's knowledge, none of the previous studies examined the combined effect of the three of them on firm growth under high and low levels of information asymmetry. The results obtained from the three favorable and the two adverse models are discussed in the following paragraphs.

Starting with the favorable models, most variables were consistent over the three models which suggest that firms suffering from low information asymmetry grow in a structured way. The variables that were consistent in terms of coefficient sign and significance were DELTADR, OIA, DPR, DY, LNINVEN, and PD. Other variables were only significant in one or two models like DE, DR, FATA, and CAFA. The change in debt level had a positive effect (DELTADR) which again suggests the financing of new investments using debt. The DPR had a positive effect as well which suggests increasing payout ratios. Moreover, the change in inventory had a positive effect which suggests investing in inventory to increase sales growth. Lastly, the operating income to assets had a positive while the probability of default had a negative impact on firm growth.

The variables that were significant in one or two models only, such as the DE, DR, FATA, and CAFA all had a negative impact on growth suggesting that low debt levels and lower investment in assets, other than inventory, helps firms grow. This is especially the case for firms with Q ratio higher than one which suggests that these firms already acquired assets using debt. The relationship was significant for every industry and for both small and medium sized firms in at least two of the three models. *It can be concluded that for firms experiencing low level of information asymmetry growth is a function of financing new investments using debt, increasing dividend payout ratio, and investing more in inventory rather than fixed assets or other current assets.*

As for the adverse models, for firms facing high level of information asymmetry or experiencing agency issues (Q ratio is lower than one), some variables were found to be significant for both models, such as DR, DELTADR, DPR, DY, BR, ECTR, OIA, CAFA, and PD. However, for three of them; DR, ECTR, and CAFA the coefficient had opposite signs in both models. Also, the DELTADR was significant at a lower significance level for both models (5% and 10%). The finding that DR and CAFA had opposite coefficients suggests that firms that suffer from high level of information asymmetry grow in a different manner. High debt level can affect growth positively or negatively, although increasing debt can help firms grow. Nevertheless, investing in current assets can either hinder or enable growth. When associated with increasing inventory, it hinders growth (PD model). Whereas, it contributes positively when there is no significant impact of inventory (Q model).

Bankruptcy risk affects growth negatively for both models suggesting that firms should try to reduce or mitigate such risk to enable growth. While dividend payout and operating income-to-assets, similar to the favorable models, contribute positively to firm growth, other variables like DE and FATA were insignificant in both models while the change in inventory had a significant impact for the PD model only. As for the size and industry dummies, the relationship was insignificant for small firms while it was significant only for medium sized firms in the PD model. The industry effect was significant in at least one model or in both except for one industry: healthcare (IND 2). Yet, it had opposite effect in one of the industries; consumer staples (IND 7) suggesting, again, different patterns of growth for firms facing high level of information asymmetry.

The above results are not linked to previous literature as the individual effect models for each of the three decisions; financing, investment, and dividend because, as mentioned above, none of the previous studies examined this relationship. An important finding that is derived from this chapter is that differentiating the sample using different proxies for information asymmetry resulted in variation in the number of observations. For example for the favorable models discussed above the number of observations using Beta ROE as a proxy for information asymmetry were 2521 while using PD ROE it dropped to 1657, and 2201 using the Q ratio. Nevertheless, this study used one proxy for firm growth - Sales growth - as it was associated with the least standard error using descriptive statistics. Other proxies of growth should be used in future research to show whether consistent results will be obtained or not. Since the adjusted R-squared was low for all the models, there is a need to examine other variables that could contribute to firm growth. In this chapter, financial variables like investment, financing, and dividend decisions were used to examine their contribution to firm growth. In the next chapter, a non-financial variable; changes in ownership structure is examined.

Chapter Four

The effect of ownership structure on firm growth at various levels of information asymmetry

4.1 Hypothesis development and methods of estimation

4.1.1 Hypotheses development

The previous chapter addressed the contribution of financial variables - investment, financing, and dividend decisions - to firm growth under high and low levels of information asymmetry. In this chapter, one of the major non-financial variables, ownership structure, is examined to measure its impact on firm growth. As mentioned before in the review of relevant literature (chapter 2) recent financial scandals have drawn extensive attention to corporate governance and its impact on efficiency and effectiveness of managers' decisions. Variables such as ownership structure, board composition, internal audit units, and committees of both executives and non-executives are all used to enhance firm performance and reduce the informational gap between managers and shareholders.

Institutional investors like mutual funds, investment managers, and brokerage firms (When they own shares rather than play their initial role as an intermediary in the secondary market) typically possess a substantial amount of shares and are better able to monitor the performance of managers. This monitoring encourages managers to focus on firm performance rather than on personal benefits. As mentioned in section 2.6, prior empirical evidence suggested either a positive impact or no effect of institutional investors on firm performance. The better performance shall enable these firms to grow in terms of sales, assets, etc. For example, Faccio and Lasfer (2000); and Fazlzadeh et al. (2011); and Al-Najjar (2015) suggested that mixed results were obtained regarding the impact of institutional investors on firm performance. Whereas, McConnell and Servaes (1990); Del Guercio and Hawkins (1999); Cornett et al. (2007); and Chen et al. (2008) found a positive relation between the percentage of institutional ownership and various performance measures. These results suggest that institutional investors might contribute to firm growth. In particular, firms that face high level of information asymmetry might rely on monitoring by institutional shareholders among other monitoring mechanisms to enhance firm growth. Thus, higher institutional ownership concentration could contribute to corporate performance in general and to firm growth in particular. Therefore, especially for firms facing high level of information asymmetry, a testable hypothesis could be derived as follows:

H1: "A positive relationship exists between institutional ownership concentration and firm growth at high level of information asymmetry."

Nevertheless, individual investors, though they vary substantially in terms of knowledge, experience, etc., generally have less access to information than institutional investors. Barber and Odean (2000) argue that individual investors are typically less informed and their average annual returns are substantially less than the average market return. They conclude that individuals are advised not to invest on their own as this affects their personal wealth. Moreover, Shleifer and Vishny (1997) claim that ownership concentration could serve as a substitute for the weak protection rights of investors. Since the individual investors are typically the less protected and less informed investors, they will normally increase their ownership portion only in firms where they have access to sufficient information upon which they can take their decision on whether to invest or not. Typically, they will select successful firms that are expected to perform better in the future in terms of profitability, growth etc. Therefore another testable hypothesis could be:

H2: "A positive relationship exists between increase in individual ownership concentration and firm growth at low level of information asymmetry."

4.1.2 Data and definition of variables

The sample used in this study is the S&P 500 non-financial firms. Annual ownership data for the period from 2004-2014 are obtained from Thomson Reuters' database. Ownership structure is divided into three items: individual investors, investment managers, and brokerage firms. The latter two variables correspond to institutional investors' ownership whereas the first one corresponds to individuals' ownership. The dependent variable in this analysis is the change in sales growth (SG), the proxy of firm growth associated with the lowest standard error. The independent variables are: change in individual investments, change in brokerage firms' ownership and change in investment managers' ownership. Brokerage firms typically play the role of financial intermediary in the secondary market yet sometimes brokerage firms hold shares in some firms as a form of investment. Thus, in Thomsen Reuter Eikon, brokerage firms' ownership and investment managers' ownership are considered proxies for institutional ownership while individual investors are separately classified.

Control variables are used for industry and size effects as in the previous chapter where industries are given dummies from one to ten except for industry three (financial firms). Additionally, the other control variable, size, is measured using the same two proxies that were used in the previous chapter: total assets and market value of equity. Data is distinguished using the same three proxies for information asymmetry: Beta ROE, PD, and Q ratio to distinguish between high and low levels of information asymmetry. The following two tables, table 4.1 and table 4.2, summarise the variables used in the analysis, which will be presented in the next section, and the descriptive statistics for ownership data used in this chapter.

Table 4.1: Definition of Variables

	Firm Growth	Proxies:	References
Dependent Variable	Growth in Sales	Continuous compound growth rate of Sales	(Hoy et al., 1992; Barkham et al. ,1995; Ardishvili et al., 1998; Flamholtz, 1986 Davidsson and Wiklund, 2000)
	Growth in Fixed Assets	Continuous compound growth rate of Fixed Assets	(Hart, 1995; Delmar et al., 2003)
	Growth in Total Assets	Continuous compound growth rate of Total Assets	Hart (1995)
	Sales-weighted fixed assets growth	Sales growth and fixed assets growth	(Eldomiaty and Rashwan, 2013)
Independent Variables		**Proxies:**	
	LN Individual investment		Barber and Odean (2000)
	LN Brokerage firms' ownership	Change in each of the three ownership variables downloaded from Thomson Reuters Eikon	Shleifer and Vishny (1997); McConnell and Servaes (1990); Del Guercio and Hawkins (1999); Cornett et al. (2007); and Chen et al. (2008)
	LN Investment managers' ownership		
Role of agency problems	**Information asymmetry**	**Proxies:**	
	Deviation of Q-Ratio from one	Q-Ratio	(Chung and Pruitt, 1994; Koch and Shenoy, 1999: Stein, 2003)
	Sensitivity of stock returns to expected ROE	ROE and stock prices	Krishnaswami and Subramaniam ,1999); Christie ,1987); and Dierkens, 1991)
	Probability of Adverse selection	The probability of default using Black-Scholes Option Pricing model	Author's contribution
Control Variables		**Proxies:**	
Firm Size (Small, medium, Large)	Ln (Total Assets)	Value of Total Assets	Dummy variables (dichotomous 0,1)
	Ln (MVE)	Market Value of Equity	
Industry Type		Type of industries form 1-10 except industry 3 (Financial firms)	Dummy variables (dichotomous 0,1)

Table 4.2: Descriptive statistics for ownership data

	Investment Managers	Brokerage Firms	Individual Investors
Mean	0.665	0.022	0.313
Standard Error	0.003	0.000	0.003
Median	0.678	0.019	0.300
Standard Deviation	0.165	0.013	0.168
Sample Variance	0.027	0.000	0.028
Kurtosis	2.610	8.684	2.862
Skewness	-0.944	2.200	0.978
Range	1.000	0.113	1.000
Minimum	0.000	0.000	0.000
Maximum	1.000	0.113	1.000
Sum	2141.777	71.873	1006.351
Count	3,220	3,220	3,220

4.1.3 Statistical Tests and Estimation Methods

As in the previous chapter, arranging the data and choosing the type of model to be used requires addressing four econometric issues: the normality versus non-normality, the linearity versus nonlinearity, fixed versus random effects estimation and endogeneity. Starting with the normality issue, the Anderson-Darling test (1952, 1954) is used to examine the normality of the data. The results indicate that the dependent as well as the independent variables are not normally distributed as the P-value is less than 5%. (Normality testing graphs are available in Appendix 3). The variables are converted into normal values using the Van der Waerden method (Waerden, 1927, 1930, 1931). In addition, collinearity was tested to ensure there is no similarity between independent variables in the model. As for the fixed versus random effects, the Hausman specification test is used to identify whether the fixed or random effects model should be used (Hausman, 1978; Hausman and Taylor, 1981). The results of the test show that the random model fits the distribution of the data. Therefore, the

Lagrange Multiplier is used for standardising the variances across firms for the dependent and independent variables (Briand and Carter, 2011).

The issue of linearity versus nonlinearity is addressed and examined as well. The Regression Equation Specification Error Test, RESET (Ramsey, 1969; Thursby and Schmidt, 1977; Thursby, 1979; Sapra, 2005; Wooldridge, 2006) is used and the results of F test (α = 1%) show that the F statistic is greater than the critical value leading to the rejection of the null hypothesis, thus a nonlinear model is appropriate.[3] Thus, the variables are raised to the power of three to make them fit a linear model. Finally, the Hausman specification test (Hausman, 1978) is used to check for endogeneity of variables to measure the effects of a two-way relationship between dependent and independent variables. This is performed by comparing the instrumental values estimates to ordinary least squares estimates. After performing the test on the variables used in this study, it was found that the three ownership variables are exogenous. Therefore, an Ordinary Least Square (OLS) method is appropriate for examining the contribution of changes in ownership structure to firm growth under high and low levels of information asymmetry.

4.2 Results and Discussion

The following table presents the outcome of the regression analysis where favorable observations are grouped in the left hand side of the table and adverse observations are

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[3] $F-\text{statistic} = \frac{(\text{SSE}_R - \text{SSE}_U) \div \text{J}}{\text{SSE}_U \div (\text{T} - \text{K})}$ where SSE_R and SSE_U are the sum squared errors for the restricted and unrestricted models respectively, J refers to the two hypotheses under consideration, T is the number of observations, and K is the number of regressors.

grouped on the right. The left hand table presents the impact of ownership structure on firm growth at low level of information asymmetry as per the three proxies of asymmetry; Beta ROE, PD, and Q ratio. The right hand presents the impact of ownership structure on firm growth at high level of information asymmetry using the same three measures. Growth in sales was used as the dependent variable as it was associated with the least standard error among the proxies of firm growth when examined using descriptive statistics.

Table 4.3: The contribution of ownership structure to firm growth

Variables	**Proxies of Information asymmetry (Favorable selection)**			**Proxies of Information asymmetry (Adverse selection)**		
Dependent	**Sales Growth**			**Sales Growth**		
	Beta ROE	**PD ROE**	**Q Ratio**	**Beta ROE**	**PD ROE**	**Q Ratio**
Constant	-0.31	0.355	0.191	0.343	-0.741	-0.516
Investment Managers	0.053	0.068	0.056	0.244*	0.016	0.072
Brokerage Firms	0.097***	0.104***	0.052***	0.103	0.082***	0.144***
Individual Investors	0.116***	0.124***	0.123***	0.142	0.098*	0.134*
Industry 1	0.183***	-----	0.124**	0.025	0.197**	-0.002
Industry 2	0.149**	-0.108	0.131**	0.225	0.337*	-0.013
Industry 4	-0.205***	-0.450***	-0.310***	-0.627**	-0.114	-0.303*
Industry 5	0.097	-0.197*	-0.011	-0.088	0.178	-----
Industry 6	0.117	0.039	0.035	-0.269	0.056	0.018
Industry 7	-0.115	-0.368***	-0.280***	-1.061***	-0.037	-0.115
Industry 8	-----	-0.1	-----	-----	-----	-0.215*
Industry 9	0.703***	0.606***	0.891***	0.904***	0.779***	0.460***
Industry 10	0.453***	0.446**	-0.15	-----	0.346*	0.481**
TASMALL	0.491***	-----	-----	-----	0.492***	0.448***
TAMED	0.199***	-0.213***	-0.152***	-0.154	0.233***	0.242**
TALARGE	-----	-0.433***	-0.304***	-0.843***	-----	-----
MVESMALL	-0.293***	-0.103	-0.139***	0.344*	0.349***	0.302***
MVELARGE	0.141***	0.068	0.062	0.339	0.558***	0.419***
N	2479	1415	1822	153	1289	956
F statistics (Sig F)	17.519***	13.016***	21.761***	4.679***	10.725***	5.472***
$\overline{R}^2$	0.09	0.113	0.146	0.253	0.102	0.066
SE	0.909	0.845	0.778	0.88	0.963	1.046
Durbin-Watson	1.935****	1.677****	1.920****	1.916****	1.868****	2.032****

Notes:

Investment managers = Ln investment managers ownership (t / t-1); Brokerage firms = Ln Brokerage firms ownership (t / t-1); Individual investors = Ln individual investors ownership (t / t-1); Industry 1-10 corresponds to industry dummies as classified in table 3.1 and total assets small, medium, large and Market value of equity small, medium, large corresponds to size dummies.

**** D-W test significant at 5% two-sided level of significance.

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

The results of the empirical analysis are mostly supporting the developed hypotheses especially for individual investors' ownership concentration. The latter is positively significant in the three favorable models (where firms face low level of information asymmetry). However, less support is given to the hypothesis related to institutional ownership concentration where investment managers' ownership is significant in one model and brokerage firms' ownership significant in two models. Yet, none of the findings contradict the stated hypotheses. These results are discussed thoroughly as follows.

The above table presents the contribution of changes in ownership structure to sales growth at high and low levels of information asymmetry. The results of the favorable models are very consistent using the three proxies of information asymmetry whereas the adverse models showed less consistency. For all models, increasing ownership concentration - either individual or institutional - contributes positively to firm growth or is insignificant. Starting with the favorable models, the change in investment managers' ownership was insignificant for the three models whereas the change in brokerage firms' ownership was positively significant at 1% significance level for the three models. Additionally, an increase in individual investments was positively significant at 1% as well. The finding that institutional ownership has a positive impact on firm growth is consistent with theories in literature that institutions help monitor managers' behavior and thus contributes to operating performance, such as McConnell and Servaes (1990); Del Guercio and Hawkins (1999); Cornett et al. (2007); and Chen et al. (2008). As for individual investments, the finding that they have a positive impact on firm growth supports the notion that ownership concentration leads to better performance as suggested by Manawaduge and De Zoysa (2013).

Nevertheless, investment managers, the other form of institutional ownership, were found to be insignificant in the three models. This is consistent with other studies that suggested insignificance of ownership structure on corporate performance like Agrawal and Knoeber (1996); Faccio and Lasfer (2000); and Fazlzadeh et al. (2011). This could be verified professionally by the fact that investment managers are reluctant to interfere in corporate governance and focus more on short-term benefits like capital gains and dividend payments as suggested by Bhide (1994); Demirag (1998); and Maug (1998).

This relationship was significant for most of the industries in at least one of the three models except for two industries; material and consumer discretionary (IND 6 and 8). Additionally, the relationship was significant for various firm sizes whether measured by total assets or by market value of equity. This finding proves that regardless of the firms' size, most firms target growth even the large ones. The adjusted R-squared ranged from 9%-15% in the three models giving insight on the relative contribution of changes in ownership structure to firms' growth when the firm is facing low level of information asymmetry.

