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The effect of capital structure on financial Performance: Ethiopia's Metal and Engineering Industry

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Declaration

I, Abnet Melese Weldehana, hereby declare that the thesis work entitled “The effect of capital structure on financial performance: Ethiopia’s Metal and Engineering Industry” submitted by me for the award of the degree of Master of Accounting and Finance of Addis Ababa University at Addis Ababa Ethiopia, is original work and it hasn’t been presented for the award of any other Degree, Diploma, Fellowship or other similar titles of any other university or institution.

Place: *Addis Ababa* Signature: _____

Date: November, 2013 Name: Abnet Melese

CERTIFICATION

I certify that the thesis work entitled “The effect of capital structure on financial performance: Ethiopia’s Metal and Engineering Industry” is a genuine work of Ato Abnet Melese who carried out the research under my guidance. Certified further, that to the best of my knowledge the work reported herein doesn’t form part of any other thesis report or dissertation on the bases of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Place: *Addis Ababa* Signature:_____

Date**:** November, 2013 Ato Abebe Yitayew (Asst. Professor)

Department of Accounting & Finance

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School of Graduate Studies

This is to certify that the thesis prepared by Abnet Melese, entitled “The effect of capital structure on financial performance: Ethiopia’s Metal and Engineering Industry” for the award of the degree of Master of Accounting and Finance in Addis Ababa University at Addis Ababa Ethiopia, is original work and it hasn’t been presented for the award of any other Degree, Diploma, Fellowship or other similar titles of any other university or institution.

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Advisor	**Signature**	**Date**

Abstract

In Ethiopia, recently there are few capital structure studies that focused on determining firm specific and macro economic factors responsible to affect capital structure decision; in these studies researchers include either profitability or performance of companies to understand whether it had an effect on capital structure selection but they ignored the reverse effect of capital structure on financial performance of companies. To understand this reverse effect this thesis analyzes the effects of capital structure and debt maturity choice on financial performance using audited financial statements collected from each 10 sampled companies of Ethiopia's Metal and Engineering Industry for the time span of six years (2007 to 2012). The multivariate OLS regression result of the study indicates capital structure has a significant and positive effect on financial performance (measured by return on equity) of the Metal and Engineering Industry companies as it is measured by debt ratio; furthermore, short term debt ratio has significant whereas long term debt ratio has insignificant but both positive effect as the study examined if different level maturity of debt has a different effect on financial performance. Thus, the study concluded that data from Ethiopia's metal and engineering industry companies support Trade-off theories and despite to their significances no different effect in direction on financial performance was found caused by levels of debt maturity. On the other hand, asset tangibility as a controllable variable was found to have a significant and negative whereas company size and asset turnover were not. Finally, the study recommended that companies in Metal and Engineering industry should employ more debt in to their capital structure; however, the industry companies should give a through consideration to determine the optimal point to which they exhaustively take the benefits of debt; otherwise they will be exposed to bankruptcy risk due to excessive utilization of debt.

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Chapter One

1. Introduction

1.1. Back ground of the study

The choice of fund sources to finance an organization's operation and investment activities is one of the major activities organization managers have to decide. This decision of managers in financing their firm's operation and investment could involve; issuance of debt, raising of new capital through issuance of additional shares of equity, or retaining of capital from earnings generated from operations; and selection from among them largely depend on the effect they have on the organizations' performance.

The issue of capital structure, mix of debt and equity, decision has begun first in the literature was in 1958 when Professor Franco Modigliani and Merton Miller published their Article on the relationship between capital structure and firms' value (hereafter MM theorem). In this earlier study, the authors concluded that under very restrictive assumptions of perfect capital market, investors' homogeneous expectations, tax free economy and no transaction costs, capital structure is irrelevant for organization's performance. This is because, the increasing benefit from cheaper debt could exactly offset by increasing financial risk; hence the effect on performance is constant. Back to then, a debate intensified on the result of MM theorem and many researchers engaged in the area;

as a result of these, various attempt and theories developed on relation between capital structure decision and performance.

Again, in 1963 Modigliani and Miller took the pioneer to study this relationship by admitting an existence of corporate tax in their analysis and they found organization could be benefited from the cheaper debt than it costs for financial risk so that better to finance an organization by debt as much as possible. Whereas Jensen and Meckling (1976) in their Agency cost model suggest that there is an optimal capital structure which leads the organization to have a better performance and it requires maintaining this optimal position. The determination of this position will involve the tradeoff among the effects of corporate and personal taxes, bankruptcy costs and agency costs. The other important theory was the Pecking order theory by Myers and Majluf (1984) which states no optimal capital structure for an organization exist rather there is a hierarchy preferences with respect to the financing of their investments. This resulted from existence of asymmetric information between the managers and investors.

Beside the theoretical development, many researchers conduct an empirical study to examine the effect of capital structure on firms' performance. And their results indicate there is a relationship between capital structure and financial performance. Though many researches done in the area, most of them conducted in developed countries where capital markets are well developed or in transitional countries markets are emerged in which the companies have greater opportunity to raise new capital easily from these markets and enables them to maintain or restructure their capital structure, results also shows an effect

on performance. But in countries where the case is different, less or no money market and capital market is well established, like Ethiopia, less effort is exerted to study the effect. Additionally, from few researches conducted in the country most of them focused on determinants of capital structure based on data from financial institutions taking the total debt level for the measurement of capital structure. The purpose of this study is to look in to the effect of capital structure on Ethiopia Metal and Engineering industry companies' financial performance by capturing different debt level and fill the knowledge gap.

1.2. Statements of the problem

An issue of financing a business operation and investment is the utmost consideration given from the time of its initial establishment to the entire life of the business. In raising the fund for use, business managers encounter different sources to choose. A source can be a fund raised from owners of the business (or stockholders) as equity and on the other hand they have an option to use debt through issuance of debt securities or borrowing loan extended by financial institutions. Yet the extent at what quantity firms should use debt in their financing of assets is left to business managers to decide.

The choice to the mix of debt and equity in capital structure has been investigated in theory and empirical evidences have been found as to the existence of relationship between capital structure and firm's performance Modigliani and Miller (1963), Myers and Majluf (1984), Rajan and Zingales (1995), Sunder and Myers (1999), Abor (2005), Luper and Isaac (2012), Daniel (2011) Weldemikael (2012) and others. Their relationship theoretically begins from the incentives debt has a tax advantage over equity since interest

payment is tax deductible (Modigliani and Miller, 1963) but not dividends distributed to owners. This tax benefit the debt brings to business firms motivate managers to employ more debt in their financing and such dependency on debt after some extent can cause the business to be risky. Consequently, owners of the business, whom they have residual claim over the assets, demands high required rate of return for additional risk they bear; as a result, an effort for raising new capital will be more expensive and leads the overall cost of financing to be high then finally it forced the firms' value to decrease.

The results found from empirical studies show a mixed result both a positive effect Berger (2002), A. Chowdhury and S.P. Chowdhury (2010), Ahmed et al. (2012), Abiodun (2012), Abu-rub (2012); and also a negative effect Chin Ai Fu (1997), Frank and Goyal (2007), Memon et al. (2010), Adekunle and Sunday (2010), Pratheepkanth (2011) and Keshtkar, Valpour and Javanmard (2012) on firms' performance. Moreover, these studies largely used a total debt level as a measure for capital structure but the level of debt is important in determining the financial performance. For example R. Zeitun and Tian (2007, p.59) found that short term debt is significantly and positively related to financial performance despite long term and total debt negatively related to performance. Further, even though several studies conducted in this area, most of them done in countries there are more developed or emerged money and capital market existed. In these countries companies have an opportunity to adjust their capital structure by generating new capital easily through issuance of new shares and/or new debt securities from the market. But in countries where there is less developed or no capital market established; such as Ethiopia, business organization faced difficulty to raise new capital other than from restricted line of credit

extended from depository institution which challenges managers to maintain their capital structure; besides, there are few researches conducted in this area in Ethiopia which largely focused on determinants of capital structure Daniel (2011), Weldemikael (2012) and others. Therefore, this situation creates a greater interest to the researcher and encouraged him to study the effect of capital structure on Ethiopia's Metal and Engineering industry companies' financial performance.

1.3. Objectives of the study

The main essence of the study is to examine the effect capital structure has on financial performance in Ethiopia's metal and engineering industry companies. There by test for capital structure theories explained by the data from the companies. Further, the researcher attempts to achieve the following specific objectives;

- Determine the extent Ethiopia's metal and engineering industry companies relied on debt;
- Examine the effect of different maturity level of debt on financial performance;
- Investigate company size's, asset tangibility's and asset turnover's impact on financial performance;
- Determining which giant capital structure theory supported in Ethiopia's metal and engineering industry;

1.4. Significance of the study

Although numerous studies conducted in developed and recently in developing nations in the area of capital structure, there are few studies done in Ethiopia. Despite these few

studies, to the extent of the researcher knowledge no single study was conducted to examine the effect of capital structure on financial performance in which debt maturity choice is considered rather those few studies almost all of them are focused on determining factors of capital structure. Therefore, this thesis shade a new light for Ethiopian capital structure studies and the importance of giving a thorough thought for different maturity level of debt in studies of capital structure. Furthermore, currently Ethiopia is struggling in achieving the Growth and Transformation Plan by the year 2014/15. Under this plan, the metal and engineering industry, for which no study conducted previously, is among the eight priority sectors for medium and large scale developments in the plan but faces various challenges including lack of loan by companies from banks. Thus, this thesis would provide the essence of debt in financing operations of the industry in relation to its effect on their performance to the responsible bodies so that it contributes its own part on achieving the Growth and Transformation Plan. Finally, the result of this study could be used as an input for interested researchers in the field to understand how important is the reverse effect of capital structure on financial performance and the maturity level of debt to capital structure studies.

1.5. Scope and limitation of the study

It is believed that financial performance have different factors to be determined with, but this thesis used only capital structure and three control variables since its objective is mainly focused on the effect of capital structure towards companies performance. The thesis is also restricted to companies in Ethiopia's Metal and Engineering industry

particularly those operating in Addis Ababa City Administration and in Finfine Special Oromia Zone and whose life span are more than six years. Audited financial statements (balance sheet and profit and loss statements) are collected from sampled companies but some challenges encountered during the collection in that some companies were not willing to provide statements due to confidentiality questions so that the researcher was forced to change this companies with others. Besides, by the reason that no capital market is established in the country, computing market value of variables is impossible. As a result, the researcher conducts the study using book value of variables.

1.6. Organization of the Paper

The study has five chapters. The first chapter is the introduction of the thesis and it gives information on the background of the study, statement of the problem, objectives, research significance, scope and limitation of the study. The second chapter contains extensive literature review both in theoretical and empirical studies. In the third chapter, the research methodology adopted for the study is discussed. The fourth chapter devoted to the empirical results of the study and its discussion and the last chapter presents the conclusion of the thesis and the recommendation forwarded to responsible bodies.

Chapter Two

2. Review of Literature

This chapter is organized in a way that the first section presents the review of theoretical studies in which major arguments of capital structure theories; like trade-off theories and pecking order theory are described in more detail. Then various empirical results from developed, transition and developing nations including Ethiopia are summarized and studies which consider maturity level of debt also reviewed for this study in the second section. Finally, the overview of Ethiopia's metal and engineering presented

2.1. Theoretical review of literature

Prior to Modigliani and Miller theorem (1958), conventional perspectives believed that using financial leverage increases company's value. Accordingly, there is optimized capital structure that minimizes capital cost (Gupta, Srivastava and Sharma, 2011). This first view of capital structure is usually called the traditional approach. And it is largely relies on a number of simplifying assumption that do not exist in reality. Some of them are; no tax exist, companies have only two choice to finance either through perpetual of debt or ordinary equity shares, no earnings and dividend payment growth and also the business risk associated with company unchanged overtime . Considering these assumptions, traditional approach arrived at a conclusion that companies should use the combination of

debt and equity finance that minimizes its overall cost of capital in order to maximize the wealth of its shareholders. (Denzil and Antony 2007, p.264)

However, by the year 1958 Modigliani and Miller affirm that, in consideration of perfect capital market the capital structure does not have influence on the market value of the company rather the benefit of using debts will compensate by the decrease of companies stock. As a result, they argued in the efficient market the debt-equity choice is irrelevant to the value of the firm, known latter as irrelevance theory (Gupta et al. 2011). In supporting of their argument, they stated also the market value of a company depends on its expected performance and commercial risk so that the market value of a company and its cost of capital are independent. But they came to this conclusion based on the assumption outlined in traditional approach and extra assumption of capital markets was perfect which was central to their model. (Denzil and Antony 2007, p. 264)

Five years later from their prior paper, Modigliani and Miller (1963) reviewed their position and incorporated the corporate taxes benefits of the debt. From then on, it is considered that the cost of debt would be smaller than equity, because the government would be indirectly subsidizing the expenses with interests (Carvaliho and Edison, 2007).

Therefore, they argued that due to tax deductibility of interest payments the appropriate capital structure for a firm is composed entirely of debt (Modigliani &Miller, 1963) since firm value will increase with higher financial leverage (Gupta et.al 2011); however, the increasing debt results in an increased probability of bankruptcy to occur. Hence, the

optimal capital structure reached when the marginal cost of bankruptcy is equal to be marginal benefit from tax sheltering provided by the increase debt ratio (Boodhoo, 2009).

Further Miller (1977), extends the 1963 model by integrating the effect of personal taxes in to their model. This Miller's complex model considers the relationship between equity available for investors to invest in. According to his model, the higher interest rate on debt borrowed will cancel out the tax benefits of the additional debt, leaving the average cost of capital unchanged. As with their first model the Miller's model also did not take bankruptcy cost into account. Consequently, the result was similar to their first model (Denzil and Antony, 2007 P. 270).

Following the path-breaking work of Modigliani and Miller (1958, 1963) on capital structure, the following conflicting theories of capital structure have been developed: Trade-off (static trade-off theory and agency cost theory) and pecking order.

2.1.1. Trade-off Theory

Trade off-theory assumes that there are benefits and costs associated with the use of debt as against equity and firms thus chose an optimal capital structure that trades off the marginal benefits and costs of debt. In the beginning, the theory was limited to the tradeoff between the tax advantages of debt against the bankruptcy costs. Then it was extended to include benefits and costs associated with the use of debt in mitigating the conflicts among the agent groups associated firm (i.e. managers, equity-holders and debt-holders). Both dimension of the theory discussed in the following two sections.

2.1.1.1. Static Trade-off theory

The original version of the trade-off theory grew out of the debate over the Modigliani-Miller theorem. A corporate income tax which was added to their original irrelevance proposition (Modigliani and Miller, 1963) created a benefit for debt in that it served to shield earnings from taxes. As per their proposition there is no offsetting cost of debt, implying a 100% debt financing. This benefit resulted from the reality in which debt has tax advantage to a company since interest payments reduce the firm's taxable income while dividends and share repurchase do not (J. Lewellen and K. Lewellen, 2006).

As a result of such advantage of debt brings to company, shareholders could have a powerful incentive to increase leverage and let companies to perform well. However, excessive dependant on debt opens a possibility for defaults on debts and exposed to bankruptcy costs or financial distress. These costs could be direct in a form of legal and administrative costs during the process of bankruptcy or indirect in a form of loss of profit as a result of unwillingness the stakeholders would be to do business with them. Consequently, to avoid this risk of bankruptcy companies should try to maintain an optimum mix of debt and equity where the marginal benefits of debt equals with the marginal cost of debt. Therefore, in the trade-off theory, as Scott's (1977) claims a company's optimal debt ratio could be determined by a trade-off between advantages of including debt in their capital structure (tax deductibility of interest payments) and its disadvantage (costs of bankruptcy). In other word, companies are expected to realize a positive relationship between financing through debt up to a certain level with performance since companies have a tax advantage. However, if companies keep on raising debt beyond

the optimum level, the advantage of tax eventually disappears and would most likely makes companies to go bankrupt; as a result the inverse relationship will be observed.

2.1.1.2. Agency Cost Theory

The agency theory was initially developed by Berle and Means (1932) who argued that due to a continuous dilution of equity ownership of large corporation; ownership and control become more and more separated (cited in Boodho,2009). Their argument has contributed its part to the capital structure decision, till Jensen and Meckling (1976,) wrote their paper titled "Theory of the firm: managerial behavior, agency cost and ownership structure."

In their paper, Jensen and Meckling (1976, pp.310) define Agency relationship;

Agency relationship is a contract under which one or more persons (the principal[s]) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent.

Based on this definition and reality, Principals (here there on shareholders) are the owners of a company, and the task of its Agents (here there on directors or managements) are merely to ensure that shareholders' interest maximized or run the company in a way which maximizes long term return of shareholders and company's profit and cash flow.

However, Jensen and Meckling (1976) observed that managers do not always run a company to maximize shareholders' wealth since their interest is never exactly the same as shareholders. For instance, it is obvious managers hold the entire residual claim but they do not capture the entire gain from their profit-enhancing activities but bear costs (Harris

and Raviv, 1990). This result in managers to exert insufficient work effort, indulging in perquisites, choosing input or output that suit their own preference or otherwise failing to maximize company's value. Additionally, the management who is the decision making body, tends always to pursue its own interest instead of those of the shareholders in a way that managers tend to spend the free cash flow available to fulfill their need for self-aggrandizement and prestige rather than returning it back to shareholders (Jensen and Ruback, 1983).

An attempt to resolve such agency problem is generally impossible for the shareholders or management at zero cost to ensure that the management will make optimal decision from shareholders' viewpoint (Jensen and Meckling, 1976). Thus, to minimize such conflict of interest, in most agency relationships shareholders limit divergences from their interest by establishing appropriate incentives for managers and by incurring monitoring cost designed to limit the aberrant activities of the managers; further in some situations it will pay the management to expend resources (bonding cost) to guarantee that they will not take certain actions which would harm the shareholders or to ensure that shareholders will be compensated if management take such actions. However, it should not be overlooked that these costs will be higher when ever shareholders want to make sure the manager acts in their interest and to control their decisions more.

In an effort to mitigate these agency costs and free cash problem, Jensen (1986) put two ways. One way of limiting such problem is to pay out a larger fraction of corporate earnings as dividends and the other one is debt financing, which is the concern of this

Thesis. According to Ahmed, Abdullah and Roslan (2012), use of debt as capital can be seen as a disciplinary tool to control agency cost. This is occurring since leverage will force managers to generate and pay out cash, simply because an interest and compulsory payment reduces the amount of remaining cash flows. Similarly, Gupta et al. (2011) supported in that in companies that have high cash flow and profitability, increasing of debts can be used as a tool of reducing the scope of the managers until resources of company may not be waste as a result of their individual purpose. On the other hand, managers that are not able to meet debt obligations can easily and promptly be displaced in favor of new managers that can do better to stakeholders interests. Consequently, managers will be forced to focus only on those activities necessary to ensure that the financial obligation of the company are met and to invest on profitable ventures which ultimately enhance the financial performance of the company (Boodho, 2009)

Despite all the above advantages that utilization of debt brings to the company, it will also be a cause for another conflict of interest to arise and the companies to be exposed to other problems such as cost of debt, bankruptcy and related costs as mentioned in previous section. This other conflict of interest is between the shareholders and creditors, since they have their own claim on the company. Such a conflict occurred commonly when managers being part of the shareholders, tend to collaborate with equity-holders, thus if the firm is approaching financial distress, equity holders may encourage managers to pass decisions, which in effect, extract wealth from debt holders to equity holders (Burferenal et.al, 2005, cited in Daniel 2011). Likely, Jensen and Meckling (1976) in their paper also argued that the shareholders-lenders conflict has the effect of shifting risk from shareholders and

appropriating wealth in their favor as they take on risky investment projects. Hence, shareholders, and managers as agent, are prompted to take on more borrowing to finance risky projects. Lenders receive interest and principal if project succeed, and shareholders appropriate the residual income; however, it is the lender who incurs the loss if the project fails since shareholders provoke the limited liability status.

As a counter action to this shareholders activity, sophisticated lenders tend to monitor the company's behavior. Consequently, costly monitoring devices will be included in to debt agreements, thereby increasing the cost of capital offered to the company. Thus, company with relatively higher agency costs tends to maintain lower level of debt. However, the agency problem can be mitigated if the debt is secured with collateralizable tangible assets (Daniel, 2011).

In addition to the monitoring action taken by debt holders, the level of debt borrowed by the company also limited by increasing cost of capital and other cost; cash problem which increases the likelihood of bankruptcy and its related cost (Boodhoo, 2009) and also forced the company to forgone or decrease the opportunity of profitable investment (Gupta et.al, 2011).

To conclude, the inclusion of debt in a capital structure reduce the agency cost incurred by shareholder which in turn to enhance the company's performance by forcing management to focus on profitable investment. However, the increasing use of debt after a certain level of debt will be limited by a monitoring action taken by debt holders and by problems related to cost of capital; cash problems, a cause for bankruptcy, and an opportunity cost to

forgone profitable investment. Therefore, a testable prediction of this model is that increasing the leverage ratio should result in lower agency costs of equity and improved company financial performance all else equal held. But, when leverage becomes relatively high, further increases generate agency cost of debt arising from conflicts between debt holders and shareholders. Finally, optimal capital structure obtained by trading off the agency cost of debt against the benefit of debt.

2.1.2. Pecking order theory

The pecking order theory was initiated by the work of Myers (1984), and Myers and Majluf (1984). This theory states that due to asymmetric information occur in between managements (insiders) and investors (outsiders) in which there are situations management would have more information about companies' value and investment opportunities whereas investors might not. In such occasion if management will go for future investment opportunities through issuance of new shares of equity, rational investors might considers the management actions as if it is because of management perception that the market overvalued their stock and as if they are trying to take advantage of it; so that, investors would under price the stock then it will dilute value and control from existing shareholders to the new one, some time the dilution from issuance of new shares may be beyond the benefits of the new project. As a result, as a way to avoid such dilution of value, management could pass over positive net present value investment opportunities or they will try to use another financing arrangement.

This alternative financing arrangement as per pecking order theory is that management will finance the new project in a way as follows; management will go first for internal fund to finance its project. Internal fund consists of retained earnings and excess liquid assets chosen in favor of other resources since it prevents dilution of control and value, keeps from any transactional costs and most importantly to deal with asymmetric information. Then if internal sources exhausted and found necessary to use external financing, the management will address their finance deficit using safest debt then to risky one and finally, as a last resort, they could use new issuance of equity shares.