Moving to the adverse models, the Beta ROE model, the one with the least number of observations, showed different results from the other two models that were consistent in their results: PD and Q ratio. In the Beta ROE model, only investment managers' ownership was positively significant at a 10% significance level while both brokerage firms and individual investments were insignificant. This shows that individual investors are repelled from firms suffering from high level of information asymmetry and even brokerage firms prefer not to get involved with such firms as suggested by Bhide (1994); Demirag (1998); and Maug (1998). The other two models were consistent in their results as for both, ownership was positively significant at a 1% significance level for brokerage firms' and 10% for individual investments. This finding is consistent with the favourable models except that the impact of individual investments is less significant. This gives supporting evidence to the role of institutional investments in monitoring corporate managers' performance and to the suggestion that individual investors prefer not to invest in firms suffering from a high level of information asymmetry.

As for the industry and size effects, the relationship is significant for most of the industries in at least one of the three models except for two industries, utilities and materials (IND 5 and 6), whereas size is significant in all three models. The adjusted R-squared ranged from 6%-25% showing various impacts of ownership concentration on firms facing high level of information asymmetry.

Overall, the results are consistent with recent findings by Al-Najjar (2015) that ownership structure and concentration revealed mixed results when testing their impact of firm performance. The contribution of this study is that favourable models showed more significant positive impact of individual investments than the adverse models. Moreover, institutional investments have a significant positive impact on firm growth and this impact is more stable for firms facing a low level of information asymmetry than firms facing a high level of asymmetry where the impact varies more across the three models. Finally, the findings of this study are consistent with previous findings that ownership structure and concentration can in fact affect firm performance, such as McConnell and Servaes (1990);

Nesbitt (1994); Smith (1996); Del Guercio and Hawkins (1999); Cornett et al. (2007); and Manawaduge and De Zoysa (2013).

4.3 Conclusion

In the previous chapter, the contribution of financial decisions; investment, financing, and dividend to firm growth is examined. In this chapter, a major non-financial decision - changes in ownership structure - is examined. Empirical findings show a significant contribution of changes in ownership structure to firm growth at high and low levels of information asymmetry. Favourable models are more consistent in terms of significance and coefficients whereas adverse models showed less consistency than the favorable ones. Yet, there is still a significant contribution of changes in ownership structure to firm growth for firms facing high level of information asymmetry.

The empirical results obtained from both chapters prove that both financial and non-financial factors contribute to firm growth and that this contribution varies according to the level of information asymmetry. Both financial and non-financial variables are not distinct from each other in the corporate context, therefore, in the next empirical analysis, both variables will be integrated together to better understand the relative contribution of both financial and non-financial variables to firm growth under a high and low level of information asymmetry.

Chapter Five

The relative contribution of financial and non-financial variables to firm growth

5.1 Introduction

In the previous two chapters, the relative contribution of financial and non-financial variables to firm growth was examined. Since both financial and non-financial variables are not isolated or distinct from each other, this chapter tries to examine the relative contribution of both sets of variables to firm growth and the relative weight of each variable under the three classifications of data according to level of information asymmetry. Observations are classified as adverse or favorable using the three proxies of information asymmetry; Beta ROE, PD, and Q ratio. Financial variables include determinants of investment, financing, and dividend decisions, while non-financing variables include ownership variables, changes in investment managers' ownership, brokerage firms, and individual investors. The data include S&P 500 non-financial firms from 2004-2014. This relationship was examined using discriminate analysis and constructing a Z-score model as discussed in the following context.

5.2 Discriminate, Content and Construct Validity

An examination for the discriminate validity, content and construct validity are necessary for ensuring the effectiveness of the discriminate analysis and the resulting discriminate model (Podsakoff and Organ, 1986). The use of discriminate analysis is a well-known practice used in creating a Z-score model. The Z-score model tackles the problem of separating two or more groups of observations (e.g. individuals, firms), by measuring these observations on several variables (Hair et al., 1995; Manly, 1998).

The main purpose behind the discriminating function is to categorise observations into deduced groups based on the characteristics of each observation. In theoretical terms, the main application of the discriminate analysis is to categorise and/or make forecasts for situations in which the dependent variable is found in qualitative terms. In this thesis, the qualitative factor is the growth of the firm, under conditions of favorable and adverse selection (in response to low and high information asymmetry respectively).

The use of discriminate analysis in the field of business was initiated by Altman (1968, 1971), Altman and Sametz (1977) and Altman and Fleur (1981) through building a Z-score model which differentiates between solvent and insolvent banks through the use of accounting information available to the public. The Z-score models are also used in other applications which include the examination of corporate transitional performance (Eldomiaty, 2005), the study of the development of enterprises (Eldomiaty and Rashwan, 2011) and the inspection of both systematic and non-systematic financial risks (Eldomiaty et. al., 2011).

5.3 Discriminate Function Analysis

Functions of the variables $\mathbf{X}_1, \mathbf{X}_2, \ldots \mathbf{X}_p$ are presented by the discriminate analysis, in an attempt to separate the *m* groups with high or low information asymmetry. The most straightforward approach involves taking a linear combination of the X variables as follows.

$$Z = a_1 X_1 + a_2 X_2 + \ldots + a_p X_p \qquad \text{(Equation 5.1)}$$

In this form, the Z reflects group differences as much as possible. Groups can be separated using Z if the mean value differs considerably from a group to another, with the values within a group being fairly constant. Deciding on the discriminate coefficients $a_1, a_2, \ldots a_p$ in the index can be done through maximising the *F* ratio for a one-way analysis of variance. Accordingly, a suitable function for the splitting of the groups can be described as the linear combination for which the *F* ratio is as large as possible. When this approach is employed, it may be possible to decide on several linear combinations for the separation of groups. In general, the number available is the smaller of *p* and *m*-1. The reduction of the space dimensionality (i.e., from the number of different independent variables X to *m*-1 dimension[s]) is one of the advantages of the linear discriminate analysis. Since this thesis is concerned with two groups (favorable and adverse selections), the resulting Z function is only a single function (i.e., one-dimensional analysis).

When the discriminate coefficients are attributed to the actual ratio, a basis is in place for classification into one of the mutually exclusive groupings. In that sense, the discriminate analysis technique has the benefit of taking into consideration an entire spectrum of characteristics that are common to the relevant observations (i.e. firms) as well as the interaction of these characteristics with each other. Another benefit for the linear discriminate analysis is that it yields a model with a considerably small number of selected measurements, which potentially conveys large quantities of information (Altman, 1968, 1971; Altman and Sametz, 1977).

5.4 The Z-Score Models

The researcher derived two linear discriminating functions with their Z index (Z model). These functions can help predict growth of firms listed in the S&P based on the values of financial and non-financial variables. The selection algorithm produces certain significant variables as predictors of grouping. The researcher carried out algorithm three times. The three runs involve the financial and ownership-related variables that are associated with the three proxies of information asymmetry; Beta ROE, PD, and Q. The discriminating functions with *p*-value < 0.05 are statistically significant at the 95% confidence level. Table 1 shows the discriminating functions with their standardised coefficients.

Table 5.1: The Components of the Discriminate Models for Favourable and adverse selection using Beta ROE as a proxy for information asymmetry

Components of the Z models	Equation Coefficients[4]
Beta ROE	
Constant	-0.072
Debt-to-Equity	-0.244
Delta Debt Ratio	0.214
Operating income-to-assets	0.590
Dividend payout ratio	0.591
Dividend Yield	0.251
Ln Inventory	0.158
Probability of Default	-0.278
Investment Managers	-0.187
Brokerage Firms	-0.227
Individual Investors	-0.446
Industry 4	-0.743
Industry 5	0.804
Industry 9	0.028
Eigenvalue[5]	0.045
% of Variance	100%
Canonical Correlation	0.206
Wilks-Lambda	0.957
x^2	67.752***
N	1564

When examining the determinants of firm growth using Beta ROE as a proxy for information asymmetry, the above variables were significant. Comparing these results with results obtained in previous chapters, a consistent outcome was found for the favorable

*** Significant at 1% significance level.

[4] Standardized Canonical Discriminate Function Coefficients.

[5] The variance in a set of variables explained by a factor or component and denoted by lambda. An eigenvalue is the sum of squared values in the column of a factor matrix, or $\lambda_k = \sum_{i=1}^{m} a_{ik}^2$ where a_{ik} is the factor loading for variable *i* on factor k, and m is the number of variables.

model. For example, debt to equity and probability of default are negatively significant, while Delta DR, payout ratio, and operating income to assets are positively significant. However, some findings contradict the previous results, specifically dividend yield and all three ownership proxies. Further discrimination between adverse and favorable models in discussed later in this chapter.

Table 5.2: The Components of the Discriminate Models for Favourable and adverse selection using PD ROE as a proxy for information asymmetry

Components of the Z models	Equation Coefficients[6]
PD ROE	
Constant	-0.182
Debt Ratio	-0.531
Delta Debt Ratio	0.159
Non-Debt Tax Shield	0.259
Delta Non-debt	0.074
Effective Corporate Tax Rate	0.069
Bankruptcy risk	0.157
Operating income-to-sales	-0.015
Operating income-to-assets	-0.739
Dividend payout ratio	-0.596
Dividend Yield	0.508
Current assets-to- fixed assets	0.111
Ln Inventory	-0.187
Probability of Default	0.625
Investment Managers	0.054
Brokerage Firms	-0.199
Individual Investors	0.162
Industry 1	-0.008
Industry 2	0.156
Industry 4	0.574
Industry 5	-0.118
Industry 6	0.328
Industry 7	0.946
Industry 8	0.348
Industry 9	-0.130
Total assets SMALL	-0.038
Total assets MEDIUM	-0.019
Eigenvalue	0.110
% of Variance	100%
Canonical Correlation	0.315
Wilks-Lambda	0.901
x^2	164.989***
N	1591

*** Significant at 1% significance level.

[6] Standardized Canonical Discriminate Function Coefficients.

When using PD ROE as a proxy for information asymmetry and examining the determinants of firm growth, mixed results were obtained. Only Delta Debt Ratio and individual investors' ownership had similar coefficients, with both favorable and adverse models obtained from the previous chapters. Other variables that had similar coefficients with one of the two models included firm size, operating income to sales, debt ratio, and effective corporate tax rate.

Table 5.3: The Components of the Discriminant Models for Favorable and adverse selection using Q Ratio as a proxy for information asymmetry

Components of the Z models	Equation Coefficients
Q Ratio	
Constant	-2.285
Debt-to-Equity	0.111
Debt Ratio	-0.038
Delta Debt Ratio	0.170
Fixed Assets to total assets	0.028
Non-Debt Tax Shield	0.103
Delta Non-debt	0.147
Effective Corporate Tax Rate	-0.114
Bankruptcy risk	0.024
Operating income-to-sales	0.098
Operating income-to-assets	0.747
Dividend payout ratio	0.530
Dividend Yield	-0.408
Current assets-to- fixed assets	-0.112
Ln Inventory	0.084
Probability of Default	-0.550
Investment Managers	-0.008
Brokerage Firms	0.071
Individual Investors	-0.053
Industry 1	2.040
Industry 2	2.452
Industry 4	2.018
Industry 5	0.285
Industry 6	2.333
Industry 7	2.296
Industry 8	2.225
Industry 9	1.460
Total assets SMALL	0.701
Total assets MEDIUM	0.508
Eigenvalue	0.889
% of Variance	100%
Canonical Correlation	0.686
Wilks-Lambda	0.529
x^2	1040.942***
N	1652

*** Significant at 1% significance level.

Using Q ratio as a proxy for information asymmetry and examining determinants of firm growth resulted in the above results. Many variables confirmed previous findings for both favorable and adverse models and had similar coefficients like delta debt ratio, effective corporate tax rate, operating income to assets, dividend payout ratio, dividend yield, probability of default, and brokerage firms' ownership. Other variables that were significant in one of the two models included debt ratio, current assets to fixed assets, change in inventory, non-debt tax shielding, and size effect.

The above results are related to the determinants of firm growth regardless of the discrimination between favourable and adverse observations. The results varied depending on the proxy for information asymmetry used. This is also confirmed by the variation in the number of observations in each group, favourable and adverse, using the three proxies. To examine the validity of the results obtained in the previous chapters for both groups, the following table (Table 5.4) summarises the coefficients of the significant and insignificant components of financial, non-financial, industry, and size variables. The table is divided into two categories: The first examines the determinants of firm growth under favourable selection using the three proxies of information asymmetry, while the second examines the determinants of firm growth under adverse selection using the same proxies. Results obtained from this table are compared with previous findings for financial and non-financial determinants of firm growth discussed in previous chapters.

Table 5.4: A Summary of the Trend for Effects of Independent Variables on Growth of S&P Firms

Independent variable	**Beta ROE**	**PD**	**Q**
	Favorable		
Debt-to-Equity	-	**Insignificant**	+
Debt Ratio	**Insignificant**	+	+
Delta Debt Ratio	+	+	+
Fixed Assets to total assets	**Insignificant**	**Insignificant**	-
Non-Debt Tax Shield	**Insignificant**	+	+
Delta Non-debt	**Insignificant**	-	-
Effective Corporate Tax Rate	**Insignificant**	+	-
Bankruptcy risk	**Insignificant**	-	+
Operating income-to-sales	+	+	+
Operating income-to-assets	**Insignificant**	-	-
Dividend payout ratio	+	-	+
Dividend Yield	-	+	+
Current-assets-to-fixed assets	**Insignificant**	-	-
Ln Inventory	+	+	+
Probability of Default	-	-	-
Investment Managers	-	+	+
Brokerage Firms	-	+	+
Individual Investors	-	+	+
Industry 1	**Insignificant**	+	+
Industry 2	**Insignificant**	+	+
Industry 4	+	+	+
Industry 5	+	+	+
Industry 6	**Insignificant**	+	+
Industry 7	**Insignificant**	+	+
Industry 8	**Insignificant**	+	+
Industry 9	+	+	+
Total assets SMALL	**Insignificant**	+	+
Total assets MEDIUM	**Insignificant**	+	+

Independent variable	Beta ROE	PD	Q
	Adverse		
Debt-to-Equity	+	**Insignificant**	+
Debt Ratio	**Insignificant**	+	+
Delta Debt Ratio	-	+	+
Fixed Assets to total assets	**Insignificant**	**Insignificant**	-
Non-Debt Tax Shield	**Insignificant**	+	+
Delta Non-debt	**Insignificant**	-	-
Effective Corporate Tax Rate	**Insignificant**	+	-
Bankruptcy risk	**Insignificant**	-	+
Operating income-to-sales	**Insignificant**	+	+
Operating income-to-assets	-	-	-
Dividend payout ratio	-	-	-
Dividend Yield	-	+	+
Current-assets-to-fixed assets	**Insignificant**	-	-
Ln Inventory	+	+	+
Probability of Default	+	+	+
Investment Managers	+	+	+
Brokerage Firms	+	+	+
Individual Investors	+	+	+
Industry 1	**Insignificant**	+	+
Industry 2	**Insignificant**	+	+
Industry 4	+	+	+
Industry 5	+	+	+
Industry 6	**Insignificant**	+	+
Industry 7	**Insignificant**	+	+
Industry 8	**Insignificant**	+	+
Industry 9	+	+	+
Total assets SMALL	**Insignificant**	+	+
Total assets MEDIUM	**Insignificant**	+	+

For the Beta ROE model, the favourable classification resulted in consistent results with the previous findings for most of the variables included in the analysis. Variables that had a significant positive impact on firm growth and were consistent with previous findings included delta debt ratio, dividend payout ratio, and change in inventory. In addition, variables with a significant negative contribution to growth consistent with previous findings are dividend yield, probability of default, and industry four. Finally, variables that were insignificant included debt ratio, fixed assets to total assets, non-debt tax shielding, effective corporate tax rate, bankruptcy risk, current assets to fixed assets, and size effect.

Some variables in the favorable models had coefficients that differed significantly from those in previous findings (Chapter two), for example, debt to equity had a positive rather than negative impact on firm growth. Operating income to sales had a positive rather than an insignificant impact, while operating income to assets was insignificant rather than positively significant. The major differences were in the ownership impact, as the three proxies for ownership structure had different results from previous findings (Chapter three). All three had a negative impact on firm growth rather than previous findings that were either positive or insignificant. As for the adverse results, the financial variables were not examined in the previous chapters due to the lack of a sufficient number of observations to fit into a GMM model. As for the ownership variables, the brokerage firms' and individual investors' ownership were consistent with previous findings as both had a positive impact on firm growth. Size effect was also insignificant as found before. Investment managers' ownership differed as it was positively significant in comparison to previous findings where it was insignificant.

For the PD models, the favorable model gave mixed results with regards to consistency with findings in chapters two and three. Consistent findings included variables such as delta debt ratio, bankruptcy risk, change in inventory, brokerage firms and individual investors' ownership, size effect, and industry effect. The adverse model resulted in consistent variables such as delta debt ratio, delta non debt tax shield, effective corporate tax rate, bankruptcy risk, current assets to fixed assets, change in inventory, and brokerage firms' and individual investors' ownership. Other variables in both models were inconsistent with previous findings.

Finally, the Q ratio favorable model was largely consistent with previous findings as many variables had similar coefficients, including delta debt ratio, fixed assets to total assets, effective corporate tax rate, dividend payout ratio, current assets to fixed assets, change in inventory, probability of default, brokerage firms' and individual investors' ownership, and size effect. Variables that were inconsistent with previous findings include debt ratio, debt to equity, bankruptcy risk, operating income-to-assets, operating income-to-sales, dividend yield, and investment managers' ownership. As for the adverse model, it showed less consistent outcome as less variables had similar coefficients like previous findings. These variables are debt ratio, delta debt ratio, non debt tax shield, effective corporate tax rate, and brokerage firms' and individual investors' ownership. All other variables were inconsistent with previous findings.