To conclude the discussion with related to leverage and performance I forward some argument that profitable companies, with future investment opportunities, have the potential to build up their internal equity by retaining income from operation than those of unprofitable companies. Consequently, as pecking order theory suggest profitable companies could finance their project by using internal source of financing so that they come up with low debt level; the reverse effect also true. Therefore, leverage expected to has a negative relation with performance.

2.2. Review of empirical studies

Similar to the theoretical results of the issue different results have been found in the empirical researches of this field. These differences clearly shown between the researches held in developed nations who have well established markets, in which companies could gain an efficient access to raise capital, and in developing nations where their markets are emerged or not developed enough for capital access and as well for restructuring their

capital composition. Furthermore, the residing difference not only restricted to the market situation of respected countries but also observed within same level of market situations as researches indicated both the direct and inverse relation between the capital structure and financial performance had.

In this section of the literature review, the researcher tried to show researches conducted in developed countries with a highlight comparison to those done on developing ones and further tried to depict the mixed results found in different researches. Then, the review goes to studies which used different levels of debt as a measure for the capital structure to see their impact on performance. Finally, it will end up by summaries of researches on the study area from Ethiopia.

2.2.1. Empirical review from developed nations

Despite there are enormous researches done using data from developed countries available, the researcher use only seven of them which are considered enough to create awareness for the audiences. Besides, from among these seven researches the first two are cross sectional (data taken from different countries) and the remaining done within individual country.

The first among well known and referenced researches conducted from developed nations is the paper done by Rajan and Zingales (1995) which entitled “What do we know about Capital structure?” This study investigated determinants of capital structure choice using data from public firms in the major industrialized countries named as G-7 (United States[USA], Japan, Germany, France, Italy, United Kingdom[UK] and Canada) with an objective to examine whether capital structure outside USA is related to factors similar to

those appearing to influence the capital structure of USA firms. In this study the researchers took "Profitability" as one factors to see its relation with capital structure; accordingly they have found that profitability is negatively correlated with capital structure in US, Japan, Italy and Canada, while in the UK it is more positively correlated, since the dominant source of external finance in UK is equity. Whereas, there are no relationship found in Germany and France. As their result clearly indicated the relationship between capital structure and profitability a substitute for performance vary among countries of developed countries.

The other well known paper similar with the former is the study undertaken by Chen and Hammes (2003) which used data from seven OECD countries (specifically US, UK, Canada, Denmark, Italy, Sweden and Germany) to analyze factors influencing firm's leverage. Similar to the Rajan and Zingales they took profitability as one factor of leverage; however, they have found a negative relation in all countries with a strong relation in Denmark and Sweden whereas a weak relation in US and Germany. As a result they concluded high performer companies exhibit lower debt.

Beyond the cross sectional researches, there are efforts to study by taking from a single countries. For instance an empirical research on Swiss companies to examine determinants of capital structure using a panel data from 106 companies for the period of ten years indicated profitability to be negatively related with leverage (Gaud et.al, 2003). Similarly a study by Reimoo (2008) on UK's 173 non-financial listed companies for a period of ten years from 1998 to 2007 also revealed same result which indicates a negative association

in between profitability and leverage. Han-suck song's (2009) study on the Swedish 6000 companies for nine year time span arrived at the same conclusion with above researchers. Above all, these researches reach to the conclusion that the relation between capital structure and performance supports the pecking order theory of capital structure.

Although all the above studies on data from developed countries shows a negative relation in between the two variables, the mixed result found in the two studies of Frank and Goyal (in the year 2007 and 2009) draw some attention. Their former research which titled as "capital structure decisions; which factor are reliably important?" examined the relative importance of many factors in the leverage decisions of publicly traded American firm for over half century using data from U.S firms on compustat CRSP revealed a negative correlation between the two variables (profitability and leverage). However, on their latter research named "profits and capital structure ", they argued towards the wrong impression about Trade of theory held by other authors because of the difference in its theoretical and empirical results. As a result they tried to support their argument by taking data from the US compustat CRSP then they have found that more profitable firms tend to issue more debt and repurchase equity or in other words less profitable firms tend to do the reverse which in short a positive relation between them.

As a summary, it is obvious that researches gave much favor to a result of negative relation and pecking order theory as it is tried to describe above but it couldn't be conclusive to say the two variables to have a complete inverse relation since there could be moments they too have direct relation as seen in the works of Frank and Goyal.

2.2.2. Empirical review from transitional and developing nations

In similar way studies from the developing nations also have similar features with that of developed nations despite their level of development. These studies mostly favored the inverse relationship of the studied variables. To support this idea with some researches we can observe beginning from the cross-country study conducted by Booth et al. (2001). They examined the financial structures of firms by a sample of ten developing countries particularly India, Pakistan, Thailand, Malaysia, Turkey, Zimbabwe, Mexico, Brazil, Jordan and Korea. They primarily focused on answering a question "Do corporate leverage decision differ significantly between developing and developed countries?" As their finding indicated no significant difference as per the decision was found but they have found profitability to have a significant and negative relation with leverage decision except for Zimbabwe. Moreover, their consistent result in both the countries and pooled data is that the more profitable the firm, the lower the debt level regardless of how it is measured. As a result, their finding is consistent with pecking order hypothesis which suggest there is an existence of significant information asymmetries and also gave a hint for costly external financing to be avoided by firms. The study by Bauer (2004) on Czech Republic firms also revealed a negative correlation between leverage and performance supporting pecking order theory as their part of examining determinants of capital structure.

Additionally, several studies seeking to knew whether capital structure has an impact on performance also reaches to the same conclusion. Among them, a study evidenced from

100 firms in national stock exchange of India (Gupta et al. 2011), study evidenced from 77 non-financial Bangladesh's four most leading sector firms (Chowdhury and Chowdhury, 2010), study evidenced from 30 listed companies traded in Colombo stock exchange Sri Lanka (Pratheepkanth, 2011), and studies evidenced from non-financial firms listed on the Nigerian stock exchange by Adenkule and Sunday(2010), and by Ossuji and Odita (2012) stating firms' capital structure has a negative impact on financial performance; in other word companies that have good performance would likely to have low debt.

However, a study on 40 Mauritanian listed firms differ slightly from above studies as the result shows firm's performance tends to be negatively related to a certain range of leverage. But beyond this range the benefit from the tax deductibility of interest expense derived from an increase in the debt ratio to be more than offset by the increase in cost related to financial distress and bankruptcy; therefore it will have a direct relation (Boodho, 2009). Lastly, in contrast to all studies discussed previously, Abu Rub (2011) has found a positive correlation between firm performance and capital structure for 28 listed companies in Palestine stock exchange.

2.2.3. Empirical review on studies using Debt Maturity level

Once finalizing the review of studies to highlight a comparison between the developed and developing nations in prior section, the researcher is interested to look at what will be the relation different maturity level of debt has with financial performance from prior research findings if any deviation could be observed unlike the total debt value. As the researcher tried to review some empirical studies which use different maturity level of debt as a

measure of leverage, there are differences in results as to their relationship with performance. To strengthen this argument the researcher discussed and presented review of research findings below.

When start the broad discussion, I found the study entitled "Determinants of capital structure in developing countries". This paper investigated the capital structure decision of firms in developing countries using firm level survey data for 25 countries of 11,125 firms from five regions: Africa, East Asia and Pacific, Latin America and Caribbean, Middle East and North Africa and South Asia with main focus on small and private firms. In this cross countries study, the researchers tried to look the relationship between debt maturity levels with performance on different categories of firms (small, medium and large) and among private and public companies. Their result shows, total debt and long term debt have a significant and negative relationship with performance on small, medium and large firms; whereas, short term debt has insignificant and negative relation on small and large firms but not for medium firms. On the other hand, all of them have been found to have insignificant relationship with performance however all are significant and negative on private firms (Bas et.al, 2009). From this cross-country study we can understand there are situations as to which maturity level of debt should not be overlooked while studying the effect of capital structure on performance.

Similar to the cross-country study discussed above, there are findings from single countries which suggest the same. For instance, one study on 70 Brazilian companies by Carvalho and Edson (2007) tried to examine the influence of capital structure regarding the factor

profitability; under which they have tried to verify the relationship among the rates of return (measures of performance) related to the composition of capital: short term debt, long term debt and equity. Their finding revealed an inverse relationship with long term financing but a direct relation for short term financing which indicates maturity level of debt to be borrowed has its own part in determining performances of companies. The other study by Ahmed et.al (2012) also examined the capital structure effects on 58 Malaysians' consumer and industrial sector listed companies in which they differentiated the short term debt, long term debt and total debt effects considering they will have different risk and return profiles, and to observe how the change in debt level affect firms' performance. Unlike Carvalho and Edson, they found long term debt to have a significant and positive relation with return on assets (ROA), but short term debt has a significant and negative relation with ROA; however, both of them have an inverse relation with return on equity (ROE) of another measure of performance which magnifies consideration of maturity level is still in need. Joshua Abor (2005) also investigated the issue by taking all listed Ghanaians' firms. He finds a significant and positive relation between short term debt and profitability suggesting that profitable firms use more short-debt to finance their operation and short term debt is an important source of financing for Ghanaian firms representing 85% of total debt financing. However, long term debt is negatively correlated with profitability. Likely, Ellili and Farouk (2011), on their examination of the issue for 33 firms listed on Abu Dhabi stock exchange, find long term debt negatively correlated with profitability and positively correlated with short term debt. Following this result, they

concluded that more profitable companies may use short term debt in financing their operating activities and use the long term debts in financing their investments.

Although all the above mentioned studies put a variation in between different debt maturity level, the next two researches clearly shown it is not always the case to have various relation with performance. The first one conducted by Keshtkar et.al (2012) which entitled as "Determinants of corporate capital structure under different debt maturities; evidence from Iran" investigated factors of capital structure considering different debt maturities in that they have found performance and total debt inversely related. Additionally, it is the same for short term and long term debt as total level. The second one evidenced from manufacturing companies of Nigeria and reached to the conclusion capital structure and performance is insignificantly and negatively correlated. Moreover, all, short term, long term and total debt level are not major determinants of firms' performance (Luper and Isaac, 2012).

Therefore, as we have seen in the above discussion to one way or another, it is important to know the impact of each maturity level of debt beside the total amount and level of debt since it may have a significant impact on performance which requires a critical decision on structuring their capital mix.

2.2.4. Empirical Review from Ethiopia

As the researcher tried to configure out in the above discussion, the empirical results regarding the relationship between capital structure and financial performance are controversial. Likewise, the case seems similar in Ethiopia also, as some states there is a negative relation, some other concluded a positive relation but other claims no significant relationship found at all. However, it is better to know that all studies, to the extent of my knowledge, were focused on determining factors of capital structure rather examining the effect of capital structure on financial performance. As a result, the researcher is restricted to review these studies only since they are the only options which can provide us a hint towards their relationship.

One study evidenced from Ethiopian small scale manufacturing cooperatives by Daniel (2011) investigated the determinants of capital structure and attempt to test the validity of dominant capital structure theories to these cooperatives. For this study the researcher used 13 small scale manufacturing cooperatives for time span of five year as a sample. Using their audited financial statements for analysis, the study found an inverse correlation with profitability which supported pecking order theory though the result was insignificant. Based on his finding he concluded profitability influences firms to maintain low leverage even if it was insignificant. Another study by Netsanet (2012) examined empirically the issue by taking evidence from 11 large construction companies residing in Addis Ababa city. This study after analyzing annual financial reports of these 11 companies, found a significant and negative relationship between profitability of the large construction

companies and their level of leverage which again supported pecking order theory as Daniel concluded. Additionally, Weldemikael's (2012) research result also agreed with these previous studies as he also concluded profitability has negative relation with leverage and it supported pecking order theory by taking and analyzing financial statements of eight commercial banks of Ethiopia.

On the other side, a research evidenced from Ethiopian insurance industry contradicted with above studies in such a way that it finds a significant and positive correlation with total debt ratio and support Trade-off theory unlike the previous reviewed three studies. As a result, it rejects the hypothesis claiming profitability is inversely related with capital structure (Bayeh, 2011). Furthermore, a research conducted by Amanuel (2011) is completely different. His study used 12 manufacturing share companies of Addis Ababa city, to understand the relevance of theoretical internal (firm level) factors determining capital structure in these share companies. Based on analysis of their audited financial reports it has concluded profitability has no any statistically significant relation with total debt.

Concerning the relationship between debt maturity level and performance, I have found only two studies, Bayeh's (2011) and Amanuel's (2012) researches. By taking Long term debt leaving short term debt, Bayeh found profitability a negative relation with long term debt indicating an increase in profit would lead to decrease in leverage. Note that total debt has a positive relation with profitability as depicted above. Whereas, Amanuel used both the short term and long term debt as a measure for maturity level and he found short term

debt positively and long term debt negatively and significantly correlated with profitability unlike the insignificant relationship of total debt level.

To summarize the discussion, we can see that there is no any conclusive decision as to mixture of debt and equity in a company's capital composition in Ethiopia and as well whether to use more short term debt or long term debt financing sources within the capital restriction environment based on prior studies. Therefore, it requires additional studies to be done especially to sectors which were not covered in prior studies like the Ethiopian Metal and Engineering Industry.

CHAPTER THREE

3.Research Methodology

The objective of this thesis is to examine the effect of capital structure on financial performance using data in annual reports from 2007 to 2012. Specifically this study examined the impact different maturity level of debt has on financial performance beyond to its total level of debt. To accomplish the forgoing research, a regression model used by Osuji and Odita (2012) with a slight adjustment for control variable using Memon, Bhutto and Abbas (2010) model was adopted. The data collected were analyzed using Eviews version 7.0. A quantitative research approach under which explanatory research method is used as a need for investigation of a cause and effect relationship between variables has been taken place. Data for this study comprises only secondary data, audited financial statements particularly balance sheet, and profit and loss statement, obtained from each sampled individual companies.

The purpose of this chapter is to present the research approach, variables and hypotheses, and to briefly indicate what type of, from where, and how relevant data is collected and analyzed to achieve the study objectives. This chapter is arranged as follows. Section 3.1 presents the Research approach. This is followed by research variables and hypothesis (section 3.2), and definition of variables and their measurement (section3.3). Then the population and sample size of the study is determined in section 3.4and it identified what is the source of data and the instrument used to collect these data in section 3.5. Finally, the

last two sections present the model used for the study and the data analysis method, in section 3.6 and 3.7 respectively.

3.1. Research approach

An eligibility of research approach primarily based on objectives and purposes which the study tried to achieve and a research problem to be answered. As the researcher tried to state the objectives and problems in the introduction chapter of this thesis, the study exert effort to examine the effect of capital structure on financial performance of Ethiopia's Metal and Engineering sector along with determining which giant capital structure theory is followed. Consistent to this, the researcher found quantitative research approach appropriate. This is because quantitative approach is an inquiry that grounded in the assumption that features of social environment constitute an objective reality that is relatively constant across time and setting (Gall et al (1996) as cited in Manning and Mcmurray, 2010). When they continued further, the dominant methodology of this is to describe and explain features of this reality by collecting numerical data on observable behavior of samples and by subjecting these data to statistical analysis, which is this study required. Moreover, quantitative researches test theories deductively from existing knowledge, through developing hypothesized relationships and proposed outcome. And to arrive at this point this research approach employs a review of the existing literature to deductively develop theories and hypotheses to be tested and requires translating of the research problem to specific variables (Yesigat, 2009). As Yesigat further noted quantitative research approaches tests the theoretically established relationship between

variables using sample data with the intention of statistically generalizing for the population under investigation.

Accordingly, this study reviewed literature extensively and discussed it in the previous chapter regarding the theoretical relationship between capital structure and financial performance along with empirical studies on the area. Based on this discussion the study developed hypothesis to be tested from the residing theories and translated the research problem into variables which are measurable. In such a way the study take financial performance as dependent variable, leverage which consist the total debt level and different maturity level (short term and long term) as independent variables and lastly company size, management efficiency and asset tangibility which are found in the literature to affect financial performance taken as a control variables. Then it tested dominant capital structure theories, trade off and pecking order, to identify which theory could be supported in Ethiopia using data from 10 sampled Metal and Engineering sector's companies.

3.2. Variables and Research hypothesis

Leverage (Debt ratio):

The static trade-off theory predicts that higher level of debt usage, due to its benefits of tax deductibility of interest payments, will favor companies' performance up to a certain range where this tax advantage eventually disappear as a result of the bankruptcy risk and financial distress aroused from excessive utilization of debt (Scott, 1977). Consequently, to

avoid this risk of bankruptcy companies would try to maintain an optimum mix of debt and equity at the point the marginal benefit of debt and marginal benefit of equity equals. Accordingly, static trade off theory says there is a positive effect of inclusion of debt in capital structure on financial performance. Likewise, the agency cost theory also predicts that higher leverage is expected to lower agency costs, reduce inefficiency and thereby lead to improvement in companies' performance. Berger (2002) argues that increasing the leverage ratio should result in lower agency costs of outside equity and improve company performance, all else held constant. From this contribution, it is expected that leverage to have a positive or direct impact on financial performance.

On the other hand, pecking order theory says that due to asymmetric information occur in between insiders and outsiders, in which there are situations management would have more information about companies' value and investment opportunities whereas investors might not (Myers and Majluf, 1984). In such occasion if management will go for future investment opportunities through external financing, rational investors might consider the management actions as if it is because the management perceived the company is overvalued and as if they are trying to take advantage of it; so that, investors would under price the company. So that, to avoid such situations management could pass over good investment opportunities that would affect companies' performance unfavorably and further the management will finance their operation in the order as follows: first they will go for internal fund, if this source is exhausted and they have found external financing necessary, they will address their finance deficit using safest debt then to risky one and as a last resort they could use new issuance of equity. Therefore, unlike the previous two

theories, pecking order theory forward debt to have a negative impact on financial performance.

As is clearly shown above there is controversy in the relation between leverage and financial performance in various capital structure theories. Besides, many empirical researches done in testing for these theories to support by data from different countries. Among these many empirical researches most of them favor pecking order theory suggesting a negative relationship between the two variables. For instance, study by Booth et al. (2001), Gaud et al. (2003), Bauer (2004), Attaullah and Hjazi (2004), Han-suck song (2005), Reimoo (2008), Abor (2008), Sen and Oruc (2008), Ellili and Farouk (2011) supported pecking order theory by their data. Similarly, most studies in Ethiopia in the area also support this theory like study by Daniel (2011); Weldemikael (2012) and Netsanet (2012) are some of them. Therefore, based on this the first hypothesis to be tested regarding total level of debt stated as;

Hypothesis 1: There is a significant negative impact of Leverage ratio on Ethiopia's Metal and Engineering Industry companies' performance.

Short term debt ratio:

Similar to the manner for the variable leverage and as part of it, the above theories explained theoretically the relationship between short term debt ratio variable with the financial performance. Rather than going for their theoretical relationship again the researcher focused on the empirical researches. The results of these researches indicated

mostly a positive relationship in between these two variables which supported a Trade-off theory of capital structure. Carvaliho and Edison (2007) found a positive impact and they suggested for this to occur is the instability of economy to arouse for a need of short run fund to finance their working capital which are the type of resources supposedly offered with relative abundance and easiness by financial institution. Abor (2005) also found a positive relation with performance which he indicated that short term debts are less expensive in which increasing short term debt with a relatively low interest rate will lead to an increase in performance level. Additionally, Ellili and Farouk (2011) supported this and justified that more profitable companies used short term debt in financing their operating activities. The only study by Amanuel (2012) using short term debt as variable for leverage in Ethiopia also supported the positive relationship. From this it is expected a positive impact of short term debt on financial performance and to support Trade off theory; so that, the second hypothesis stated as follows;

Hypothesis 2: There is a significant positive effect of short term debt on Ethiopia's Metal and Engineering industry companies' financial performance.

Long term debt ratio:

Concerning Long term debt as variable for leverage, different studies revealed that it has a negative impact on financial performance and support pecking order theory, which to indicate that highly profitable companies use internal fund in financing their long term investment rather than borrowing a long term debt. This is supported from studies by Carvaliho and Edison (2007), Bas et al. (2009), Abor (2005), Keshtkar et al.(2012), and

Bayeh (2011) and Amanuel (2012) from Ethiopia's case. Based on these, long term debt is expected to have a negative effect on financial performance which would support Pecking order theory. Consequently, the third hypothesis would be as follows;

Hypothesis 3: There is a significant negative effect of long term debt on Ethiopia's Metal and Engineering industry companies' financial performance.

Company size:

The size of the company affects favorably its financial performance in many ways. First, large companies can exploit economies of scale and scope, and thus being more efficient compared to small firms. Second, larger firms have a greater access to long term capital from financial institutions than smaller companies but smaller companies tend to either borrow short by means of bank loans or raising capital from owners. Lastly, large companies would have greater power than smaller companies to compete in highly competitive market. However, it may have unfavorable consequence if any suffer from inefficiencies as a company grows in size which would lead the company to inferior financial performance. As a result of this relationship with performance the researcher believed it to have an effect on financial performance of Ethiopia's Metal and Engineering sector companies and included it as control variable. Similarly, Abor (+) (2005), Memon et al. (-) (2010), Ahmed et al. (+) (2012), Adekunle and Sunday (+) (2010) and Osuji and Odita (+) (2012) added company size in their study as control variable and found it to have a significant effect. Considering its impact on performance and from existing literature, it is expected to have a positive effect and the fourth hypothesis stated as;

Hypothesis 4: There is a significant positive effect of companies' size on Ethiopia's Metal and Engineering industry companies' performance.

Asset Tangibility:

Asset tangibility is also considered to be the major factor of a company's performance. Mackie (1990) as cited in Osuji and Odita (2012) argues that a company with high fraction of plant and equipment (tangible assets) has the asset base made debt choice more likely and influence the company performance. Since tangible assets are used as collateral, company which possesses more investment on these assets would have lower borrowing cost to improve performance. Supporting this, Akintoye (2008) argues that companies retaining large investments in tangible assets will have smaller costs of financial distress that lead to better performance than companies that relies on intangible assets (as cited in Adekunle and Sunday, 2010). However, if there is an inefficient use of these fixed assets, it could leave companies in difficulty (Memon et al., 2009). Relying on this argument, asset tangibility used as a control variable believing that it will also have an effect on financial performance of Ethiopia's Metal and Engineering sector companies. It was also used as control variable in the studies by Memon et al. (2009); by Adekunle and Sunday (2010); and by Osuji and Odita (2012). The effect of asset tangibility is expected to be positive; hence, the fifth hypothesis to be tested is;

Hypothesis 5: There is a significant positive effect of Asset tangibility on Ethiopia's Metal and Engineering industry companies' performance.