Overall, in both favorable and adverse models few variables showed similar results using the three proxies of information asymmetry. In the favorable models, delta debt ratio, operating income to sales, change in inventory, probability of default, and industry effect for industries 4, 5, and 9 were consistent across the three models. Regarding the adverse models, consistent variables were operating income to assets, dividend payout ratio, change in inventory, probability of default, industry effect for the same industries; 4, 5, and 9, and all three ownership proxies. These results strengthen the argument that many observations were classified differently under various measures of information asymmetry.

This finding suggests the need for calculating the cut-off points for each of the three proxies of information asymmetry. The cut-off Points are calculated on the Z-scale using the estimated prior probability ratios, and are shown in Table 5.5. The cut-off points are calculated as ln (P1/P2), where P1= the prior probability of favorable selection and P2= the prior probability of adverse selection. The prior probability ratio is as estimate of the proportion of firms that have observations similar to those of the corresponding groups 1 and 2.

Table 5.5: The Cut-Off Point for Growth of the firm and information asymmetry

Prior Probability	**Favorable**	**Adverse**	**Cut-Off Point**
Beta ROE	0.958	0.042	-3.127
PD	0.492	0.508	-0.032
Q	0.677	0.323	-0.74

5.5 Relative Contribution of the Model's Discriminatory Power

The main use of the discriminate analysis is that the profile of the final variables shows the relative contribution of each variable to the total discriminatory power of the Z-Score model and the interaction between them. The common approach to the assessment of the relative contribution is based on measurement of the proportion of the Mahalanobis D^2 or the distance between the centroids of the two constituent groups accounted for by each variable (Mosteller and Wallace, 1963; Taffler, 1982, 1983). It is calculated as follows.

$$P_j = \frac{c_j\left(\bar{r}_{jf} - \bar{r}_{js}\right)}{\sum_{i=1}^{4} c_i\left(\bar{r}_{if} - \bar{r}_{is}\right)} \qquad \text{(Equation 5.2)}$$

Where P_j = the proportion of the D^2 - distance accounted for by ratio $j\bar{r}_{if}$ and $\bar{r}_{is}$ = the means of the below-median and above-median groups for ratio *i* respectively.

Table 5.6: Relative Contribution of the Models' Discriminatory Power

Components of the Z model	Relative Contribution (%) *
Beta ROE	
Debt-to-Equity	5.12%
Delta Debt Ratio	4.49%
Operating income-to-assets	12.39%
Dividend payout ratio	12.41%
Dividend Yield	5.27%
Ln Inventory	3.32%
Probability of Default	5.84%
Investment Managers	3.93%
Brokerage Firms	4.77%
Individual Investors	9.37%
Industry 4	15.61%
Industry 5	16.89%
Industry 9	0.59%
TOTALS	
% of Financial	48.86%
% of Non-Financial	18.06%
Industry Type	33.08%

* Mosteller-Wallace measure.

Components of the Z model	Relative Contribution (%) *
PD	
Debt Ratio	7.47%
Delta Debt Ratio	2.24%
Non-Debt Tax Shield	3.64%
Delta Non-debt	1.04%
Effective Corporate Tax Rate	0.97%
Bankruptcy risk	2.21%
Operating income-to-sales	0.21%
Operating income-to-assets	10.39%
Dividend payout ratio	8.38%
Dividend Yield	7.14%
Current assets-to- fixed assets	1.56%
Ln Inventory	2.63%
Probability of Default	8.79%
Investment Managers	0.76%
Brokerage Firms	2.80%
Individual Investors	2.28%
Industry 1	0.11%
Industry 2	2.19%
Industry 4	8.07%
Industry 5	1.66%
Industry 6	4.61%
Industry 7	13.31%
Industry 8	4.89%
Industry 9	1.83%
Total assets SMALL	0.53%
Total assets MEDIUM	0.27%
TOTALS	
% of Financial	56.68%
% of Non-Financial	5.84%
Industry Type	36.68%
Size	0.80%

* Mosteller-Wallace measure.

Components of the Z model	Relative Contribution (%) *
Q	
Debt-to-Equity	0.56%
Debt Ratio	0.19%
Delta Debt Ratio	0.86%
Fixed Assets to total assets	0.14%
Non-Debt Tax Shield	0.52%
Delta Non-debt	0.74%
Effective Corporate Tax Rate	0.57%
Bankruptcy risk	0.12%
Operating income-to-sales	0.49%
Operating income-to-assets	3.79%
Dividend payout ratio	2.68%
Dividend Yield	2.06%
Current assets-to- fixed assets	0.56%
Ln Inventory	0.42%
Probability of Default	2.78%
Investment Managers	0.04%
Brokerage Firms	0.36%
Individual Investors	0.26%
Industry 1	10.34%
Industry 2	12.43%
Industry 4	10.23%
Industry 5	1.44%
Industry 6	11.83%
Industry 7	11.64%
Industry 8	11.28%
Industry 9	7.40%
Total assets SMALL	3.55%
Total assets MEDIUM	2.57%
TOTALS	
% of Financial	16.56%
% of Non-Financial	0.67%
Industry Type	76.64%
Size	6.13%

* Mosteller-Wallace measure.

The tables above show the contribution of financial, non-financial, industry, and size variables to firm growth. The contribution of each variable is presented along with the totals for each category. Results of the Beta ROE model show that 48% of firm growth could be attributed to financial variables, while 33% of firms' growth is a direct impact of variation in industry type. Only 18% of firm growth could be linked to changes in ownership structure.

The results of the PD model are different - the financial variables explain 56% of firms' growth while ownership structure contributes to less than 6% of growth. Industry type explains 36% of firms' growth whereas size was found to be the least significant, explaining only 0.8% of the growth of firms. Finally, the Q Ratio model gave a significantly different insight on the determinants of growth as industry type had the highest impact with 76% and financial variables dropped to only 16%. Size was more significant than previous models as it was found to contribute to 6% of growth. Changes in ownership structure had the smallest contribution, at 0.6%. These results raise the need for an accuracy matrix to understand better the classification of observations using different models since it is evident that each test is associated with mixed results using each of the three proxies for information asymmetry.

5.6 The Accuracy-Matrix of the Z model

In a multigroup case, the discriminate analysis produces a measure of success, which is a classification table or so-called ‘accuracy matrix’. The actual group membership is equivalent to the priori groupings utilised by the model in an attempt to classify these groups correctly. At this stage, the model is basically explanatory. In addition, the discriminate model produces a predictive function as long as new groups are classified. The Hs (Hits) stand for correct classifications and the Ms (Misses) stand for misclassification. M_1 represents a Type I error and M_2 represents a Type II error. The jack-knife test, or

Lachenbruch Holdout Test (Lachenbruch, 1967) is a well-known statistical test to produce a classification table. The final results of the jack-knife test are shown in Table 5.8. Type I and Type II errors are presented in table 5.7.

Table 5.7: The accuracy matrix for the discriminate analysis.

Actual Group Membership	Predicted Group Membership	
	Favorable Selection	Adverse Selection
Favorable Selection	**H**	**M** $_1$
Adverse Selection	**M** $_2$	**H**

Type I and Type II errors can be easily observed according to the accuracy matrix shown in Table 5.7. It is worth noting that Table 5.7 shows that Type I and II errors are less than the Hs (Hits) in both groups of Favorable and Adverse selection. This result supports the high relative reliability of the estimated discriminate models.

Table 5.8: Lachenbruch Holdout Test (Jack-knife test), Favorable and Adverse selections

Actual Group Membership	No. of cases	Predicted Group Membership	
		Beta ROE	
		Favorable	*Adverse*
Favorable Selection	1498	1496	2
		99.9%	0.1%
Adverse Selection	66	65	1
		98.5%	1.5%
		PD	
		Favorable	*Adverse*
Favorable Selection	782	536	246
		68.5%	31.5%
Adverse Selection	809	329	480
		40.7%	59.3%
		Q	
		Favorable	*Adverse*
Favorable Selection	1118	1039	79
		92.9%	7.1%
Adverse Selection	534	354	180
		66.3%	33.7%

Table 5.8 shows that the three discriminate models for the three models differ in their discriminate power (BETA ROE 95.7%, PD 63.9%, and Q 84.3%). This indicates that the Z score model for the Beta ROE and Q ratio can be used more operationally than the model for PD. This also means that the variables in the Beta ROE model explain most of the variations in firm growth. On the other hand, some of the variations in firm growth using the PD model can be explained by factors other than those included in the model. Beta ROE model is also associated with the least number of adverse observations and correspondingly with the highest number of favourable ones. This could be explained by the rising attention to corporate governance and monitoring imposed on the S&P 500 firms from financial markets. Such large firms with significant institutional ownership; investment managers and brokerage firms are less likely to have severe agency issues and high level of information asymmetry. This could be the reason why Beta ROE model outperformed the other two models in explaining determinants of firm growth for this particular sample set.

Chapter Six

Summary and conclusion

6.0 Introduction

This chapter is a summary of the findings of this thesis. Section 1 summarises the empirical findings. Section 2 addresses potential limitations that can be associated with the issues of data availability (or lack of) including the use of other relevant proxies to measure the same effects. Section 3 presents recommendations and policy implications. Section 4, discuss areas for future research.

6.1 Conclusions

The empirical analysis in this research study was presented in chapters three, four, and five. Chapter three investigated the relative contribution of financing, investment, and dividend decisions to firm growth under conditions of high and low levels of information asymmetry. Chapter four examined the impact of a major non-financial variable, ownership structure, on firm growth. Finally, chapter five combined both financial and non-financial variables such as ownership structure, industry effect, and size to examine the relative contribution of each and the relative weight of each variable using discriminate analysis and a Z-score model.

In chapter three, the effects of the three main corporate finance decisions on firm growth were examined under favourable and adverse selections corresponding to low and high information asymmetry, respectively. In the favourable models, most variables were consistent using the three proxies of information asymmetry which suggest that firms suffering from low information asymmetry grow in a structured and predicted way. The variables that are found to be consistent in terms of coefficient sign and significance are: i) change in debt ratio, ii) operating income-to-assets, iii) payout ratio, iv) dividend yield, v) changes in inventory level, and vi) the probability of default. The change in debt level proxy had a significant positive effect on firm growth which suggests that firms facing a low level of information asymmetry and trying to finance new investments should rely more on debt. A similar finding was made for the payout ratio - a positive effect on growth - which suggests that increasing payout ratios could be used as a strategy to enhance growth. The change in inventory was also found to have a positive effect which suggests investing in inventory could be used as a strategy to increase sales growth. Lastly, the operating income to assets had a positive impact while the probability of default had a negative impact on firm growth.

The variables that were significant in one or two models out of the three examined, such as the debt-to-equity, debt ratio, fixed assets-to-total assets, and current assets-to-fixed assets, all report a negative impact on growth suggesting low debt levels and low investment in assets (other than inventory) help firms grow. This is particularly the case for companies with a Q-ratio > 1, which suggests that these companies already acquire assets using debt as a form of financing. The relationship was significant for every industry and for both small- and medium-sized firms in at least two of the three models. From these results, it is concluded that for firms experiencing a low level of information asymmetry, growth is a function of financing new investments using debt, increasing dividend payout ratio, and investing more in inventory rather than in fixed assets or other current assets.

In the adverse models, for firms facing high levels of information asymmetry or experiencing agency issues (Q-ratio < 1), the results are mixed. Some of the variables examined are found to be significant for both models, e.g. the debt ratio, changes in debt ratio, payout ratio, dividend yield, bankruptcy risk, effective corporate tax rate, operating income-to-assets, current assets-to-fixed assets, and probability of default. However, in three cases, (DR, ECTR, and CAFA) the coefficients reported have opposite signs for both models. In addition, the change in debt ratio appears to be significant at a lower level for both models (5% and 10%). The finding that DR and CAFA had opposite coefficients suggests that firms that suffer from high level of information asymmetry grow in different manners or patterns. High debt levels can affect growth positively or negatively, although increasing debt can help firms grow. Similarly, investing in current assets can either hinder or enable growth – e.g. increasing inventory levels appears to hinder firm growth (PD model), while current asset investments can contribute positively when there is no significant impact of inventory levels (Q model).

Regarding the issue of bankruptcy risk, the results of this study suggest that it can affect growth negatively. This result is consistent using both econometric models. These results suggest that firms should try to reduce or mitigate such risk as much as possible to enable firm growth. On the contrary, proxies for dividend payout and operating income-to-assets ratios are found to perform similarly to the favorable models and to contribute positively to firm growth. This can be explained as firms facing a high level of information asymmetry focus on their dividend policies and operating profitability to enhance firm growth as both proxies are monitored closely by stakeholders. Other variables such as DE and FATA were insignificant in both models while the change in inventory had a significant impact for the PD model only. As for the size and industry dummies, the relationship was insignificant for small firms while it was significant only for medium sized firms in the PD model. The industry effect was significant in at least one model or in both except for one industry - healthcare (IND 2). In addition, it had opposite effect in one of the industries -

consumer staples (IND 7) - suggesting, again, that there are different patterns of growth for firms facing a high level of information asymmetry.

In chapter four, the contribution of ownership structure to firm growth was examined using ownership data for the S&P 500 non-financial firms. The results of the favorable models are largely consistent across the three proxies of information asymmetry whereas the adverse models showed less consistency. In all models, increasing ownership concentration (either individual or institutional) contributes positively to firm growth but there are cases where these proxies appear to be insignificant in statistical terms. Starting with the favourable models, the change in investment managers' ownership was insignificant for the three models whereas the change in brokerage firms' ownership was positively significant at 1% significance level in all cases. Additionally, an increase in individual investments was positively significant at the 1% level. These findings suggest that increasing ownership concentration enhances firm growth. However, the two forms of institutional ownership (brokerage firms and investment managers) vary in terms of statistical significance.

This relationship was significant in most industries examined and for at least one of the three models tested. There are only two exceptions: material and consumer discretionary (IND 6 and 8). The finding that ownership structure is insignificant for both industries could be due to the nature of their products as for both industries' growth in sales could be affected by variables other that ownership structure, e.g. the preferences of consumers and the global demand on material. Additionally, the relationship was significant for various firm sizes as measured by total assets and/or by market value of equity. This finding proves that regardless of size, most firms concentrate on achieving high growth. According to the results, the adjusted R-squared values range from 9%-15% giving reliable insight on the relative contribution of ownership structure to firms' growth when the firm is facing low level of information asymmetry.

Moving to the adverse models, the Beta ROE model (the one with the least number of observations) reports different results to those from the other two models, the PD and Q ratio. In the Beta ROE model, only investment managers' ownership was positively significant at the 10% significance level while both brokerage firms’ and individual investments are found to be insignificant. This suggests that individual investors are deterred from investing in firms suffering from high level of information asymmetry. This finding, to some extent, is also applicable to the case of the brokerage firms which also appear to avoid investing in such firms. The other two models are consistent in their results. Brokerage firms' and individual investors’ ownership proxies appear to be positive and statistically significant at the 1% (brokerage) and 10% (individual investments) significance levels. This finding is consistent with the favourable models. This gives supporting evidence to the role of institutional investments in monitoring corporate managers' performance and to the theory that individual investors prefer not to invest in firms suffering from high level of information asymmetry. As for the industry and size effects, this relationship is found to be significant in most of the industries examined and for at least one of the three models used. The only two exceptions are the case of utilities and materials (IND 5 and 6). On the contrary, corporate size appears to be significant in all three models used. Finally, the adjusted R-squared results range from 6% to 25% indicating various levels of attributory power of the ownership concentration proxy for the case of firms that face high level of information asymmetry.

Overall, all results indicate that favourable models are positively related with individual investments; while the opposite holds true for the case of the adverse (high-information asymmetry) models. Moreover, institutional investments have a positive impact on firm growth. This is more evident for the case of firms that face low levels of information asymmetry. Also, this relationship appears to be of different magnitude across the three models used.

Finally, in chapter five both financial and non-financial variables were examined along with industry and size dummies to measure the relative contribution of each of them to firm growth using both discriminate analysis and a Z-score model. Starting with the results of the discriminate analysis for the Beta ROE model, the favourable classification findings are consistent with the ones reported earlier, with the exception of few variables. Significant variables that show a positive impact on firm growth include the delta-debt ratio, dividend payout ratio, and the changes in inventory. Moreover, significant variables that appear to contribute negatively to growth are the dividend yield, probability of default. Negative growth was also observed in industry four (Information Technology). Finally, insignificant variables include the debt ratio, fixed assets to total assets, non-debt tax shielding, effective corporate tax rate, bankruptcy risk, current assets to fixed assets, and finally, the size effect.

A few variables in the favourable models have different coefficients than previous findings. For example, in the latter tests, the debt to equity proxy appears to be positively related rather than negatively related (as in the previous chapters) to firm growth. Operating income to sales has a positive rather than an insignificant impact, while operating income to assets is found to be insignificant (compared to earlier tests that report a significantly positive relationship). The major differences are attributed to the impact of the ownership concentration proxy used, as the three proxies for ownership structure examined report different results. All these proxies (investment managers, brokerage firms, and individual investors' ownership) appear to have a negative impact on firm growth as compared to the previous findings, chapter four) where they appear to be either positive or insignificant. As for the adverse results, the financial variables are not examined in the previous chapters due to the lack of enough observations to fit in a GMM specification. Regarding ownership variables, both the brokerage firms' and individual investors' ownership proxies are consistent with all previous findings which suggest a positive relationship with the firms' growth. Finally, size effect is found to be insignificant (as in earlier tests), while investment managers' ownership is reported to be positive and significant, in line with previous findings in this study.

As for the PD models, the favourable model reports mixed results. Consistent findings included variables like delta debt ratio, bankruptcy risk, change in inventory, brokerage firms and individual investors' ownership, size effect, and industry effect. The adverse model resulted in consistent variables like delta debt ratio, delta non debt tax shielding, effective corporate tax rate, bankruptcy risk, current assets to fixed assets, change in inventory, and brokerage firms' and individual investors' ownership. Other variables in both models were inconsistent with previous findings. The same applies for the case of the Q-ratio favorable model, which findings are consistent with the previous tests. Most variables have similar coefficients, e.g. delta debt ratio, fixed assets to total assets, effective corporate tax rate, dividend payout ratio, current assets to fixed assets, change in inventory, probability of default, brokerage firms' and individual investors' ownership, and size effect. This suggests that firms suffering from low level of information asymmetry enhance their growth through focusing on the same variables: the determinants of dividend policy, financing new investments through debt, and ownership structure.

Other variables were inconsistent with previous findings like debt ratio, debt to equity, bankruptcy risk, operating income to assets, operating income to sales, dividend yield, and investment managers' ownership. This shows that although firms facing low level of asymmetry grow in a structured way, there is variation due to differences in operations, riskiness etc. The adverse model, demonstrated a less consistent outcome as fewer variables had similar coefficients like previous findings. These variables are debt ratio, delta debt ratio, non debt tax shielding, effective corporate tax rate, and brokerage firms' and individual investors' ownership. All other variables were inconsistent with previous findings. This again suggests that firms facing high levels of information asymmetry can still grow but in different and less consistent patterns.

Overall, in both favorable and adverse models few variables showed similar results using the three proxies of information asymmetry. In the favorable models, delta debt ratio, operating income to sales, change in inventory, probability of default, and industry effect for industries 4, 5, and 9 (Information Technology, Utilities, and Energy) were consistent across the three models. This shows that regardless of the proxy used for information asymmetry, these three industries they were consistent in their impact on firm growth. Regarding the adverse models, consistent variables are operating income to assets, dividend payout ratio, change in inventory, probability of default, industry effect for the same industries; 4, 5, and 9, and all three ownership proxies.

Upon examining the relative weight or contribution for each group of variables, financial, ownership, industry, and size to firm growth, the following results were obtained: The Beta ROE model show that 48% of firm growth could be attributed to financial variables, while 33% of firms' growth is a direct impact of variation in industry type. Only 18% of firm growth could be linked to changes in ownership structure.

The PD model shows different results as the financial variables explain 56% of firms' growth while ownership structure contributes to less than 6% of growth. Industry type explains 36% of firms' growth whereas size if the least significant as it only explains 0.8% of the growth of firms. Finally, the Q Ratio model showed significantly different insight on determinants of growth as industry type had the highest impact with 76% and financial variables dropped to only 16%. Size was more significant than previous models as it verifies 6% of growth, and the changes in ownership structure had the smallest contribution of 0.6%. Previous literature discussed in chapter two suggests an impact for ownership structure and financial determinants on firm growth (Lang et al., 1996; Cornett et al., 2007; and Chen et al., 2008). The findings of this study contribute to previous literature by empirically weighing the relative contribution of such variables along with size and industry effects.

Finally, the three discriminate models for the three models differ in their discriminate power (BETA ROE 95.7%, PD 63.9%, and Q 84.3%). This indicates that the Z score model for the Beta ROE and Q ratio can be used more operationally than the model for PD. This also means that the variables in the Beta ROE model explain most of the variations in firm growth. On the other hand, some of the variations in firm growth using PD model can be explained by other factors than those included in the model. Beta ROE model is also associated with the lowest number of adverse observations and correspondingly with the highest number of favourable ones. This could be verified by the rising attention to corporate governance and monitoring imposed on the S&P 500 firms from various stakeholders in the financial markets due to the size and impact of such firms. Such large firms with significant institutional ownership - investment managers and brokerage firms - are less likely to have severe agency issues and high level of information asymmetry due to the monitoring imposed by institutional shareholders (Aguilera et al., 2008; and Judge, 2010). This could be the reason why Beta ROE model outperformed the other two models in explaining determinants of firm growth.

6.2 Limitations

A major limitation that faced this study was the availability of secondary data. For example, few data items were missing for sample firms which are the constituents of S&P 500. The use of S&P 500 has minimized the possible problem of survivorship bias, yet those few missing observations affect a small part of the GMM analysis as with case of adverse model using Beta ROE as the proxy of information asymmetry. Moreover, non-financial data like board structure and composition were not available on DataStream or Thomson Reuters Eikon. This limited the empirical analysis of non-financial determinants of firm growth to changes in ownership structure. Another limitation regarding the S&P 500 constituents is that DataStream downloads the current index constituents at the time of download (2015). Over the last 25 years many firms might have been removed or added to the index. Similarly, the analysis included large firms, with huge market capitalization and the results can't be generalized for all type of firms in the U.S for example.

Another limitation to this study was the existence of many proxies to measure specific items like firm growth or information asymmetry. For example, firm growth could be measured by growth in sales, assets, profits, sales-weighted assets growth, employment etc. Also, information asymmetry could be measured by the trade spread, Beta ROE, Probability of default of ROE, or Q ratio. These various measures lead to various and mixed findings by previous studies that could be sometimes misleading or inconsistent. Therefore, researchers should be aware and very careful when using historical accounting and financial information/data.

Furthermore, the availability of different proxies for measuring information asymmetry -and the fact that previous research did not confirm the superiority of any of them- resulted in different classifications for data. For example for the favourable models discussed in chapter three, the number of observations using Beta ROE as a proxy for information asymmetry were 2521, 1657 for PD ROE, and 2201 using Q ratio. The variability and huge difference in sample size proves that for a given observation, it could be classified as favourable or adverse according to the proxy used. This in turn, hinders the reliability of these proxies in measuring the level of information asymmetry. Finally, as mentioned in chapter three in the section of hypotheses development, dividend payout acknowledged only cash dividends when analyzing payout policies. Other types of dividends were not examined due to lack of data regarding other types of profit distribution.

6.3 Recommendations and policy implications

Based on the empirical findings of this thesis, we provide evidence that the rule of '*one size fits all'* does not apply to the case of capital structure. This decision exhibits considerable complexity as there are many interconnected intrinsic and extrinsic micro-characteristics in a modern business. Overall, the findings of this thesis suggest that firms can adjust their financial policies to adhere to the level of information asymmetry they are subject to. For example, firms suffering from high level of information asymmetry should be more transparent in communicating prospect investments and the financing instruments employed to make sure that false signals are not sent to market participants. Moreover, firms that suffer less from informational problems could rely more on debt financing when pursuing new corporate investments and enhancement of firm growth. The empirical findings suggest that some variables are significant only for one or more of the industries and for specific firm sizes. Therefore, investors need to understand the determinants of growth that maximise their utility based on the size of the firm and the industry it belongs to. Nevertheless, the ownership structure that best fits their knowledge and investment style could alter their investments from one firm to another.

Managers and corporate board members should also be fully familiar with the level of information asymmetry, ownership structure, the industry where they operate, and their firm size. Using the findings of this empirical study, they can make more informed decisions regarding the design of investment, financing, and dividend policies/strategies so as to enhance firm growth. Nonetheless, they should try to mitigate the effects of variables than hinder growth like Bankruptcy risk and probability of default. For instance, as my empirical findings suggest, firms facing high level of information asymmetry should avoid investing in current assets due to the high probability of a negative impact of inventory in the pursue of growth targets (PD model). On the contrary, investing in current assets could be beneficial and positively associated to firm growth if inventory levels are kept to the absolute minimum (Q model).

6.4 Scope for future research

A major area for future research is to examine the same relationships examined in this study using datasets from different countries (developed and emerging) to better understand whether consistent results can be obtained under alternative political, economic, financial and regulatory regimes. Also, future research should consider using alternative proxies for firm growth and examine the consistency of such growth measures. For example, proxy measures like weighted-fixed assets growth, growth in assets, and growth in employment size could be used.

Future research should address the problem of inconsistency of proxies for information asymmetry. As mentioned before, using each measure of the three used in this study resulted in huge differences in sample size. The absence of a "widely accepted" measure for information asymmetry that could be easily calculated using available market data is a challenging issue that future research must tackle. The problem associated with available measures is that they require using market or accounting data that are sometimes misleading or unavailable. For example, trade spread, one of the proxies of information asymmetry in previous studies (Glosten and Harris, 1988; Madhavan et al., 1997; Huang and Stoll, 1997) could be a direct result of market volatility and preferences of investors rather than an information asymmetry problem. Future research should also concentrate on identifying other determinants of firm growth and especially the case of other financial and non-financial/qualitative measures. As the findings of chapter five suggest, indicators such as industry classifications, ownership structure, and firm size can significantly determine and/or been associated to firm growth. This opens the opportunity for examining such non-financial variables and other determinants of firm growth in more depth.

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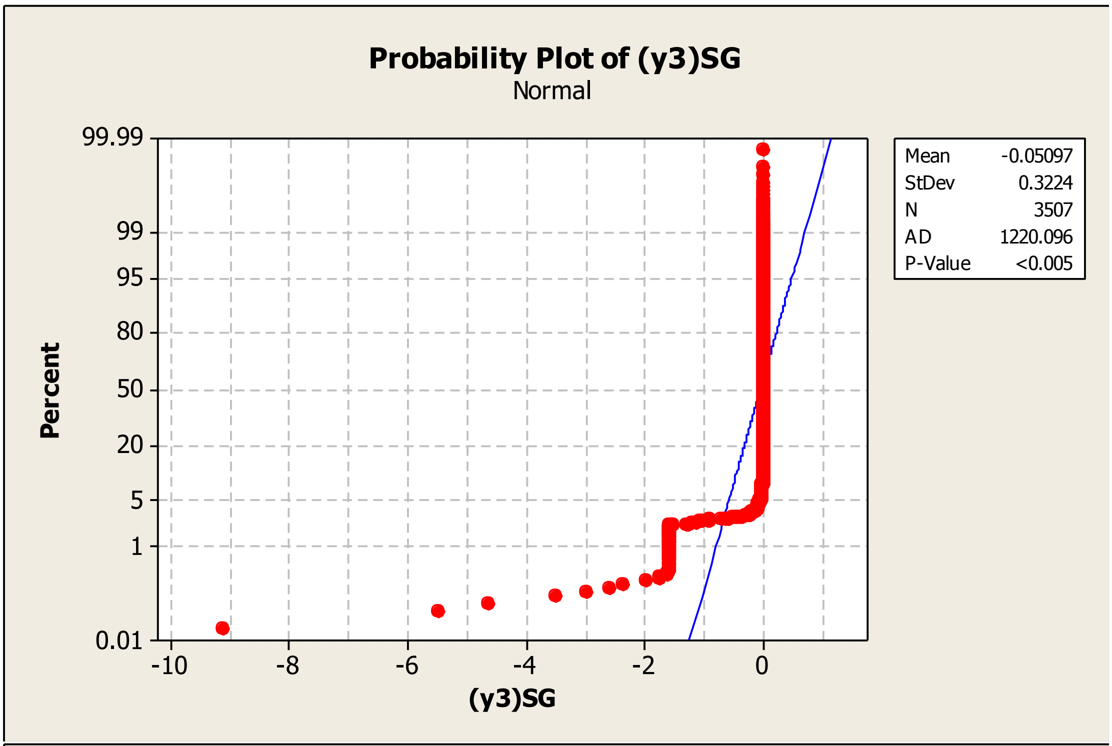
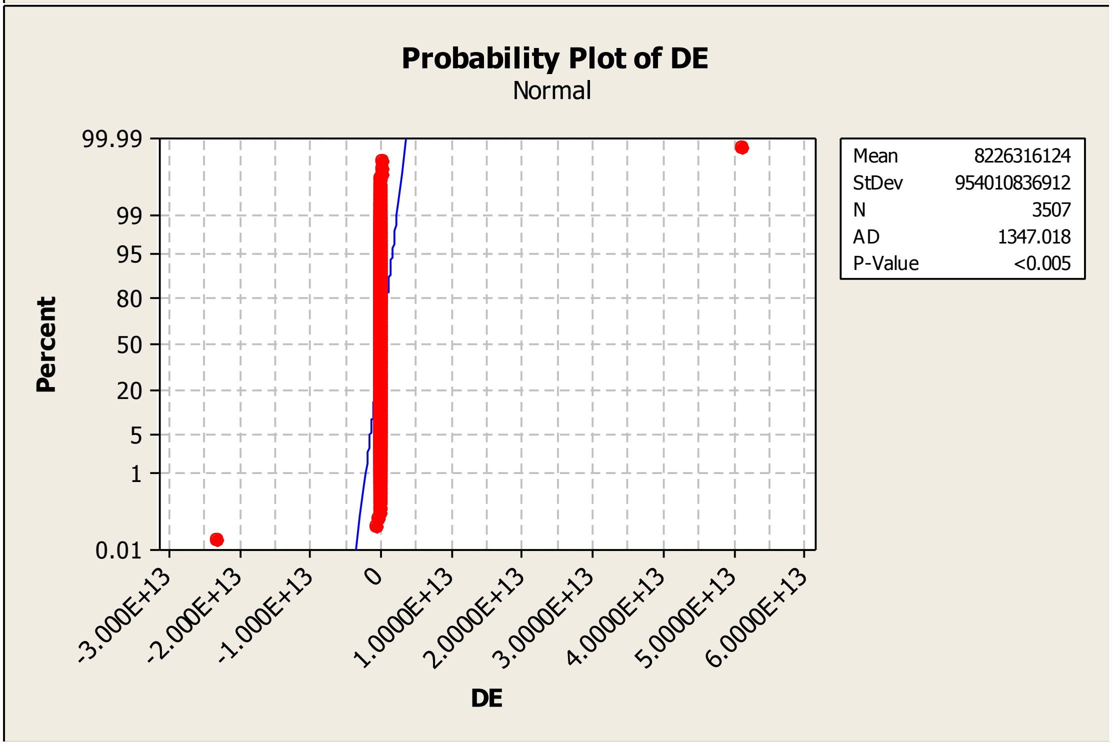
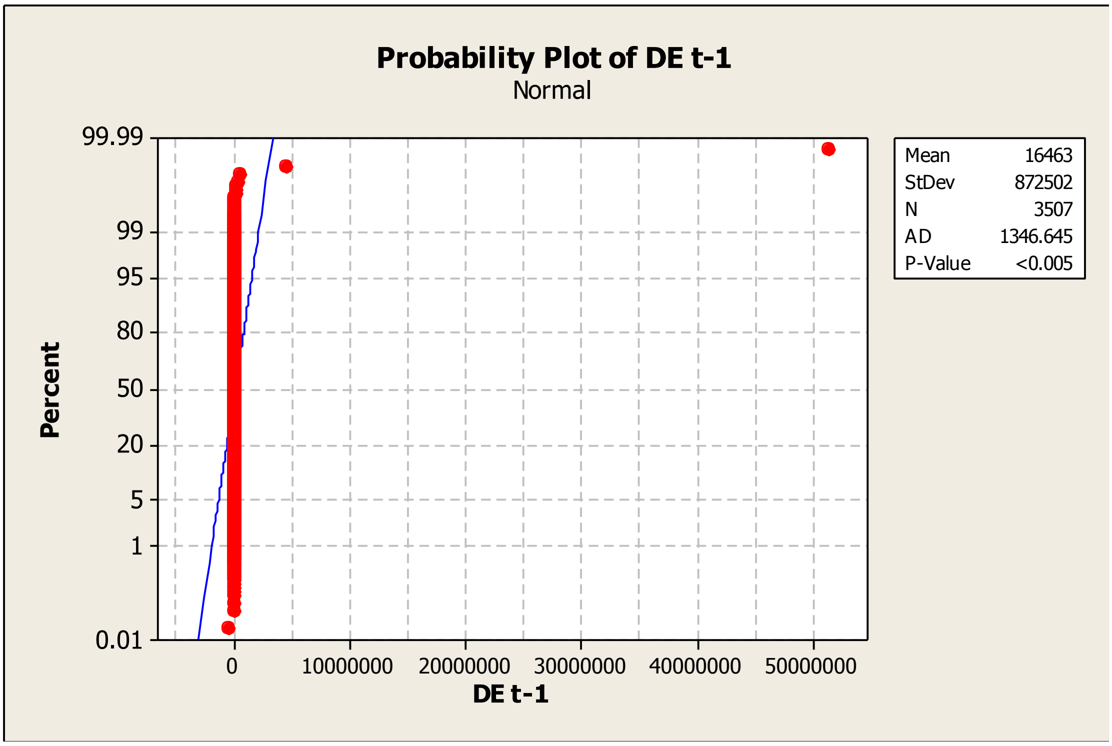
Appendix 1