Asset turnover

The efficiency of management is also determined companies' performance in that if the management is efficient in utilizing companies' assets to generate income the company will perform better otherwise it would expose the company for operational and financial difficulties. This can be measured by the way and manner they utilize the assets of the firm to yield positive returns to the firm. Asset turnover ratio is an important financial ratio that can be used to achieve the purpose of measuring management efficiency; hence the introduction of a control variable, Asset turnover is valuable for this study. This variable also introduced in the study of Adekunle and Sunday (+) (2012), and Osuji and Odita (+) (2012).In this study it is expected that a positive relationship exists between asset turnover and companies financial performance. Therefore, the last hypothesis to be tested is;

Hypothesis 6: There is a significant positive impact of Asset turn over on Ethiopia's Metal and Engineering industry companies' performance

3.3. Definition and measurement of variables

This study consists seven variables; a dependent variable financial performance; three different independent variables of capital structure: Leverage ratio, Short term debt ratio, and Long term debt ratio; and three control variables: Company size, Asset tangibility and Efficiency of management. All these variables are measured based on book value as it provides an easy and accurate way to calculate ratios (Shah and Hijazi, 2004). Book value measures preferred since book values are related to values of these variables already in

place while market value depends on present value of growth opportunities (Myer 1984, cited in Daniel, 2012). Besides, it is complicated and difficult to find their market value in countries like Ethiopia where there is no proper established capital markets; so that, no other option left for the researcher to choice other than book value measure.

3.3.1. Dependent variable

Financial performance;

In the field of finance, various financial ratios; such as return on assets (RoA), return on equity (RoE) and return on investment (RoI) could be used as a proxy measure of companies' financial performance but in this study the researcher has used only RoE as a proxy measure of financial performance because it is more effectively and widely acceptable measure in the existing literature. RoE measure the amount of income generated from equity financing of assets employed by dividing profit (earning) before tax (EBT) by total owners equity of a company. Here, RoE calculated by utilizing Earning before tax instead of earning before tax and interest since interest expenses are not presented separately in Ethiopia's Metal and Engineering sector companies' profit and loss statements. Therefore,

$$\text{RoE} = \frac{\text{Earnings Before Tax (EBT)}}{\text{Total owners' Equity}}$$

A high percentage of RoE indicate better performance while low percentage represents the reverse. Chin Ai Fu (1997), Abor (2005), Carvaliho and Edison (2007), Abu rub (2012), Ahmed et al. (2012) and Osuji and Odita (2012) also used RoE to measure performance.

3.3.2. Independent Variables:

In this study, capital structure used as independent variable using three different level of debt to assets ratios to measure leverage. First, it took the total level of debt of companies for computing leverage ratio. Then decomposing the total debt level into short term debt and long term debt, it computed the short term debt ratio and long term debt ratios respectively to have a better understanding whether there is an effect of different maturity level of debt on Ethiopia's Metal and Engineering sector companies' performance.

Leverage:

Debt ratio (Dr);

Leverage measured by Debt ratio; total liabilities (short term liabilities and long term liabilities) by total assets used as one of the independent variables to represent capital structure. This ratio reveals that how much percentage of the total assets is financed by debt financing and also viewed as a proxy for what is left for owners in case of liquidation. This ratio stated as;

$$Dr = \frac{\text{Total Liabilities}}{\text{Total Assets}}$$

Debt ratio is more familiar as a measure for Leverage in empirical researches of capital structure studies. Among those Rajan and Zingales (1995), Booth et al. (2001), Gaud et al. (2003), Reimoo (2008), Daniel (2011), Bayeh (2011), and Netsanet (2012) used it to measure leverage.

Short Term Debt ratio (SDr);

Short term debt ratio also indicates what portion of the total assets of a company is financed using from short term matured debt. And this measured as;

$$SDr = \frac{\text{Current Liabilities}}{\text{Total Assets}}$$

Note: short term liability is defined for this study as liabilities which are paid within less than one year or one operating cycle.

This ratio also introduced in study of Bas et al. (2009), Luper and Isaac (2012), Ellili and Farouk (2011) and Amanuel (2012).

Long term debt ratio (LDr);

Similarly, Long term debt ratio depicts how much of total assets are financed by using long term debt financing means. And it is measured;

$$LDr = \frac{\text{Long term Liabilities}}{\text{Total assets}}$$

Note: long term liability is defined for this study as liabilities which will mature beyond one year or one operating cycle.

Long term debt ratio also captured to measure maturity level of leverage in the studies of Bas, Muradoglu and Phylaktis (2009), Luper and Isaac (2012), Ellili and Farouk (2011), Bayeh (2011), and Amanuel (2012).

3.3.3. Control variables:

In addition to the above independent variables, the researcher took three variables, which are found in the literature to have an influence on companies' financial performance, namely, Company size, Asset Tangibility, and Efficiency of management, as control variables in this study.

Company size (SZ);

As companies' financial performance factor, company size included as a control variable. And to achieve the normal distribution and linearity Size of a company measured by natural logarithm of total assets.

SZ= natural logarithm (Total assets)

Nguyen and Ramachandran (2006), Shah and Hijazi (2004), Adenkule and Sunday (2010), Daniel (2011), Bayeh (2011) and Osuji and Odita (2012) similarly used natural logarithm of total assets to measure company size.

Asset tangibility (Tang);

Asset tangibility has been found in most literature of capital structure that affects company's performance and included as a control variable which is measured by dividing Net fixed assets to Total assets. This is written as;

$$\text{Tang} = \frac{\text{Fixed Assets}}{\text{Total Assets}}$$

It has also been used by Chen and Hammes (2003), Han-suk Song (2005), Zeitun and Tian (2007), Daniel (2011), W/ Mikael (2012) and Amanuel (2012).

Efficiency of management (Turn);

The efficiency of the management of a firm can be measured by the way and manner they utilize the assets of the firm to yield positive returns to the firm. Asset turnover ratio is an important financial ratio that can be used to achieve the purpose of measuring management efficiency, hence the introduction of the variable, TURN, as a controlled variable, in this study as it is used in Osuji and Odita (2012). Thus, the formula stated as;

$$\text{Turn} = \frac{\text{Total Sales}}{\text{Total Assets}}$$

3.4. Study Population and Sample Size

The population of this study is Metal and Engineering companies in Ethiopia. As per the Metal Industry Development Institute (MIDI), currently companies involved in major Ethiopia's metal and engineering industry; like in the production of reinforcement bar, steel section and profiles, corrugated sheets and participating in related engineering activities reaches 78 in number. As the study required a six year data beginning from the year 2007 to 2012, eight companies which commenced their operation after 2007 excluded and left 70 companies to be eligible population for the study.

Due to time and fund constraint, and accessibility problem, it is difficult to conduct the study by using the whole population. Cohen (2005) also noted this and states these factors (expense, time and accessibility constraints) as frequent hindrances which prevent researchers from gaining information as a whole population; so he advices researchers to obtain data from a smaller group or subset of total population in such a way that the knowledge gained is representative of the study population under study (cited in Netsanet, 2012). As a result, the researcher believed to take a sample from this population. The sampling procedure to take an individual company from the whole population was through cluster sampling procedure. As Cress well (2003) described this procedure; the researcher first sample groups or organization (or clusters), then obtains names of individuals with in groups or clusters and samples within the cluster; further, it is believed that each cluster are diverse and somewhat a representative of the population as a whole. Accordingly, this study clustered the whole population in to two broad groups geographically; the first group consists of all metal and engineering companies established and operated in Addis Ababa city administration and in Special Finfine Oromia zone; and the second group consists of all other metal and engineering companies operated in Ethiopia. Based on this criterion the researcher found 58 companies in the first cluster and 12 in the second. Based on mentioned constraints and problems of accessibility to reach both clusters, the researcher decided to use the first cluster, where most of the country's companies found and believed it captures the variability of population, from which the desired sample to be randomly drawn by using a simple random sampling method.

Once the clustered group identified, the next step was to take sample from this selected group. Regarding to the selection process, Cress well (2003) recommends a random sampling in which each individual company in the population has an equal probability of being selected. As he noted further randomization helps the study to choose a representative sample from the population and provides the ability to generalize to a population. In line with this argument 10 companies (17.24%) have been drawn as a sample by using a simple random sampling. These sampled companies include;

⇒ Walia Steel Industry PLC

⇒ Nigat Mechanical Engineering S.C.

⇒ Sintec Ethiopia PLC.

⇒ Ziquala Steel Production Factory

⇒ Alemgenet Trade and Industry PLC.

⇒ Kality Metal Products Factory

⇒ Ethiopian Iron and Steel Factory

⇒ Hast Enterprise (Horn of Africa Steel trading)

⇒ Ethiopian steel PLC.

⇒ Alem Steel PLC.

3.5. Data source and collection instrument

To achieve the purpose of the study, the researcher depends solely on secondary data taken from companies annual audit reports. The data characterized as panel data, which capture both the cross section and time series dimensions. Baltagi et al. (1994) cited in Chen and Hammes (2003) described the advantages of panel as a way to increase number of data points and degree of freedom, and to reduce co-linearity among explanatory variables that lead to improve the efficiency of econometric estimates. They noted additionally, it can also control for individual heterogeneity due to hidden factors that if neglected in time series or cross sectional estimation which leads to biased result. By this rational the researcher chooses to use panel data type.

The criterion for companies to be included in the study required companies to have a six year audited financial statements particularly balances sheet and profit and loss statements covering a period from 2007 to 2012 inclusive. Therefore, from the total 10 sampled companies, there would be 60 observations which are sufficient for undertaking a regression analysis. These financial statements were obtained from each sampled individual companies. This is because no other means available to reach such data legally.

3.6. Model specification

The study employs Return on equity (RoE) as dependent variable which measures company's financial performance. Although there is no unique measurement of financial performance in the literature, RoE was chosen because it is important accounting based

and widely accepted measures of financial performance; and the independent variables are Debt ratio (DR) to measure total debt level, and short term debt ratio (SDR) and long term debt ratio (LDR) to measure different maturity levels after decomposing total debt. These variables serve as proxies for capital structure. However, a number of factors could have effects on company's financial performance; hence, the need for control variables to include in the model is obvious. Therefore, the researcher added Company size (Size), Asset tangibility (Tang) and Asset turn over (Turn) as control variables since they are found in many empirical researches of the issue.

The models for this study derived on the basis of prior studies such as Osuji and Odita (2012), Memon et.al (2010), Ahmed et.al (2012) and Abor (2005) and these two equations are believed to capture the essence of the subject under study. The general model of this study, as found in other empirical literature is represented by;

$$Y=\beta_0+ \beta_1 D_1 it+ \beta_2 Z_2 it+ e\text{it}$$

Where; Y *is the dependent variable;*

D_1 *are the independent variables;*

Z_2 *are the control variables*

β_1 *and* β_2 *are the coefficient of explanatory variables*

e*it is the error term. It has zero mean, constant variance and non auto correlated*

Specifically, when the above model is adopted for this study, the regression models could be written as;

Equation 1:

$$ROE = \beta 0 + \beta 1\ Dr_{it} + \beta 2\ Size_{it} + \beta 3\ Tang_{it} + \beta 4\ Turn_{it} + e_{it}$$

Equation 2:

$$ROE = \beta 0 + \beta 1\ SDr_{it} + \beta 2\ LDr_{it} + \beta 3\ Size_{it} + \beta 4\ Tang_{it} + \beta 5\ Turn_{it} + e_{it}$$

Where;

- ✓ ROE= Return on Equity
- ✓ β 0 is the constant term
- ✓ β1 to β5 are the coefficient of the explanatory and control variables.
- ✓ Dr_{it} = Debt ratio for "*i*" company at time "t".
- ✓ SDr_{it}= Short term debt ratio for "*i*" company at time "t".
- ✓ LDr_{it}= Long term debt ratio for "*i*" company at time "t"
- ✓ $Size_{it}$= Company size for "*i*" company at time "t"
- ✓ $Tang_{it}$= Asset tangibility for "*i*" company at time "t"
- ✓ $Turn_{it}$= Asset turn over for "*i*" company at time "t"
- ✓ e_{it}= the error term

3.7. Data analysis method

The panel data collected from companies' audited financial statements analyzed by using "E-views version 7.0." statistical package. Using this statistical package, the researcher has undertaken various statistical analysis methods in order to test the proposed hypothesis. First, the study employed a descriptive statistics of variables to provide the researcher and

audience in picturing the situation and to present relevant information (Malhotra, 1997 cited in Bayeh, 2011). Then it conducted Pearson's correlation matrix test to identify the relationship of each variable among them and with dependent variables, and various specification tests has been done to check for assumptions of classical linear regression model: heteroscedasticity, autocorrelation, multicolinearity, and normality are held along with a test for either a fixed effect or random effect model is appropriate for the study. Finally, the study used multiple regression models to test the influence of capital structure on Ethiopia's Metal and Engineering Industry companies' financial performance by applying Ordinary least square (OLS) regression method with a rational that it can minimize the error between the estimated point on the line and the actual observed points of the estimated regression line giving the best fit (San and Heng, 2011).

The impact of each explanatory variable on leverage was assessed in terms of the statistical significance of the coefficients 'βs'. Using a 1%, 5%, and 10% level of significance, an estimated coefficient was considered to be statistically significant: at 1%, if p-value $\leq$ 0.01, at 5%, if p-value $\leq$ 0.05 and at 10%, if p-value $\leq$ 0.1. It is conventional to use a 5% significance level, but 10% and 1% are also commonly used (Brooks, 2008). The signs in the model reveal the expected relationship between the dependent variable, and independent variables. Lastly, all results presented through tables and graphs.

Chapter Four

4.Empirical research result and discussion

The previous three chapters present the problem and purpose of this study, the review of theoretical and empirical researches of the study area and the research methodology adopted for achieving its purpose. In this chapter, the results of the study along with discussions are presented. The chapter has four major sections; the first section presents a descriptive statistics result, the second section tell us the correlation analysis among the selected variables, and the third section show different statistical tests to assure that classical linear regression model's assumptions are held with a suggestion to correct for assumptions not held. Finally, the OLS regression result presented and discussed so that the research hypothesis are tested.

4.1. Summary of Descriptive Statistics

Use of descriptive statistics in analyzing quantitative data helps to provide information to the researcher and users in such a way that it describes the overall level of the group of observation to show the center of a set of observation, and to compare and investigate values in a set of data among themselves and how much the values vary from the corresponding average. Accordingly, this study employed a descriptive statistics and presented summary of these result in table 4.1. As it is shown in the table three descriptive measures used; two of them (mean and median) used to describe the center of observations and the other (standard deviation) used to measure the variation or dispersion of

observations from mean of the observations of the dependent, independent and control variables. Therefore, in this section the results of these statistics are discussed in briefer manner on the following paragraphs.

Table 4 1 Descriptive statistics of dependent, independent variables and control variables

Source: E-views output from sampled audited financial statements from the year 2007 to 2012

First, as depicted in column two of table 4.1 the mean of ROE, a measure of financial performance (dependent variable), is 0.41. This result revealed that for every birr a company financed through equity financing would earns 40 cents in return. The other

	ROE	DR	SDR	LDR	SIZE	TANG	TURN
Mean	0.40866	0.57280	0.39813	0.17467	18.1716	0.29555	1.23176
Median	0.20841	0.57970	0.45733	0.08729	18.3275	0.28018	0.93258
Maximum	3.24434	0.95568	0.83136	0.63860	19.7044	0.77225	4.62512
Minimum	(1.48985)	0.03229	0.00889	0.00000	16.1430	0.03399	0.08210
Std. Dev.	0.77411	0.23546	0.21966	0.19305	0.94787	0.17898	0.97758
Observations	60	60	60	60	60	60	60

measure which is not affected by extremely large or small values, the median, similarly indicated that Metal and Engineering industry companies to have a positive return of 21cents for financing through equity. However, as shown in the table there is higher variation ranging from a positive return of Birr 3.24 to a negative (loss) of Birr 1.49 on

every birr the owners' invested in their companies, and the variation further indicated by standard deviation of 0.77. Thus, in Ethiopia's metal and engineering industry there are companies running their operations at loss at one end and companies which have high performance and gaining high return as much as three times to their equity investments; the latter could further indicated that companies may depend more on external financing other than equity to run their operation.

Second, the independent variable, debt ratio, which measure capital structure considering gross amount of debt, has an approximately same mean and median of 0.573 and 0.579 respectively. These figures shows that on average or centrally an Ethiopia's Metal and Engineering industry company financed 57% of its assets through debt financing. In other word, the owners' contribution and the retained earnings for companies' financing accounted for the remaining portion of 43%. Furthermore, these ratios give a little hint as to the preference of financing options, equity or debt, of the industry, since on average these Metal and Engineering industry companies are using large amount of debt compared to the equity they have used. But, we can observe simply that there are companies that restrict themselves from borrowing debt in financing their operating activities; this can be explained by looking at the minimum value of debt ratio of 0.03 which reveals that only 3% of the total assets are financed through debt. On the other side, there are companies which assets are financed by debt to the level of 95.5%. This variation also indicated by standard deviation of 0.22.

In addition to the gross level of debt amount, the study aimed at decomposing it into different maturity level as short and long term debt to see if there is any different effect and took them as capital structure measures. In this regard their descriptive statistics results are presented on the column 3 and 4 of table 4.1. The table shows on average companies financed their assets (operation) more by using short term debt, 39.8%, rather than by using long term debt, 17.5%. The median indicated also the same as the mean since their values for short term debt ratio and long term debt ratio are 0.46 and 0.09 respectively to reveal that most of the sampled companies choose short term debt than long term debt. Concerning the range, short term debt ratio gain a maximum value of 83% and a minimum of less than 1%, where as long term debt ratio took a maximum level of 64% and a minimum of null reflecting those companies which do not use any debt that mature beyond one year. Comparing one another with respect to the portion they take from the total debt, short term debt accounts 69.5% of total debt (39.8%/57.3%) and long term debt accounts 31.5 % (17.5%/57.3%) depicts that Ethiopia's Metal and Engineering industry companies relied more on short term debt this could be because short term financing are inexpensive or it is an important source of financing as Abor (2005) concluded or it could also be that companies relied on short term debt to finance their operating activities as Ellili and Farouk (2011) found. Additionally, the low level of long term debt in the capital structure could be that companies in Ethiopia largely depends on restricted loans extended by financial institutions and no other source such as raising capital from equity or debt market are available since there are no established capital markets in the country.

Finally, the companies size, asset tangibility's and asset turnover measures of the control variables presented in the last three column of table 4.1. In order to maintain the normal distribution and linearity, company size was measured by transforming to natural logarithm of total assets, but for this discussion the researcher used the real birr value of total assets and to clearly understand the figure the natural logarithm results put under parenthesis along with it. Accordingly, Ethiopia's Metal and Engineering industry companies have an average size of Birr 77,951,703(18.1716) with a maximum of Birr 361,004,145.6 (19.7044) and a minimum of Birr 10,252,170.53 (16.143) which shows a greater variation between companies reaching to Birr 350,751,975 and a standard deviation of 0.947 also indicates this variations. On the other hand, the asset tangibility as measured by ratio of fixed assets to total assets reflects that on average from total assets of Metal and Engineering companies only 29.6% represent fixed assets. This result could be described in other words as more than 70% of the total assets are current assets, in most situations are not used as collateral to borrow from financial institutions which in turn makes borrowing difficult or increase cost of borrowing and exposed to financial distress that leads financial performance to decrease (Adekunle and Sunday, 2010). Though the mean indicated to the level of 29.6%, in the industry there are companies which possessed fixed assets as a larger portion of total assets reaching 77.23% (maximum value) and on the other extreme there are also companies which fixed assets are even less than 3.5% of their total assets. Lastly, when we look at the asset turnover ratio their mean value is 1.23 interpreted as on average for every single birr invested in total assets, Ethiopia's metal and engineering industry

companies generated birr 1.23 with a range in between the maximum of 4.62 and minimum .08 which to have a standard deviation of 0.978.

4.2. Correlation analysis

This section of the result discussion provides the linear relationship between the dependent variable (financial performance) and explanatory variables including both the independent and control variables by using correlation matrix. Correlation matrix helps to quantify the extent to which two quantitative variables, dependent and independent variables, go together. Values of the correlation coefficient are always being in between -1 and +1. The sign of the correlation coefficient determines whether the correlation is positive or negative (direct or inverse); whereas, the magnitude of the correlation coefficient determines the strength of the correlation. Accordingly, the closer the correlation coefficient to +1, the stronger the positive correlation would be and if the correlation coefficient is close to -1, it indicates a strong negative correlation in between considered variables. However, if the coefficient of the correlation approaches to zero (0) it inform us, there would be little or no linear relationship exists among the variables. Hence, to perform this correlation analysis this study used a Pearson product moment of correlation coefficient and presented the summary of it in table 4.2.

As shown in table 4.2, the correlation coefficient between ROE and Debt ratio is 0.355 and it is significant at 1%. This shows that as the metal and engineering companies increased their borrowing of debt, their return on equity financing also increased indicating a direct relationship between them. This finding is not consistent with the pecking order theory,

which suggests due to asymmetric information between investors and managers, profitable companies finance their operation (project) by using internal source of financing so that they come up with low debt level, but rather it is supported by trade-off theories in that the use of debt has the advantage to serve as a shield to earnings from tax since interest payments are tax deductible, to lead for better financial performance at one hand or the use of debt reduces the agency cost incurred by owners which in turn to enhance companies' performance by forcing management to focus on profitable investment on the other hand. Similar with the findings of Frank and Goyal (2009), Bayeh (2011) and Abu Rub (2011) but it contradicted with the findings of Rajan and Zingales (1995), Chen and Hammes (2003), Reimoo (2008), Booth et al. (2001), Gupta et al. (2011), Osuji and Odita (2012), Daniel (2011) and with Netsanet (2012). Therefore, Ethiopia's Metal and Engineering industry companies are more likely to use debt to increase their financial performance in line with the suggestions of Trade-off theories as a result of the positive correlation between performance and debt level.