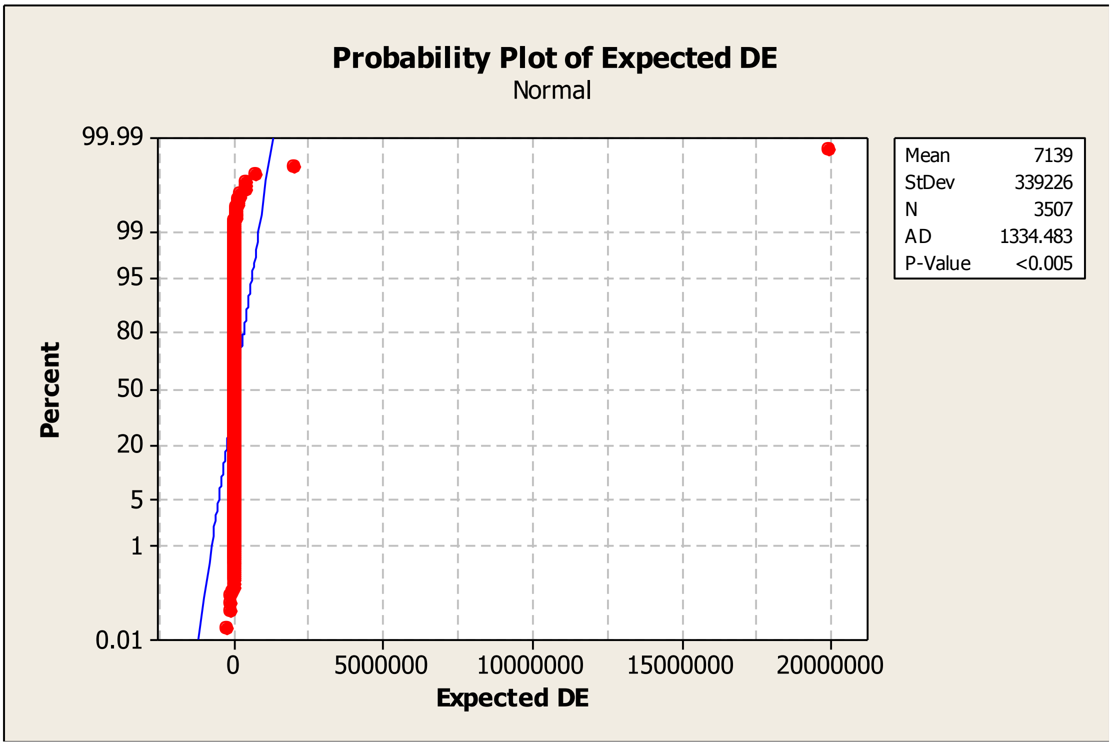
Normality testing for financial variables



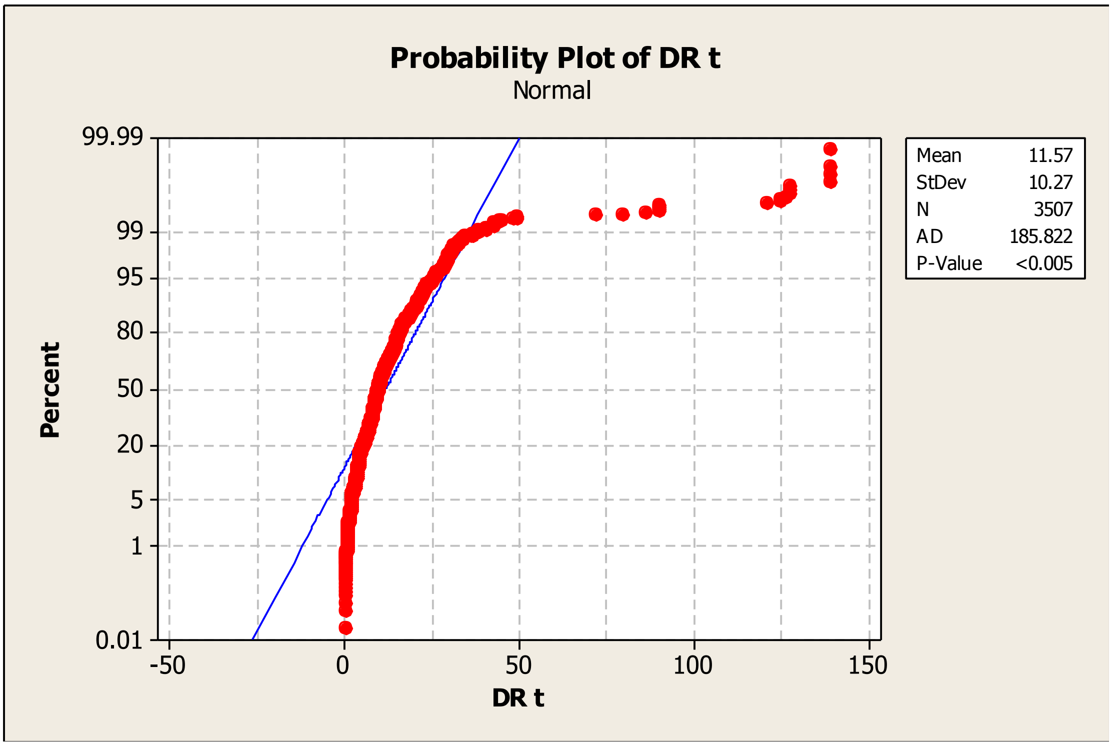


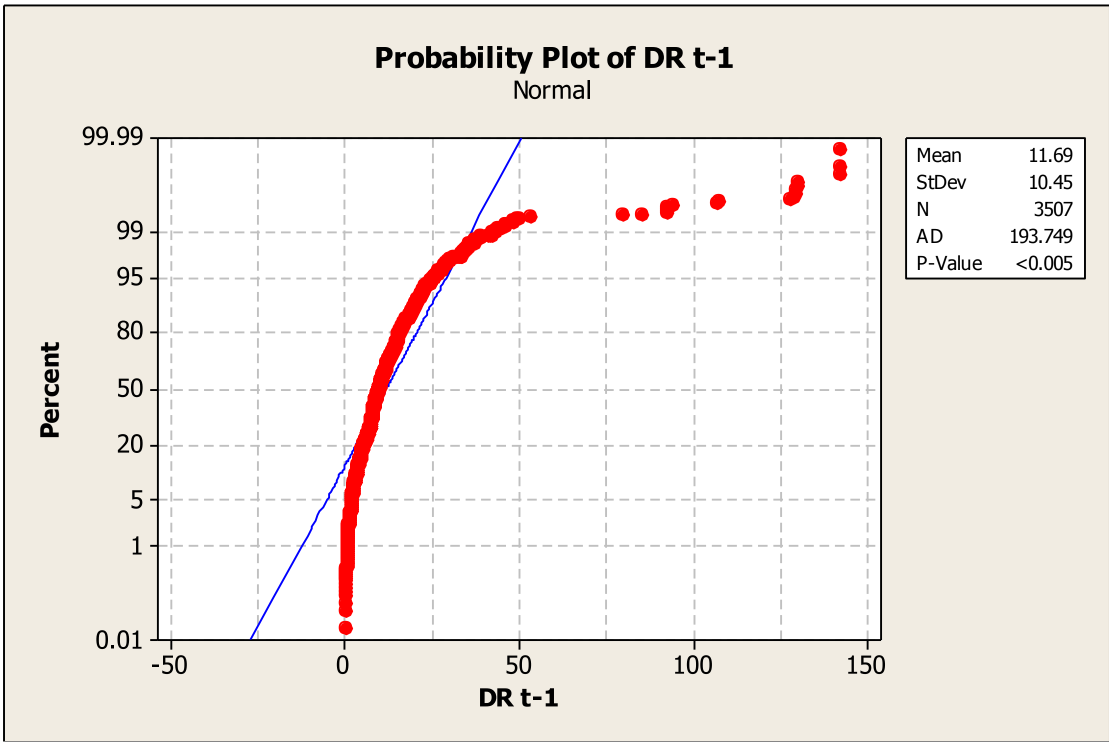


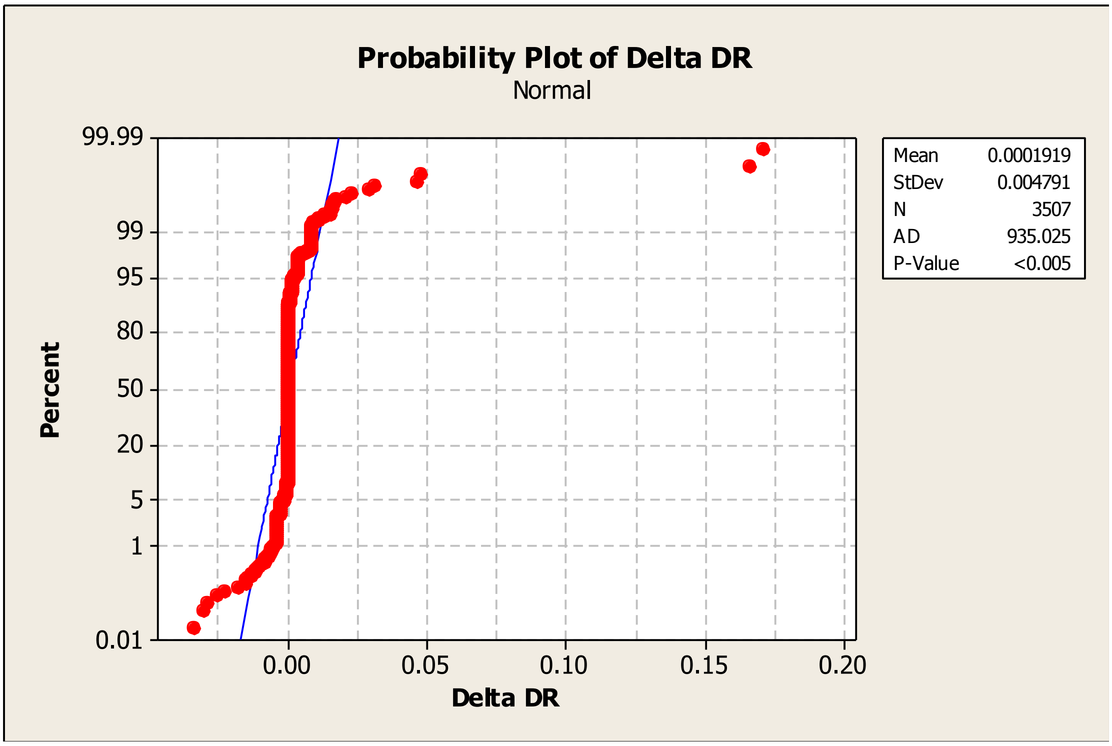
Probability Plot of DE t-1
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
0
10000000
20000000
30000000
40000000
50000000
DE t-1
Mean 16463
StDev 872502
N 3507
AD 1346.645
P-Value <0.005



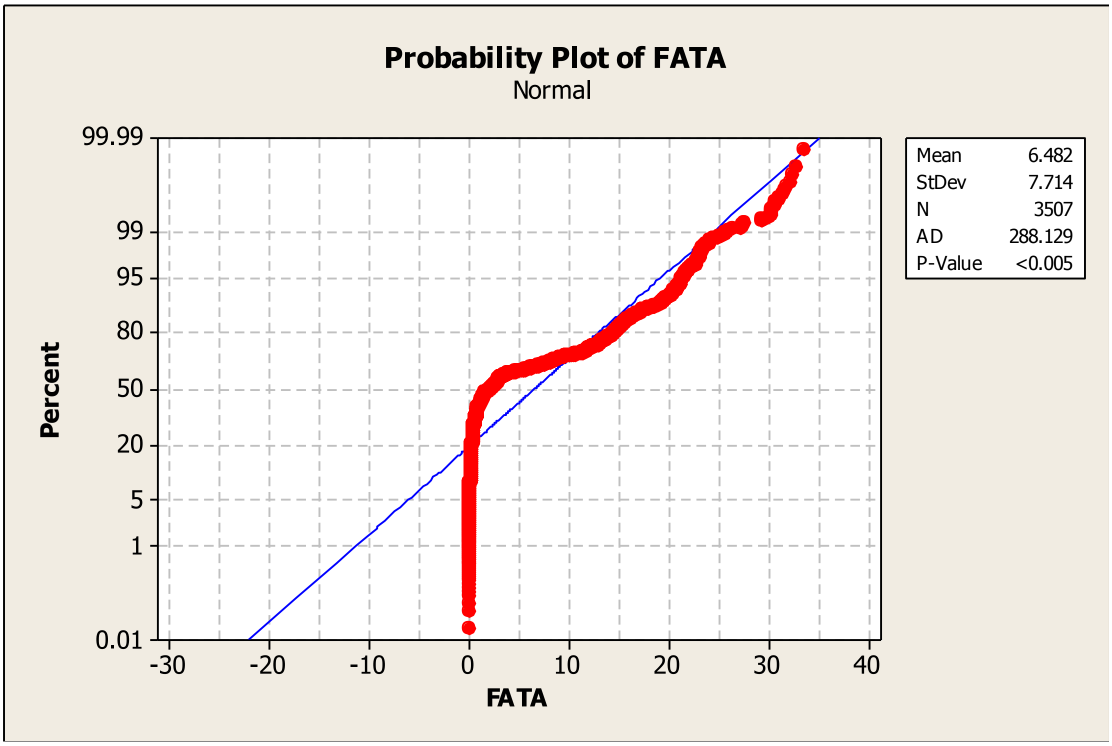
Probability Plot of Expected DE
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
0
5000000
10000000
15000000
20000000
Expected DE
Mean 7139
StDev 339226
N 3507
AD 1334.483
P-Value <0.005


Probability Plot of DR t
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-50
0
50
100
150
DR t
Mean 11.57
StDev 10.27
N 3507
AD 185.822
P-Value <0.005

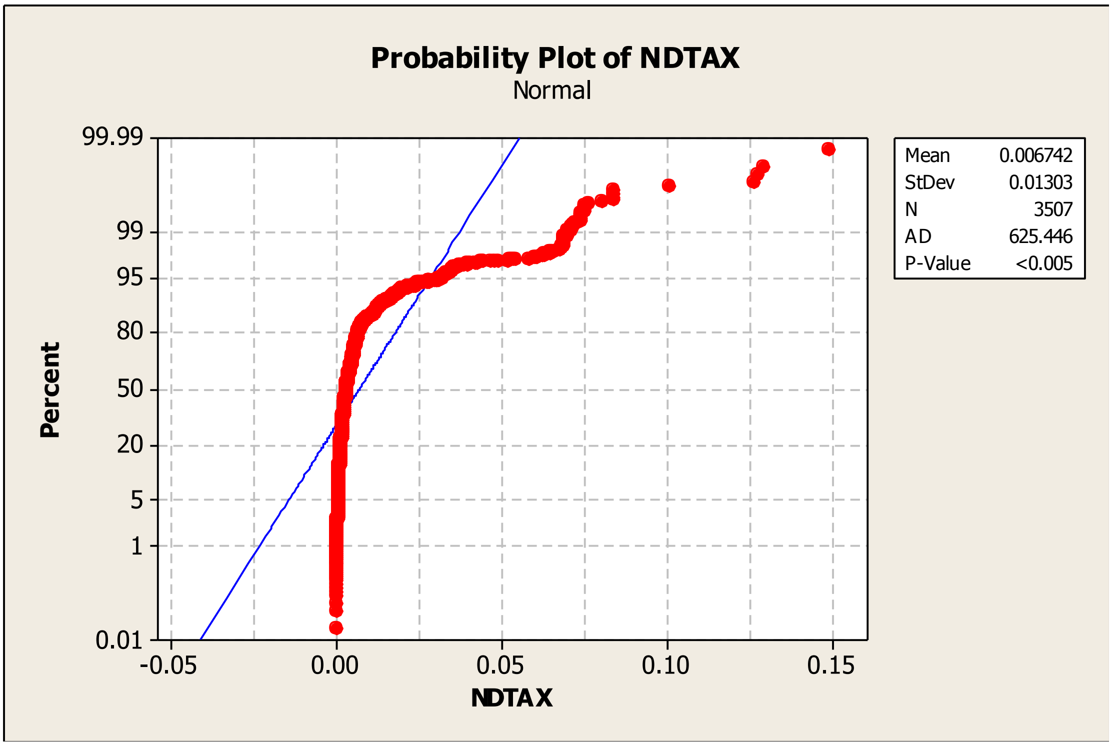

Probability Plot of DR t-1
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-50
0
50
100
150
DR t-1
Mean 11.69
StDev 10.45
N 3507
AD 193.749
P-Value <0.005

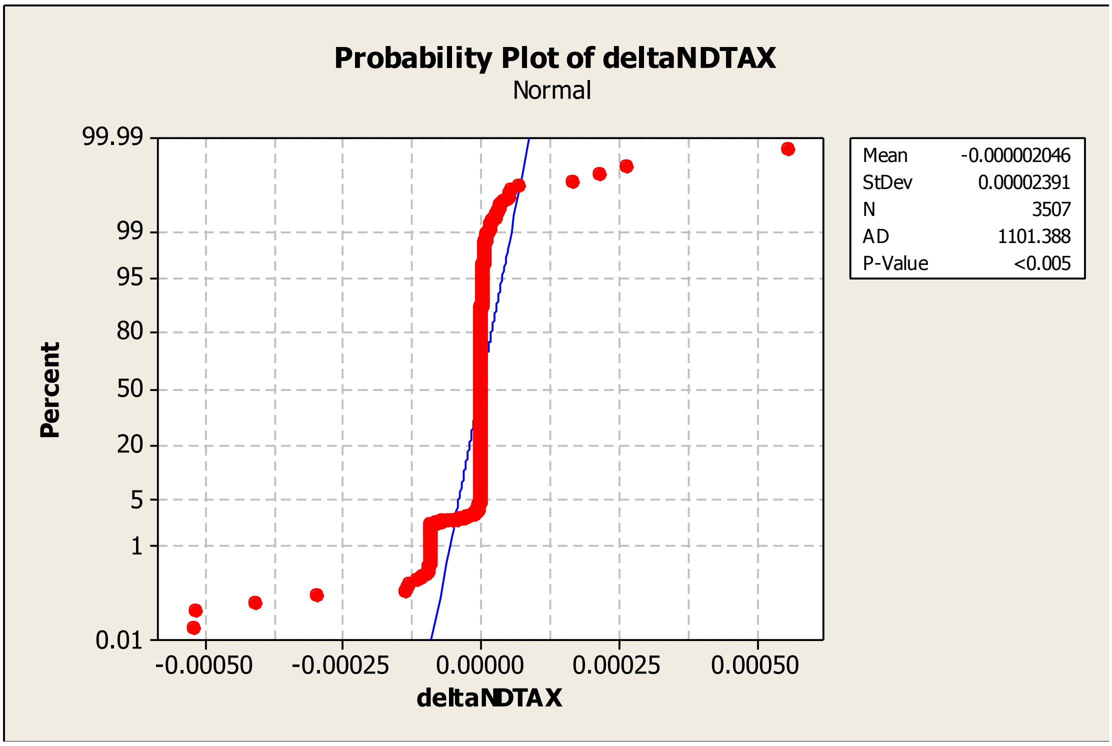


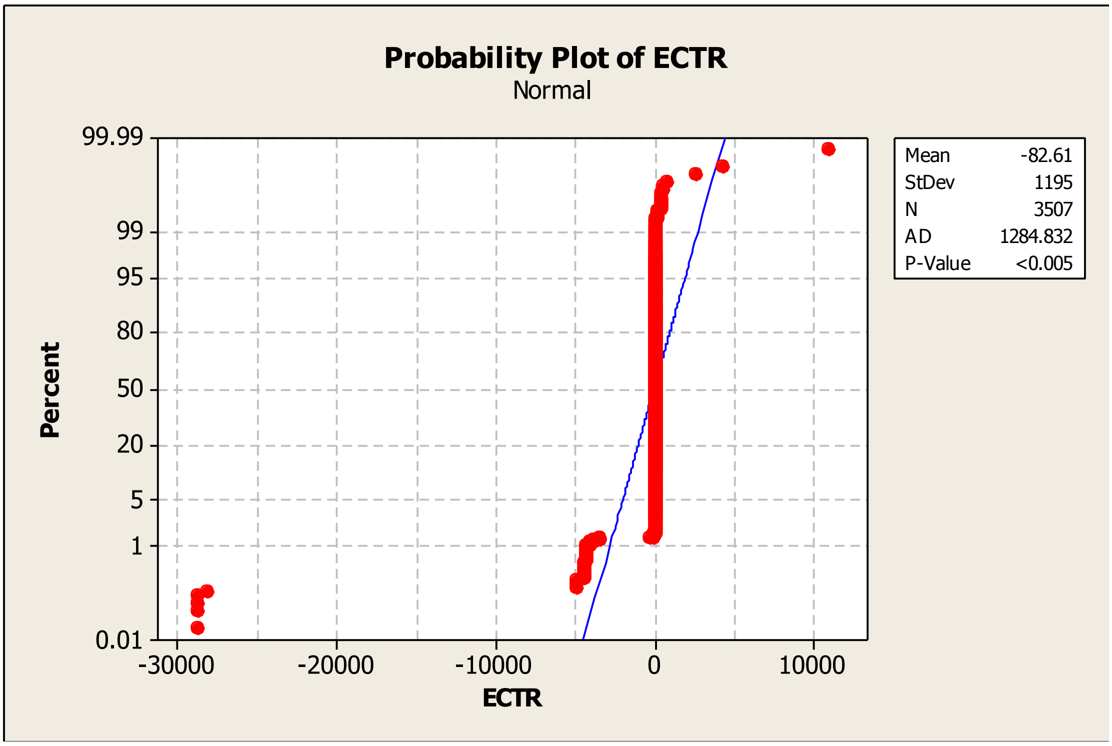
Probability Plot of Delta DR
Normal
Mean 0.0001919
StDev 0.004791
N 3507
AD 935.025
P-Value <0.005
Percent
99.99
99
95
80
50
20
5
1
0.01
0.00
0.05
0.10
0.15
0.20
Delta DR



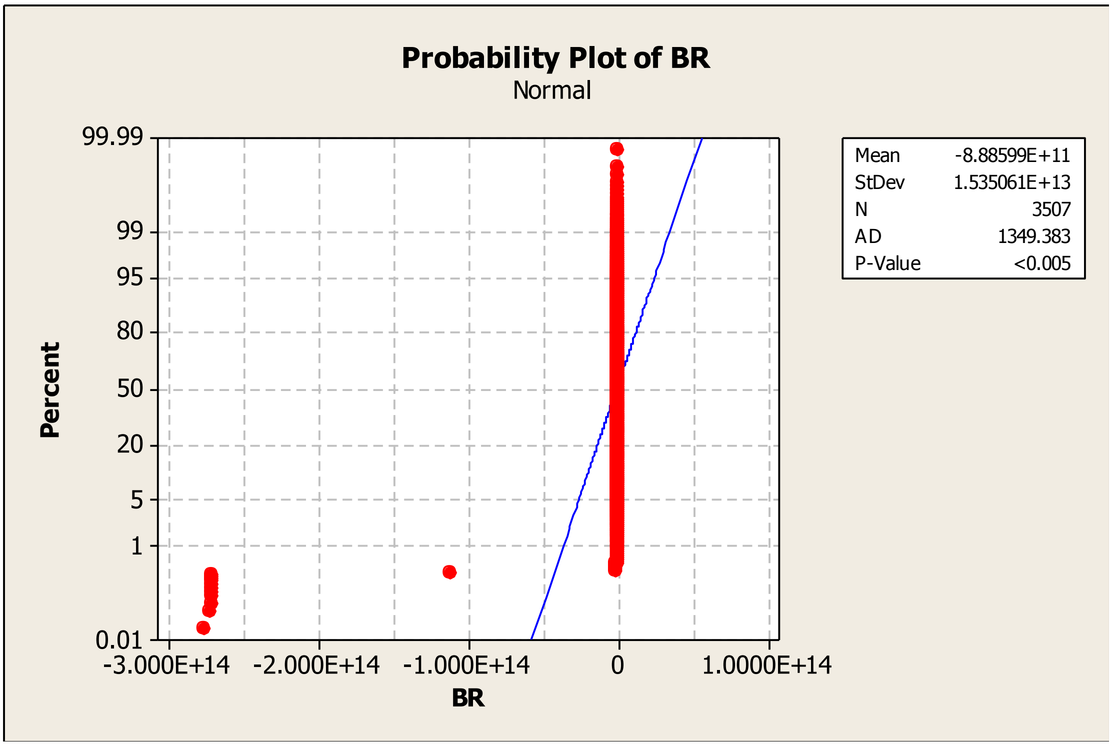
Probability Plot of FATA
Normal
Mean 6.482
StDev 7.714
N 3507
AD 288.129
P-Value <0.005
Percent
99.99
99
95
80
50
20
5
1
0.01
-30
-20
-10
0
10
20
30
40
FATA


Probability Plot of NDTAX
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-0.05
0.00
0.05
0.10
0.15
NDTAX
Mean 0.006742
StDev 0.01303
N 3507
AD 625.446
P-Value <0.005

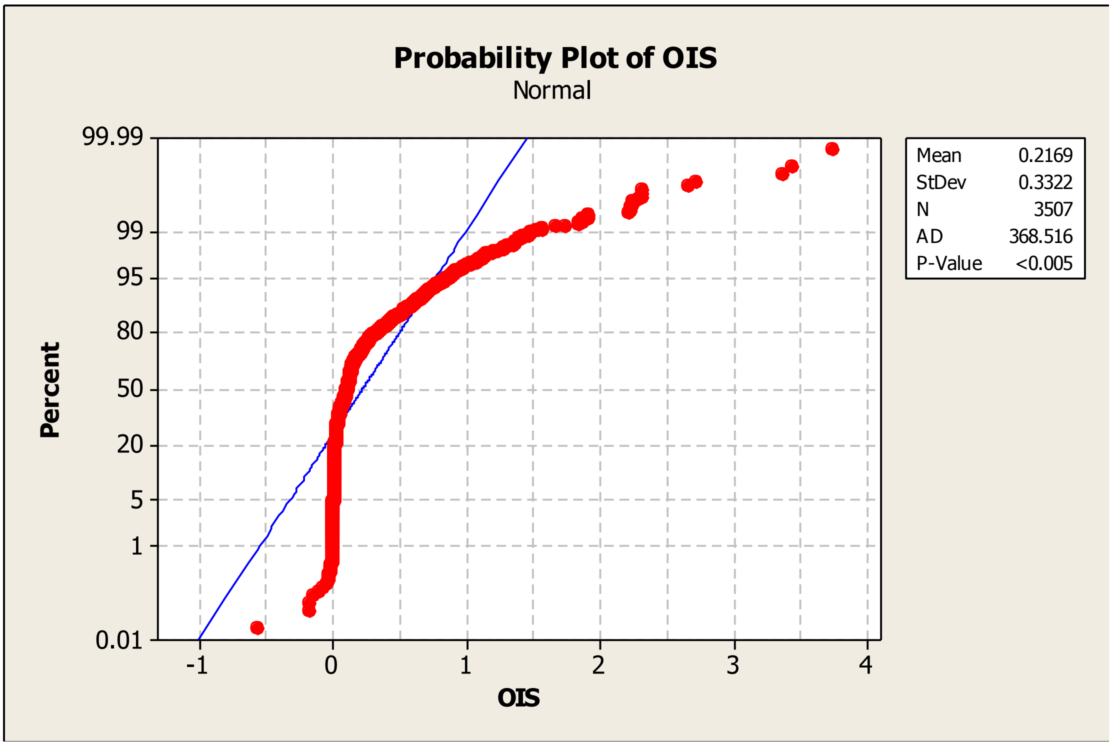

Probability Plot of deltaNDTAX
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-0.00050
-0.00025
0.00000
0.00025
0.00050
deltaNDTAX
Mean -0.000002046
StDev 0.00002391
N 3507
AD 1101.388
P-Value <0.005

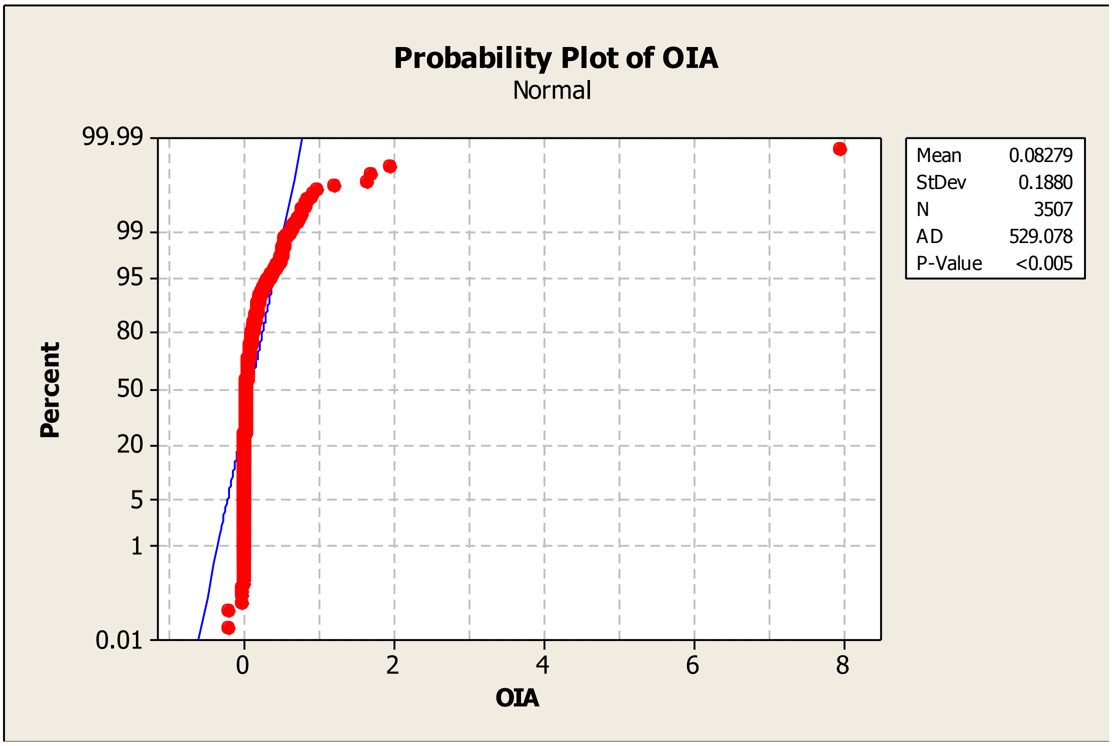


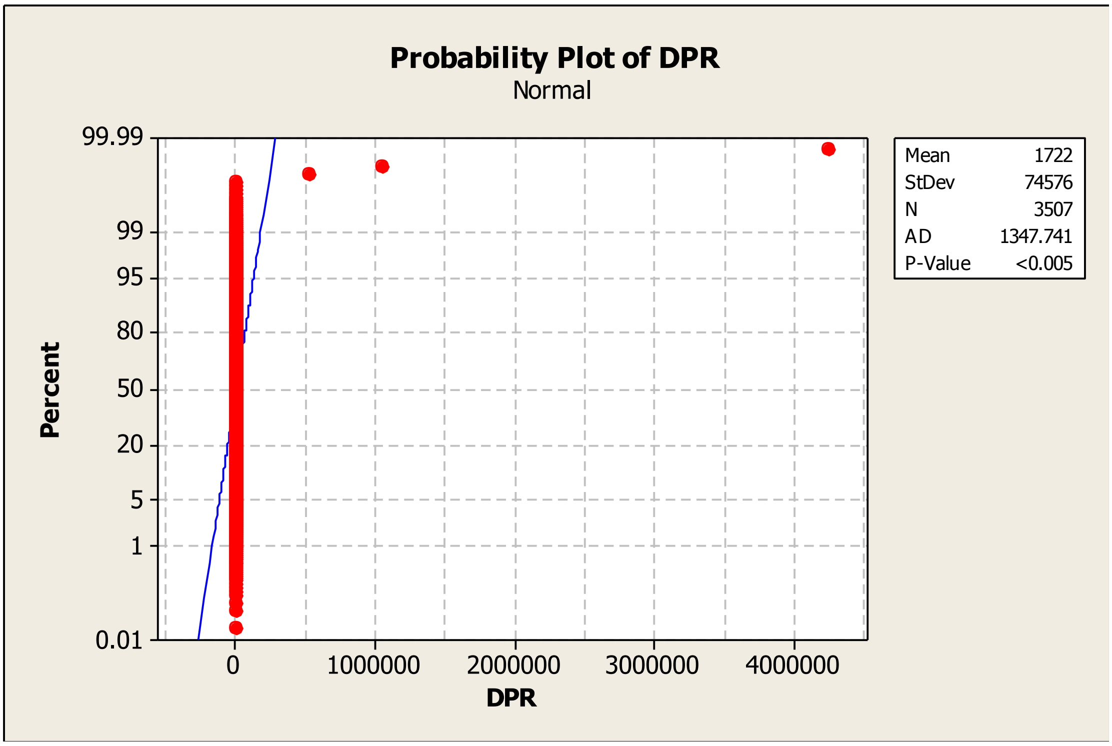
Probability Plot of ECTR
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-30000
-20000
-10000
0
10000
ECTR
Mean -82.61
StDev 1195
N 3507
AD 1284.832
P-Value <0.005



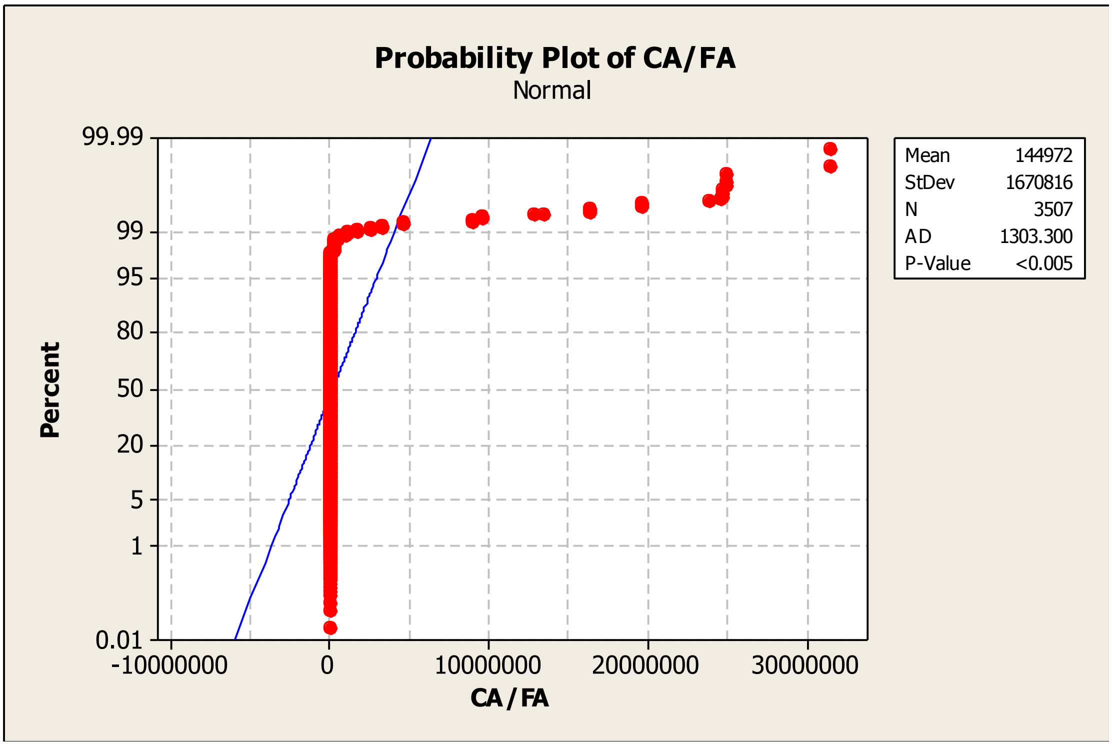
Probability Plot of BR
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-3.000E+14
-2.000E+14
-1.000E+14
0
1.0000E+14
BR
Mean -8.88599E+11
StDev 1.535061E+13
N 3507
AD 1349.383
P-Value <0.005


Probability Plot of OIS
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-1
0
1
2
3
4
OIS
Mean 0.2169
StDev 0.3322
N 3507
AD 368.516
P-Value <0.005