Table 4 2 Pearson's correlation matrix between the dependent and explanatory variables

Correlation Probability	ROE	DR	SDR	LDR	SIZE	TANG	TURN
ROE	1.000000 -----						
DR	0.355356 0.0053***	1.000000 -----					
SDR	0.559727 0.0000***	0.642143 0.0000***	1.000000 -----				
LDR	-0.203467 0.1189	0.489026 0.0001***	-0.354644 0.0054***	1.000000 -----			
SIZE	0.171055 0.1913	0.081196 0.5374	-0.106492 0.4180	0.220207 0.0909*	1.000000 -----		
TANG	-0.427561 0.0007***	0.262419 0.0428**	-0.229139 0.0782*	0.580800 0.0000***	0.058294 0.6582	1.000000 -----	
TURN	0.163345 0.2124	0.038625 0.7695	0.411110 0.0011***	-0.420677 0.0008***	-0.305818 0.0175**	-0.424691 0.0007***	1.000000 -----

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

Source: Generated from E-views

Continuing our discussion to the other measure of capital structure, short term debt ratio, it has been found a strongly significant and positively correlated with ROE at 0.56, which is more than the total debt level has. Like the total debt level, the short term debt ratio also follows the trade-off theories indicating the direct relationship between the short term debt ratio with financial performance. This finding is similar with Carvaliho and Edison (2007), Abor (2005), Ellili and Farouk (2011) and with Amanuel (2011) but contradict with Keshtkar et.al (2012), Ahmed et.al (2012) and with Luper and Isaac (2012). However,

unlike the short term debt ratio, Long term debt ratio has an insignificant and negative correlation with ROE that reveals as long term debt borrowing increases the Metal and Engineering industry companies' financial performance decline. This result depicts that these companies would prefer internal fund rather than borrowing long term debt to finance their assets which is consistent to the pecking order theory of capital structure. Findings of Abor (2005), Carvaliho and Edison (2007), Bas et.al (2009), Ellili and Farouk (2011), Amanuel (2011), and Keshtkar et.al (2012) are similar with this study whereas the study by Ahmed et.al (2012) contradicted to this study.

Despite that all of the control variables are expected to have a positive relation with financial performance, only company size and efficiency of management measured by asset turnover have a positive but insignificant relationship with ROE having coefficient of correlation of 0.17 and 0.16 respectively. But unexpectedly asset tangibility of companies turned to has a strongly significant and negative correlation with ROE at -0.43. The sign of the correlation coefficient of company size slightly indicates that the larger the size of the company the better the financial performance will be. This could be described further as larger companies have the chance to exploit economies of scale and scope, to access long term capital and also to have greater power than smaller firms in highly competitive market that leads them to perform better in the industry and this is similar with the finding of Abor (2005), Adekunle and Sunday (2010), Ahmed et.al (2012), and Osuji and Odita (2012); but contradict with Memon et.al (2010). Similarly, the positive correlation of asset turnover with ROE revealed that as the efficiency of the management improved in generating sales by efficient use of assets, the performance of Metal and Engineering industry companies'

improved financially. This result had been found in study of Adekunle and Sunday (2010), and Osuji and Odita (2012). Regarding the asset tangibility, there was argument saying that "those companies which have large fraction of tangible assets of their total assets have the asset base to give as a collateral that enables them to borrow more debt and have a lower level of financial distress so that they will have a better financial performance". However, in Ethiopia's Metal and Engineering industry the case is different since there is a significant and negative correlation coefficient between tangibility and ROE indicating that the more a company invested in tangible (fixed) assets the lower would be its financial performance. The reason behind this contradiction could be an inefficient use of fixed assets by Metal and Engineering industry companies. This finding is similar with studies of Memon et.al (2010) and Osuji and Odita (2012).

4.3. Test for Classical linear regression Model Assumptions

Prior to any move for running a regression using ordinary least square method there must be some conditions that should be met. For an ordinary least square to be used in estimating coefficients by regressing equations and to have Best Linear Unbiased Estimators (BLUE), at least five assumptions need to hold. These are assumptions stating errors have a zero mean, equal variance of errors, errors are uncorrelated, Zero covariance between explanatory variables and errors, and errors are normally distributed. Thus, in this section the researcher tried to show whether they hold or not using various appropriate statistical tests, and the corrections taken for any invalidity of CLRM assumptions using

recommended adjustment. Note that almost all of the discussion of this section depends on the work of Brooks (2008).

Assumption of Mean of errors is zero: (E (ut) =0)

This assumption required that the average value of the errors is zero (0). According to this assumption, if the average value of the error term is non zero it may causes undesirable consequence to occur like R^2 which is the measure of goodness of fit statistics would be meaningless as it has a chance to exhibit a negative value is high and biases in the slope coefficient estimates are likely to exist. However, in order to achieve this assumption the model should contain a constant term in the regression equation so that it will never be violated. Therefore, as it is clearly seen in the model specification, there is a constant term in both equations which assured that the first assumption is not violated.

Assumption of Homoscedasticity: (Var (ut) =$\delta^2 < \infty$)

The assumption of homoscedasticity assumes that the variance of the errors is constant, but if this assumption is failed the errors are said to be heteroscedastic. In the presence of heteroscedasticity in errors, OLS estimators could give unbiased and consistent coefficient of estimates, but they are no longer BLUE since the OLS standard errors are wrong in such a way that both it will be too large for intercept, and too low or too big for the slope; hence, any inferences made could be misleading. Therefore, in order to detect whether the errors are heteroscedastic or not, this study employed Breusch-Pagan-Godfrey and White's tests for heteroscedasticity (see tables on appendix A-1 to A-4) for both equations.

From these tables, it is obvious that both tests rejected the null hypothesis stating that errors are homoscedastic since both the *F* and χ^2 (*"LM"*) versions of the test statistic give the same conclusion that there is evidence for the presence of heteroscedasticity, since the p-value depicts that it is significant even at 1% level. Thus, the assumption of homoscedasticity did not hold so that there should be some correction measures which cure this problem. The first option could be using a heteroscedasticity-consistent standard error estimates like the White's Modified standard error estimates, but it needs greater caution since it is only appropriate when the residuals of the estimated equation are heteroscedastic but serially uncorrelated. As shown in the next section, errors are found autocorrelated so a need for other correction measures which is consistent in the presence of heteroscedasticity and autocorrelation; so, the study found a Newey-West variance-covariance estimator appropriate and applied for this study.

Assumption of no autocorrelation: cov (u*i*, u*j*) =0

This assumption states that the covariance between the errors term overtime or cross-sectionally is zero or simply errors are uncorrelated with one another. But if the errors are not uncorrelated with one another, they are said to be auto correlated or that they are "serially correlated". Estimating an equation in the presence of autocorrelation has similar consequence with heteroscedasticity that the coefficient estimates derived using OLS are still unbiased, but they are inefficient and are not BLUE so that standard errors estimate could be wrong. Thus, there exist the possibilities that wrong inference could be made about whether a variable is or is not important factor of variation in the dependent variable,

and the tendency to reject the null hypothesis when it is correct is increase and R^2 is likely to be inflated relative to its correct value. Since violation of this assumption has such consequences, a test of this assumption is required using Durbin-Watson (DW) and Breusch-Godfrey tests. DW is a test only of whether consecutive errors are related to one another and E-views by default provides this test with the regression result. Unlike others this test does not follow a standard statistical distribution such as 't', 'F', 'χ^2' rather it has two (2) critical values: an upper (du) and lower (dl) and there is also an intermediate region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. The relevant lower and upper 1% critical value for 60 observations having four explanatory variables of DW statistic are dl=1.28 and du=1.56; and of having five explanatory variables are dl=1.25 and du=1.60 (see Appendix G). Therefore, the rejection, non-rejection and inconclusive regions of the DW statistic test are shown in appendix B-1 and B-2 in the Appendix B. Based on this the DW test statistics as indicated from the regression results in table 4.3 and 4.4 are found 1.32 and 1.45 for the first and second equations respectively, and both statistic results laid on the inconclusive region where neither rejected nor not rejected. As a result of the DW tests did not assure the exact pattern of the autocorrelation so that the researcher used another test, Breusch-Godfrey serial correlation LM test, which is a more general test for autocorrelation that allows examination of the relation between the immediate error and several of its lagged values at the same time.

From tables on Appendix B-3 and B-4, the Breusch-Godfrey serial correlation LM test depicted that there is an autocorrelation in between errors found when it is examined the relation between immediate error terms with 4 lagged error term values since the p-value of the statistics are significant at 5%. Therefore, to avoid the effect of autocorrelation, Newey-West variance-covariance estimator used as mentioned in the previous sub-section.

Assumption of covariance of explanatory variables and errors are Zero:

(*Xt* are non-stochastic)

OLS estimator is consistent and unbiased in the presence of stochastic regressors, provided that the regressors are not correlated with the error terms of the estimated equation. Moreover, as long as the first assumption (E (u) =0) hold, the estimator will be unbiased even if the regressors are stochastic. As a result of the inclusion of intercept in the model makes the first assumption achieved and in the other way this assumption also holds.

Assumption of normality: ($u_t \sim N(0, \delta)$)

Normality assumption assumed that errors are normally distributed or symmetric about its mean. This assumption is required to conduct single or joint hypothesis tests about the model parameters. For this study the researcher used a histogram residual normal distribution graph in which the Bera-Jarque (*BJ*) normality test is considered. Accordingly, the normality test for the second equation of the model (when short term debt ratio and long term debt ratio used as independent variables) is shown in Appendix C-2. The P-value of the BJ test is not significant at 5% and even also at 10% so that the normality assumption

is hold for the second equation of the model. However, the BJ test for the first equation (when debt ratio used as independent variable) is significant at 5% (see Appendix C-1) indicating that there is no normal distribution of errors which have unfavorable effect on estimated coefficients. As a way to resolve this unfavorable effect various attempts has been done for instance an inclusion of dummy variables (for observations 3-08, 3-11, 5-08 and 5-09) separately and jointly to the regression in order to remove outliers but no improvement have been seen in the normal distribution of the errors. Furthermore, giving a thought that the non-normality could be intrinsic to all of the data and removal of outliers would not make residuals of such a model normal, the researcher tried another attempt to check for autoregressive conditionally heteroscedastic (ARCH) effect (see Appendix c-3). Despite all these efforts no ARCH effect is there and normality problem also not cured.

Test for Multicolinearity

An implicit assumption that is made when using OLS estimation method is that the explanatory variables are not correlated with one another. If there is no relationship between the explanatory variables, they would be said to be orthogonal to one another. If this assumption will not be hold R^2 will be high but individual coefficients will have high standard errors so the regression look good as a whole but the individuals are not significant, regressions become very sensitive to small changes in the specification, and makes confidence interval for the parameters very wide and significant test might therefore give in appropriate conclusion and so make it difficult to draw a sharp inference. As a result, the researcher conduct this test by using a correlation matrix for the explanatory

variables as depicted in appendix D-1 when debt ratio considered as independent variable of the first equation and for the second equation (see appendix D-2)

From the tables in appendix D the larger observed correlations are 0.58 between long term debt ratio and asset tangibility in the second equation and -0.42 between tangibility and asset turn over. As rule of thumb it is suggested that if the pair wise correlation coefficient between two regressors is high, say, in excess of 0.8, multicolinearity will be a serious problem (Gujarati, 2003). Therefore, based on this criterion there is no serious multicolinearity problem in the explanatory variables.

Appropriateness either Random Effect or Fixed Effect model used

Finally, the researcher checks for whether a random effect or fixed effect model is appropriate for this study. To determine the best from among them the study used Hausman specification test. Accordingly, the investigation indicates that period random effect has been found appropriate since its chi-square p-value is insignificant as shown in Appendix E-1 and E-2 equation one and two respectively. For the matter of comparison with others: two dimensions of random effect, cross-sectional dimension, and the cross-sectional and period fixed effect (using redundant fixed effect tests) attached in the appendix E-3 to E-10.