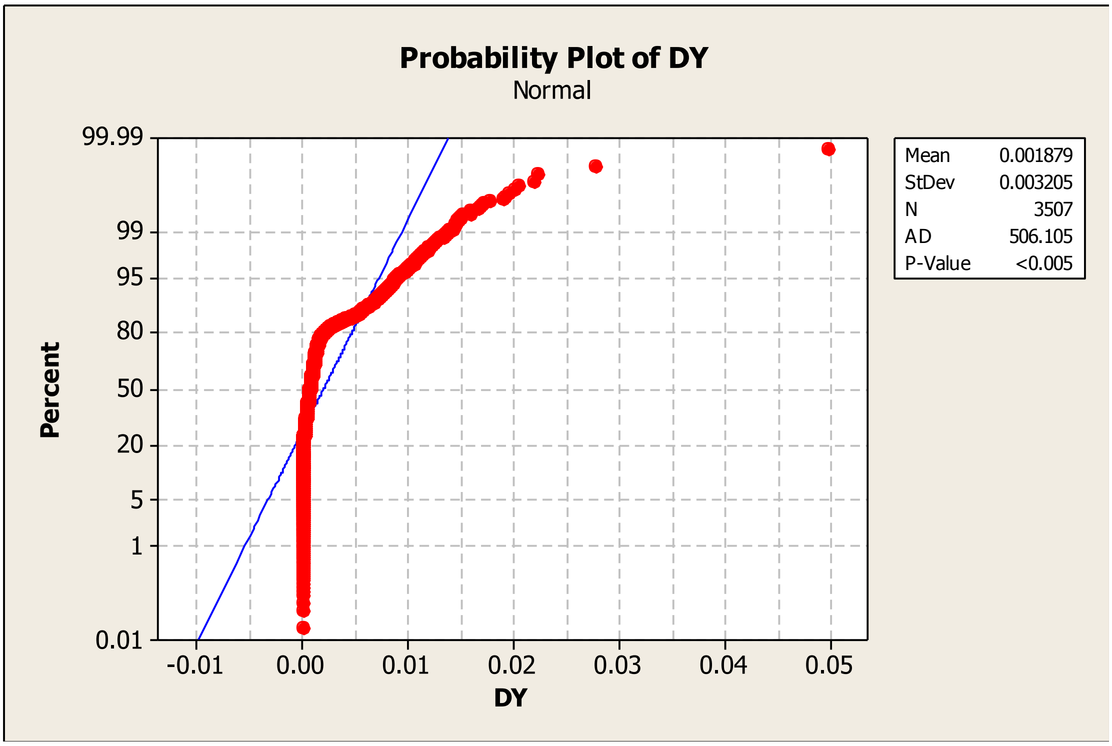

Probability Plot of OIA
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
0
2
4
6
8
OIA
Mean 0.08279
StDev 0.1880
N 3507
AD 529.078
P-Value <0.005

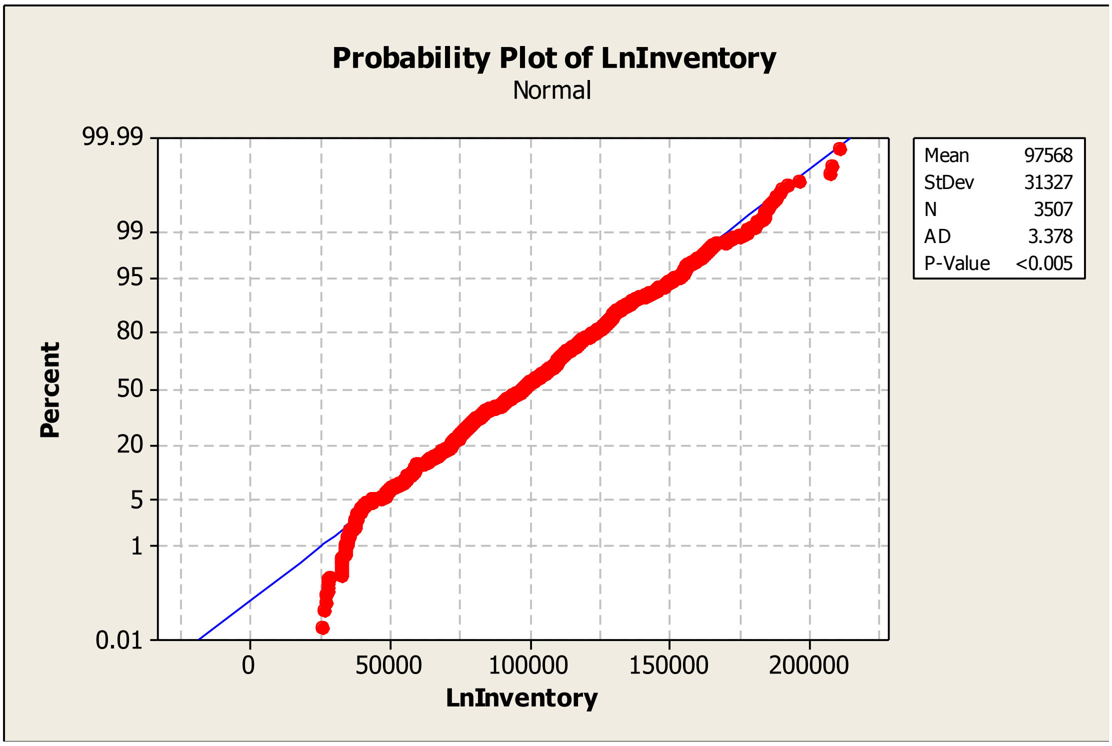


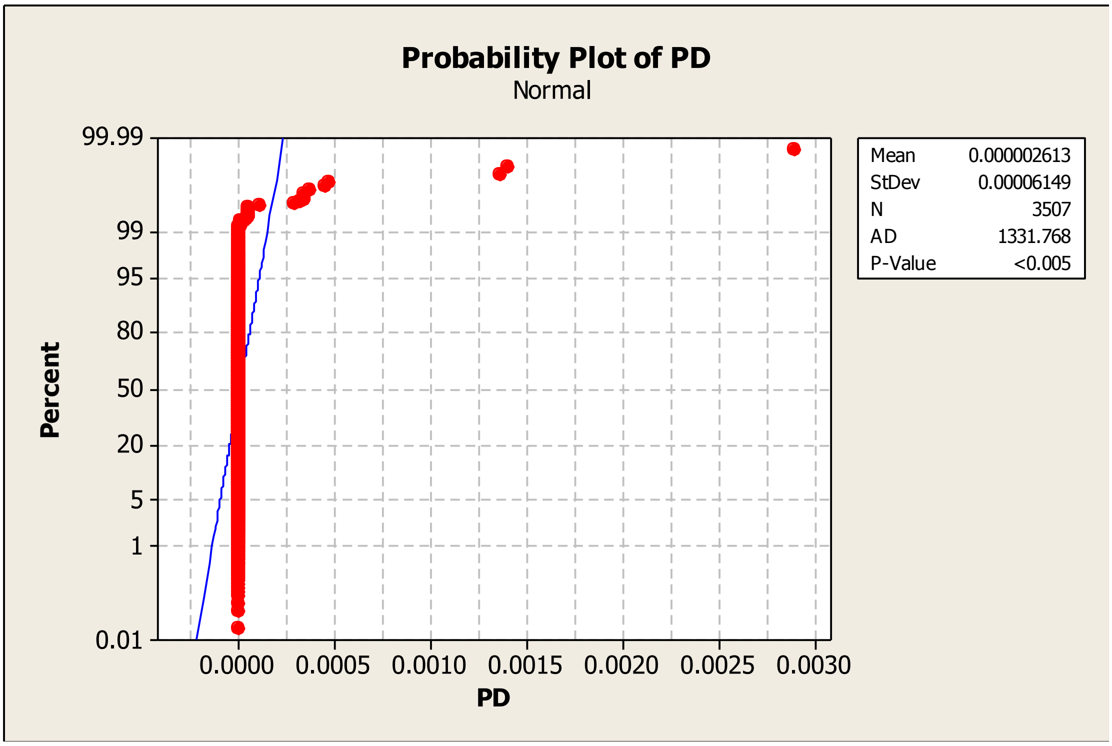
Probability Plot of DPR
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
0
1000000
2000000
3000000
4000000
DPR
Mean 1722
StDev 74576
N 3507
AD 1347.741
P-Value <0.005



Probability Plot of CA/FA
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-10000000
0
10000000
20000000
30000000
CA/FA
Mean 144972
StDev 1670816
N 3507
AD 1303.300
P-Value <0.005


Probability Plot of DY
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-0.01
0.00
0.01
0.02
0.03
0.04
0.05
DY
Mean 0.001879
StDev 0.003205
N 3507
AD 506.105
P-Value <0.005


Probability Plot of LnInventory
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
0
50000
100000
150000
200000
LnInventory
Mean 97568
StDev 31327
N 3507
AD 3.378
P-Value <0.005


Probability Plot of PD
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
PD
Mean 0.000002613
StDev 0.00006149
N 3507
AD 1331.768
P-Value <0.005

Appendix 2

Results of Hausman Test for Endogeneity

Table (A): Results of Hasuman Test for Endogeneity for Bankruptcy risk

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002	0.009	0.192	0.848
NDE	0.156	0.014	11.149	0.000
NDELTADR	0.042	0.011	3.807	0.000
NDELTAND	-0.018	0.012	-1.541	0.123
NDPR	0.170	0.018	9.626	0.000
NDRT	-0.111	0.015	-7.598	0.000
NDY	-0.498	0.019	-26.300	0.000
NECTR	-0.148	0.010	-14.630	0.000
NFATA	-0.160	0.014	-11.768	0.000
NLNINVEN	-0.044	0.010	-4.281	0.000
NNDTAX	0.140	0.012	11.707	0.000
NOIA	0.016	0.014	1.138	0.255
NOIS	0.091	0.013	7.123	0.000
NPD	0.035	0.014	2.540	0.011
RESID (Bankruptcy risk)	0.076	0.010	7.385	0.000
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared residual	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Bankruptcy Risk has a probability of 0.000 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (B): Results of Hasuman Test for Endogeneity for Delta non-debt tax shield

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003	0.009	0.287	0.774
NBR	0.076	0.010	7.412	0.000
NDE	0.153	0.014	10.846	0.000
NDELTADR	0.046	0.011	4.222	0.000
NDPR	0.154	0.018	8.692	0.000
NDRT	-0.096	0.015	-6.442	0.000
NDY	-0.475	0.019	-24.908	0.000
NECTR	-0.137	0.010	-13.281	0.000
NFATA	-0.163	0.014	-11.933	0.000
NLNINVEN	-0.035	0.010	-3.373	0.001
NNDTAX	0.138	0.012	11.468	0.000
NOIA	0.032	0.014	2.309	0.021
NOIS	0.100	0.013	7.776	0.000
NPD	0.022	0.014	1.575	0.115
RESID (DeltaNDTAX)	-0.017	0.012	-1.453	0.146
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared residual	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Delta Non-Debt tax shield has a probability of 0.146 which shows that this variable does not suffer from endogeneity and does not need an Instrumental Variable (IV)

Table (C): Results of Hasuman Test for Endogeneity for Delta Debt Ratio

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003	0.009	0.299	0.765
NBR	0.075	0.010	7.254	0.000
NDE	0.165	0.014	11.727	0.000
NDELTAND	-0.021	0.011	-1.878	0.060
NDPR	0.159	0.018	8.924	0.000
NDRT	-0.100	0.015	-6.720	0.000
NDY	-0.482	0.019	-25.042	0.000
NECTR	-0.131	0.010	-13.056	0.000
NFATA	-0.160	0.014	-11.660	0.000
NLNINVEN	-0.040	0.011	-3.785	0.000
NNDTAX	0.138	0.012	11.601	0.000
NOIA	0.028	0.014	2.044	0.041
NOIS	0.101	0.013	7.852	0.000
NPD	0.021	0.014	1.481	0.139
RESID (Delta DR)	0.045	0.011	3.991	0.000
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Delta Debt Ratio has a probability of 0.000 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (D): Results of Hasuman Test for Endogeneity for Debt-to-equity

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000	0.009	0.044	0.965
NBR	0.080	0.010	7.791	0.000
NDELTADR	0.066	0.011	5.972	0.000
NDELTAND	-0.016	0.012	-1.344	0.179
NDPR	0.158	0.018	8.881	0.000
NDRT	-0.021	0.012	-1.786	0.074
NDY	-0.472	0.019	-24.512	0.000
NECTR	-0.132	0.010	-12.871	0.000
NFATA	-0.160	0.014	-11.684	0.000
NLNINVEN	-0.038	0.010	-3.704	0.000
NNDTAX	0.126	0.012	10.585	0.000
NOIA	-0.010	0.013	-0.717	0.473
NOIS	0.133	0.012	10.848	0.000
NPD	0.052	0.014	3.666	0.000
RESID (Debt-to-equity)	0.153	0.014	10.878	0.000
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Debt-to-equity has a probability of 0.000 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (E): Results of Hasuman Test for Endogeneity for Dividend payout ratio

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004	0.009	0.450	0.653
NBR	0.084	0.010	8.173	0.000
NDE	0.154	0.014	10.897	0.000
NDELTADR	0.046	0.011	4.093	0.000
NDELTAND	-0.007	0.011	-0.572	0.567
NDRT	-0.095	0.015	-6.376	0.000
NDY	-0.342	0.012	-28.356	0.000
NECTR	-0.143	0.010	-13.917	0.000
NFATA	-0.154	0.014	-11.310	0.000
NLNINVEN	-0.040	0.010	-3.830	0.000
NNDTAX	0.144	0.012	12.083	0.000
NOIA	0.038	0.014	2.758	0.006
NOIS	0.091	0.013	7.106	0.000
NPD	0.006	0.014	0.443	0.658
RESID (DPR)	0.158	0.018	8.849	0.000
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Dividend Payout Ratio has a probability of 0.000 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (F): Results of Hasuman Test for Endogeneity for Debt Ratio

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.005	0.009	0.535	0.593
NBR	0.086	0.010	8.489	0.000
NDE	0.105	0.011	9.435	0.000
NDELTADR	0.047	0.011	4.181	0.000
NDELTAND	-0.011	0.012	-0.917	0.359
NDPR	0.154	0.018	8.628	0.000
NDY	-0.491	0.019	-25.528	0.000
NECTR	-0.138	0.010	-13.446	0.000
NFATA	-0.170	0.014	-12.574	0.000
NLNINVEN	-0.045	0.010	-4.354	0.000
NNDTAX	0.143	0.012	12.037	0.000
NOIA	0.018	0.014	1.271	0.204
NOIS	0.125	0.012	10.027	0.000
NPD	-0.006	0.014	-0.457	0.648
RESID (DR)	-0.098	0.015	-6.590	0.000
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Debt Ratio has a probability of 0.000 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (G): Results of Hasuman Test for Endogeneity for Dividend yield

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002	0.009	0.220	0.826
NBR	0.106	0.010	10.493	0.000
NDE	0.144	0.014	10.240	0.000
NDELTADR	0.052	0.011	4.638	0.000
NDELTAND	0.009	0.011	0.781	0.435
NDPR	-0.204	0.011	-18.301	0.000
NDRT	-0.124	0.015	-8.337	0.000
NECTR	-0.160	0.010	-15.544	0.000
NFATA	-0.198	0.013	-14.702	0.000
NLNINVEN	-0.097	0.010	-9.717	0.000
NNDTAX	0.166	0.012	13.918	0.000
NOIA	0.084	0.014	6.177	0.000
NOIS	0.025	0.012	1.983	0.047
NPD	0.012	0.014	0.850	0.395
RESID (DY)	-0.479	0.019	-24.848	0.000
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Dividend yield has a probability of 0.000 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (H): Results of Hasuman Test for Endogeneity for Effective Corporate Tax Rate

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003	0.009	0.372	0.710
NBR	0.098	0.010	9.700	0.000
NDE	0.146	0.014	10.394	0.000
NDELTADR	0.029	0.011	2.668	0.008
NDELTAND	-0.017	0.012	-1.511	0.131
NDPR	0.178	0.018	10.026	0.000
NDRT	-0.103	0.015	-6.919	0.000
NDY	-0.508	0.019	-26.356	0.000
NFATA	-0.183	0.014	-13.535	0.000
NLNINVEN	-0.028	0.010	-2.669	0.008
NNDTAX	0.158	0.012	13.317	0.000
NOIA	-0.009	0.013	-0.656	0.512
NOIS	0.129	0.013	10.262	0.000
NPD	0.013	0.014	0.895	0.371
RESID (ECTR)	-0.137	0.010	-13.264	0.000
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Effective Corporate Tax rate has a probability of 0.000 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (I): Results of Hasuman Test for Endogeneity for Fixed Assets-to-Total Assets

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003	0.009	0.401	0.689
NBR	0.073	0.010	7.139	0.000
NDE	0.150	0.014	10.655	0.000
NDELTADR	0.039	0.011	3.515	0.000
NDELTAND	-0.017	0.012	-1.509	0.131
NDPR	0.141	0.018	7.910	0.000
NDRT	-0.110	0.015	-7.479	0.000
NDY	-0.506	0.019	-26.589	0.000
NECTR	-0.149	0.010	-14.612	0.000
NLNINVEN	-0.020	0.010	-1.964	0.050
NNDTAX	0.050	0.009	5.257	0.000
NOIA	0.070	0.013	5.172	0.000
NOIS	0.065	0.013	5.186	0.000
NPD	0.015	0.014	1.101	0.271
RESID (FATA)	-0.163	0.014	-11.915	0.000
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Fixed Assets-to- total assets has a probability of 0.000 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (J): Results of Hasuman Test for Endogeneity for Change in Inventory

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002	0.009	0.263	0.792
NBR	0.079	0.010	7.725	0.000
NDE	0.154	0.014	10.947	0.000
NDELTADR	0.047	0.011	4.182	0.000
NDELTAND	-0.016	0.012	-1.375	0.169
NDPR	0.160	0.018	9.016	0.000
NDRT	-0.103	0.015	-6.987	0.000
NDY	-0.494	0.019	-26.645	0.000
NECTR	-0.135	0.010	-13.152	0.000
NFATA	-0.158	0.014	-11.532	0.000
NNDTAX	0.143	0.012	12.029	0.000
NOIA	0.021	0.013	1.595	0.111
NOIS	0.116	0.012	9.940	0.000
NPD	0.027	0.014	1.940	0.052
RESID (LnINV)	-0.036	0.010	-3.437	0.001
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Change in Inventory has a probability of 0.001 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (K): Results of Hasuman Test for Endogeneity for Non-debt tax shield

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002	0.009	0.226	0.821
NBR	0.076	0.010	7.361	0.000
NDE	0.139	0.014	9.866	0.000
NDELTADR	0.042	0.011	3.750	0.000
NDELTAND	-0.007	0.012	-0.575	0.565
NDPR	0.167	0.018	9.369	0.000
NDRT	-0.103	0.015	-6.979	0.000
NDY	-0.500	0.019	-25.954	0.000
NECTR	-0.148	0.010	-14.480	0.000
NFATA	-0.067	0.011	-6.247	0.000
NLNINVEN	-0.048	0.010	-4.589	0.000
NOIA	0.057	0.014	4.119	0.000
NOIS	0.070	0.013	5.595	0.000
NPD	0.032	0.014	2.254	0.024
RESID (NDTAX)	0.140	0.012	11.723	0.000
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Non-debt tax shield has a probability of 0.000 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (L): Results of Hasuman Test for Endogeneity for operating income-to-assets

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003	0.009	0.323	0.747
NBR	0.073	0.010	7.038	0.000
NDE	0.146	0.014	10.700	0.000
NDELTADR	0.044	0.011	3.939	0.000
NDELTAND	-0.018	0.011	-1.585	0.113
NDPR	0.161	0.018	8.997	0.000
NDRT	-0.094	0.015	-6.351	0.000
NDY	-0.487	0.019	-25.742	0.000
NECTR	-0.132	0.010	-13.238	0.000
NFATA	-0.170	0.013	-12.815	0.000
NLNINVEN	-0.030	0.010	-3.086	0.002
NNDTAX	0.145	0.012	12.209	0.000
NOIS	0.118	0.011	10.590	0.000
NPD	0.019	0.014	1.359	0.174
RESID (OIA)	0.030	0.014	2.182	0.029
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Operating income-to-assets has a probability of 0.029 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (M): Results of Hasuman Test for Endogeneity for operating income-to-sales

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002	0.009	0.254	0.799
NBR	0.068	0.010	6.681	0.000
NDE	0.175	0.013	13.022	0.000
NDELTADR	0.045	0.011	4.031	0.000
NDELTAND	-0.014	0.011	-1.174	0.240
NDPR	0.145	0.018	8.166	0.000
NDRT	-0.124	0.014	-8.620	0.000
NDY	-0.440	0.019	-23.626	0.000
NECTR	-0.148	0.010	-14.726	0.000
NFATA	-0.139	0.013	-10.454	0.000
NLNINVEN	-0.067	0.009	-7.170	0.000
NNDTAX	0.120	0.012	10.384	0.000
NOIA	0.089	0.012	7.458	0.000
NPD	0.022	0.014	1.542	0.123
RESID (OIS)	0.101	0.013	7.819	0.000
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Operating income-to-sales has a probability of 0.000 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (N): Results of Hasuman Test for Endogeneity for Probability of Default

Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004	0.009	0.472	0.637
NBR	0.078	0.010	7.663	0.000
NDE	0.157	0.014	11.169	0.000
NDELTADR	0.044	0.011	3.913	0.000
NDELTAND	-0.015	0.011	-1.332	0.183
NDPR	0.153	0.018	8.717	0.000
NDRT	-0.091	0.014	-6.383	0.000
NDY	-0.478	0.019	-24.790	0.000
NECTR	-0.136	0.010	-13.203	0.000
NFATA	-0.161	0.014	-11.830	0.000
NLNINVEN	-0.037	0.010	-3.562	0.000
NNDTAX	0.141	0.012	11.816	0.000
NOIA	0.026	0.013	1.937	0.053
NOIS	0.100	0.013	7.784	0.000
RESID (PD)	0.024	0.014	1.727	0.084
R-squared	0.233	Mean dependent variable		0.000
Adjusted R-squared	0.232	S.D. dependent variable		0.998
S.E. of regression	0.875	Akaike info criterion		2.572
Sum squared resid	7903.200	Schwarz criterion		2.582
Log likelihood	-13284.730	Hannan-Quinn criterion		2.575
F-statistic	224.720	Durbin-Watson stat		0.281
Prob(F-statistic)	0.000			

Note:

The Residual of Probability of default has a probability of 0.084 which shows that this variable suffers from endogeneity and needs an Instrumental Variable (IV)

Table (O): Results of Hasuman Test for Endogeneity for lagged sales growth

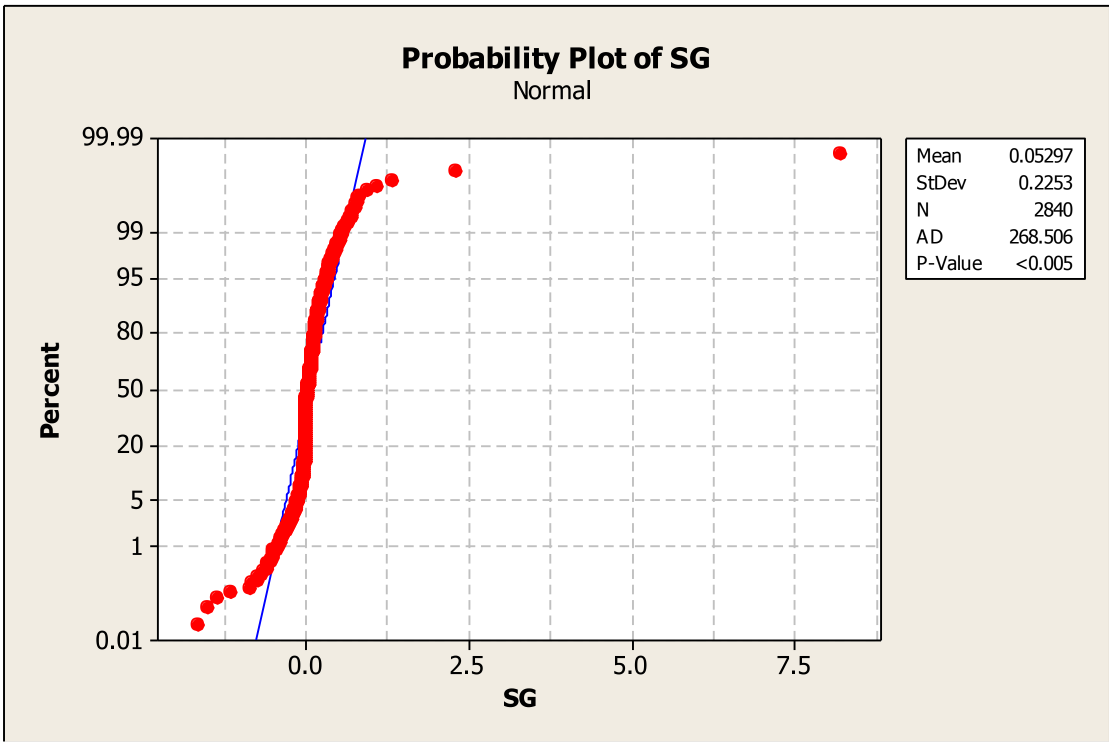
Variable (n=10,343)	Coefficient	Std. Error	t-Statistic	Prob.
C	0.215	0.014	15.756	0.000
NBR	0.000	0.000	0.767	0.443
NDE	0.000	0.000	-1.153	0.249
NDELTADR	0.000	0.000	0.785	0.433
NDELTAND	-3.572	0.331	-10.787	0.000
NDPR	590.986	56.718	10.420	0.000
NDRT	0.000	0.000	0.237	0.812
NDY	0.000	0.000	0.283	0.777
NECTR	0.103	0.003	35.060	0.000
NFATA	-0.099	0.003	-34.461	0.000
NLNINVEN	-12.926	1.248	-10.353	0.000
NNDTAX	0.000	0.000	0.466	0.641
NOIA	0.000	0.000	-0.278	0.781
NOIS	-0.002	0.001	-3.899	0.000
RESID (lagged sales growth)	0.000	0.000	-8.133	0.000
R-squared	0.878	Mean dependent variable		0.106
Adjusted R-squared	0.878	S.D. dependent variable		1.031
S.E. of regression	0.360	Akaike info criterion		0.796
Sum squared resid	1337.693	Schwarz criterion		0.810
Log likelihood	-4098.589	Hannan-Quinn criterion		0.801
F-statistic	3920.773	Durbin-Watson stat		1.985
Prob(F-statistic)	0.000			

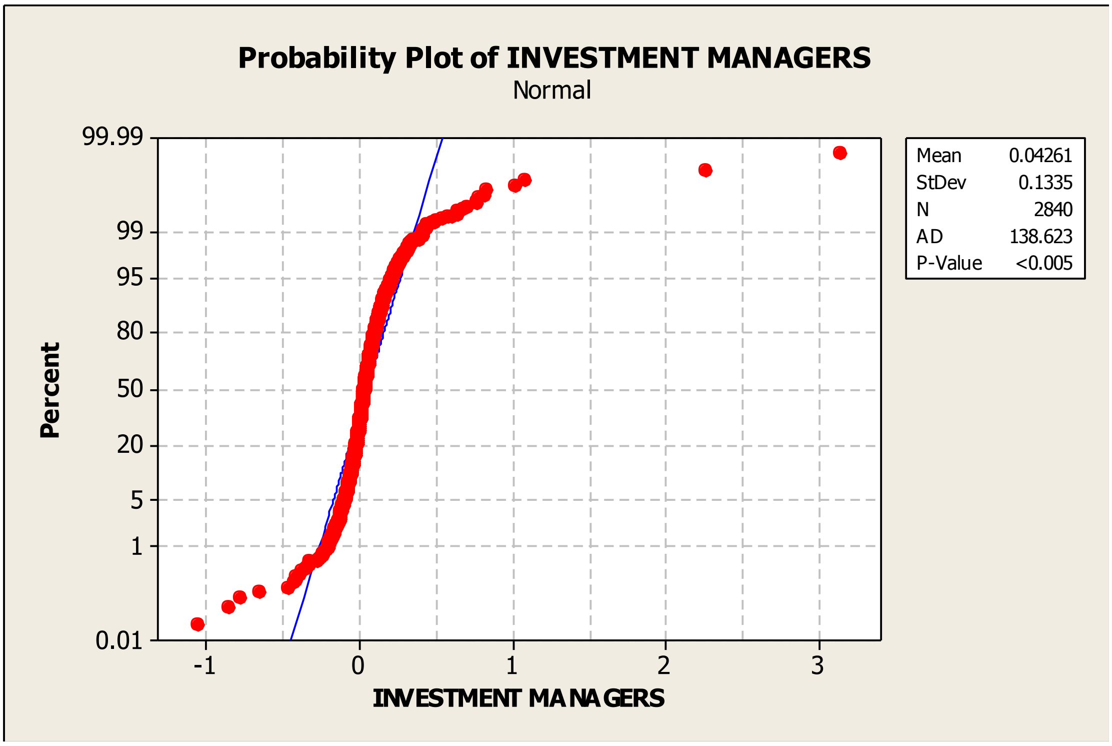
Note:

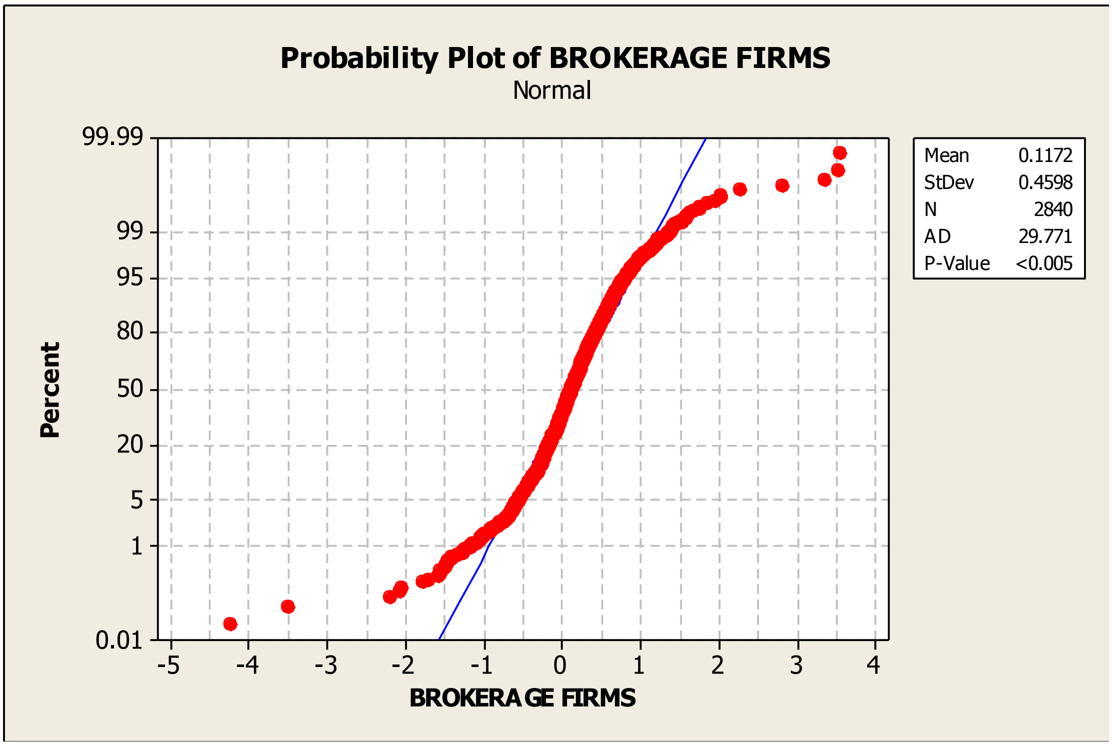
The Residual of lagged sales growth has a probability of 0.000 which shows that this variable suffers from endogeneity which is verified since the Dependent variable is sales growth.

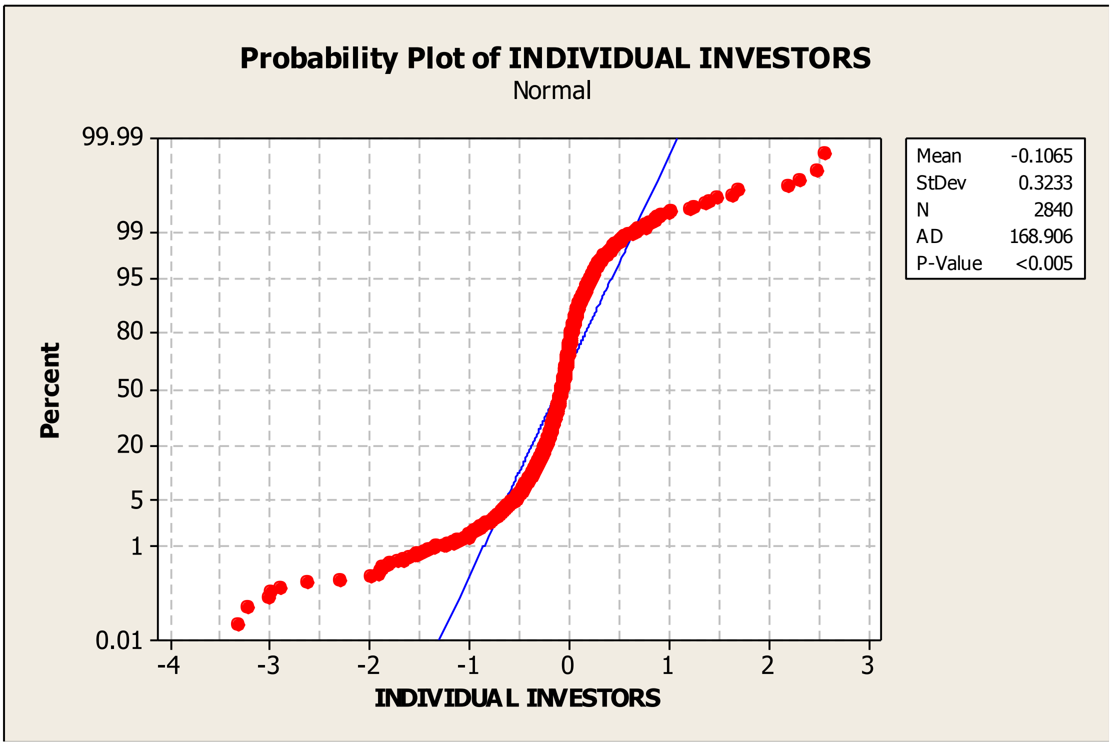
Appendix 3

Normality testing for ownership variables






Probability Plot of BROKERAGE FIRMS
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-5
-4
-3
-2
-1
0
1
2
3
4
BROKERAGE FIRMS
Mean 0.1172
StDev 0.4598
N 2840
AD 29.771
P-Value <0.005


Probability Plot of INDIVIDUAL INVESTORS
Normal
Percent
99.99
99
95
80
50
20
5
1
0.01
-4
-3
-2
-1
0
1
2
3
INDIVIDUAL INVESTORS
Mean -0.1065
StDev 0.3233
N 2840
AD 168.906
P-Value <0.005