4.4. Discussion of regression analysis result

In the previous sections of this chapter the study tried to provide important information about the characteristics of the data, observations and variables using a descriptive statistics, and it also tried to see the relation between the dependent variable and the independent and control variables to determine the direction and magnitude of their relationships using a correlation matrix. Then it followed by the tests of the classical linear regression model assumptions which are the pillar for this section by applying different appropriate statistical tests so that the resulted estimates would be best, unbiased and consistent. Now in this section the chapter present the result of the regression based on the model specifications appear in chapter three and suggested additional correction measures along with the specified models to be used in the previous section and then followed by the hypothesis testing and result discussion.

4.4.1. Regression result

As the objective of this study is to examine the effect of capital structure on Ethiopia Metal and Engineering industry company's financial performance, the study took ROE as a measure of financial performance (dependent variable) and three different measures of capital structure (independent variables): debt ratio which used to measure for the gross debt level; short and long term debt ratio after decomposing the total level of debt to see if there is a significant effect of debt maturity on performance along with three control variables (company size, asset tangibility and asset turn over) which were found most in similar studies. Therefore, ROE is regressed over the capital structure and control variables

so that this study has two equations one having debt ratio as independent variable and the other having both short term debt and long term debt ratio as independent variables.

4.4.1.1. Estimation result of ROE model when DR used

The model empirically to be tested for ROE as it includes DR in independent variables is;

$$RoE = \beta 0 + \beta 1\, Dr_{it} + \beta 2\, Size_{it} + \beta 3\, Tang_{it} + \beta 4\, Turn_{it} + e_{it}$$

The result of the least square regression presented in table 4.3 indicates that the adjusted R^2, which measures how well the regression model explain the actual variation in the dependent variable, has a value of 0.407. This result reveals that 40.7% of the total variability of financial performance of Ethiopia's Metal and Engineering industry is explained by the considered variables (debt ratio, size, tangibility and turnover) which lead to the conclusion that the selected explanatory variables provide good explanatory power. Furthermore, the *F-statistic* value of 11.3 with zero p-value to five decimal strengthened this conclusion depicting that the variables in the model are capable of explaining variation of financial performance measured by ROE rejecting none of the variables could explain it.

The table also shows that debt ratio has a significant and positive effect on the financial performance at 5% significance level, and asset tangibility (a control variable) also found to have a statistically significant effect on financial performance but unlike debt ratio it affects negatively. Though both size and turnover did not have a significant effect on ROE even at 10% significance level, it is clear that size has a positive effect but turnover has negative effect to companies' financial performance. Besides when we compare these

results with the one computed using the Newey-west variance-covariance estimator (see Appendix F-1) the same result has been found.

Table 4 3 OLS regression result of ROE model as DR used

Dependent Variable: ROE
Method: Panel EGLS (Period random effects)
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60
Swamy and Arora estimator of component variances
White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.869576	2.030336	-0.920821	0.3612
DR	1.651190	0.669112	2.467733	0.0167
SIZE	0.118649	0.109817	1.080424	0.2847
TANG	-2.574201	0.730396	-3.524391	0.0009
TURN	-0.050987	0.064145	-0.794871	0.4301

R-squared	0.447275	Mean dependent var	0.408660
Adjusted R-squared	0.407076	S.D. dependent var	0.774115
S.E. of regression	0.596080	Sum squared resid	19.54214
F-statistic	11.12673	Durbin-Watson stat	1.327045
Prob(F-statistic)	0.000001		

Source: E-views output

4.4.1.2. Estimation result of ROE model when SDR and LDR are used

Beyond the objective of examining the effect of capital structure on financial performance this study also aimed at decomposing the gross debt level to short and long term debt to see whether debt maturity choice have an effect on financial performance. Therefore, the ROE model which is to be tested empirically would be;

$$ROE = \beta 0 + \beta 1\, SDr_{it} + \beta 2\, LDr_{it} + \beta 3\, Size_{it} + \beta 4\, Tang_{it} + \beta 5\, Turn_{it} + e_{it}$$

Table 4 4OLS regression result of ROE model as SDR and LDR used

Method: Panel EGLS (Period random effects)
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60
Swamy and Arora estimator of component variances
White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.419054	1.903462	-1.270871	0.2092
SDR	2.102956	0.769542	2.732737	0.0085
LDR	0.712168	0.458978	1.551640	0.1266
SIZE	0.143878	0.099621	1.444252	0.1544
TANG	-2.028712	0.523817	-3.872938	0.0003
TURN	-0.120830	0.088087	-1.371720	0.1758

R-squared	0.503625	Mean dependent var	0.408660
Adjusted R-squared	0.457665	S.D. dependent var	0.774115
S.E. of regression	0.570085	Sum squared resid	17.54981
F-statistic	10.95776	Durbin-Watson stat	1.456290
Prob(F-statistic)	0.000000		

Source: E-views output

Similar to the first equation of the model, as it is shown in table 4.4 the adjusted R^2 of the model give information that explanatory variables have a good explanatory power. This is because 45.7% of the variability of ROE (measure of financial performance) is explained by explanatory variables of SDR, LDR, SIZE, TANG and TURN. Additionally, the F-statistics value of 10.96 with a zero P-value to six decimal confirms this conclusion.

As shown in the table 4.4 SDR, LDR and SIZE have a positive effect on financial performance where as TANG and TURN have a negative impact on performance. From this all explanatory variables only SDR and TANG have been found statistically

significant at 1 %, the remaining three variables including LDR are not statistically significant even at 10%. Nonetheless, the regression result by using the Newey-West variance-covariance estimator which introduced to correct the autocorrelation and heteroscedasticity problem shows that SIZE has a significant effect on performance at 10% significance level but others are not changed. (See Appendix F-2)

4.4.2. Hypothesis testing and Result discussion

In the previous sub section the study shows the overall result of the regression of the two equations of the model in which it identified the appropriateness of the model in explaining the variability of the ROE (measure of financial performance), and it has determined variables which have significant impact on performance along with their direction of the effect. In this sub section the study discussed the regression result of each capital structure and control variables and their relative effect on financial performance in more detail. Besides, the statistical findings of the capital structure variables discussed in relation to underlying capital structure theories and with previous empirical studies. Finally, the research hypothesis developed to be rejected or not rejected is known.

Capital structure

Regarding the effect capital structure has on financial performance, there are two giant theories of capital structures (Trade-off theories and Pecking order theory) which they have their own arguments. A Static trade-off theory (one of trade-off theory) argued that higher level of debt usage, due to its benefits of tax deductibility of interest payments, will favor

companies' performance to the extent this tax advantage eventually disappear as a result of bankruptcy risk and financial distress. Accordingly, static trade off theory says there is a positive effect of inclusion of debt in capital structure on financial performance. Likewise, Agency cost theory (the other Trade-off theory) argued that higher leverage is expected to lower agency costs, reduce inefficiency and thereby lead to improvement in companies' performance so that it is expected leverage (debt) to have a positive or direct impact on financial performance. On the other hand, Pecking order theory argued against these theories and states that external financing, including debt, could be undervalued by investors since they may perceived that management are taking advantage of it and company is overvalued so that this leads to an unfavorable effect on companies' performance. As a result, pecking order theory says debt has a negative effect on financial performance. For this study debt ratio, short term debt ratio and long term debt ratio used to measure capital structure.

Debt Ratio;

As it is presented on table 4.3, the period random effect estimation result shows a positive effect of debt ratio on financial performance of Ethiopia's Metal and Engineering industry companies, with a regression coefficient 1.65, t-statistic of 2.446 and p-value of 0.0167. This value indicated that debt ratio has significant effect on performance at 5% significance level.

Even though this study has expected the effect of debt ratio to be negative and it would follow a pecking order theory, the finding from this study does not support it, rather it

supports the Trade-off theory suggesting that higher debt usage enhance financial performance since it has an advantage of tax deductibility of interest payments, lowering agency cost and reducing inefficiencies. Therefore, financing an operation through debt would lead companies in Metal and Engineering industry to perform better financially or in other words as companies increase debt in their capital structure it provides them to enhance their financial performance. Consequently, the first hypothesis stated that debt ratio has a significant and negative effect on financial performance of Ethiopia's Metal and engineering industry companies is rejected. The finding of a positive relation of debt also found by studies of Frank and Goyal (2009), Abu-Rub (2011), Abor (2005) Bayeh (2011) and Rajan and Zingales (1995) for companies in UK. But inconsistent with studies by Booth et.al (2001), Chen and Hammes (2003), Gaud et.al (2003), Bauer (2004), Frank and Goyal (2007), Reimoo (2008), Han-Suck Song (2009), Chowdhury and Chowdhury (2010), Pratheepkanth (2011), Daniel (2011), Weldemikael (2012) and Netsanet(2012).

Short term debt ratio

As mentioned in the beginning of the result discussion, this study attempted to see the effect of debt maturity choice on financial performance and to achieve this end it decomposed the gross level of debt into short term mature and long term mature debt.

As expected in this study, short term debt ratio has a statistically significant and positive effect on financial performance. This result is confirmed by looking at the coefficient, t-statistics and p-value of short term debt ratio presented in table 4.10 and accordingly, they are 2.10, 2.732 and 0.008 respectively. Since it is significant at 1% significance level, short

term debt is a major factor to affect performance. This significant effect could be explained as the Metal and Engineering industry companies use short term debt as an integral part of their financing could be because it is inexpensive or it is an important source of financing available for them in the country as Abor (2005) suggested so that when these companies use more short term mature debt their performance is enhanced. This finding of the study is consistent to the trade-off theory which argues that the inclusion of debt in capital structure has a positive effect as a result of the advantage tax is deductible for interest payments but is not consistent with the pecking order theory which says companies prefer internal fund to finance their operation. Thus, the second hypothesis, stating that short term debt ratio has a significant and positive effect on financial performance is not rejected.

Similarly, prior studies consistent to this finding are Abor (2005), Carvaliho and Edison (2007), Ellili and Farouk (2011) and Amanuel (2011) suggesting that companies use a short term debt to finance their operation activities. On the other hand, studies of Bas et.al (2009), Ahmed et.al (2012), Keshtkar (2012) are contradicted to this finding which concludes short term debt has a negative impact on financial performance.

Long term debt ratio

The third hypothesis predicted that using long term maturity debt has a significant and negative effect on financial performance. However, the result from table 4.10 shows that it has an insignificant and positive effect with a coefficient of 0.71 and a p-value of 0.126, and this statistics further indicated that it is not significant even at significance level of 10% which is against the hypothesis so that it is rejected. From this result, though it is not

significant statistically, the sign of the effect shows that long term debt usage in Ethiopia's metal and engineering industry has followed a Trade-off theory of capital structure which suggests an inclusion of debt in capital structure has a positive impact on performance, but not consistent to Pecking order theory that companies finance their operation through an internal fund since debt could have an unfavorable effect to their performance.

Study by Ahmed et.al (2012) and Luper and Isaac (2012) are consistent to this study finding, but studies by Abor (2005), Bas et.al (2009), Keshtkar (2012), Ellili and Farouk (2011), Carvaliho and Edison (2007), Bayeh (2011) and Amanuel (2011) contradict to this finding.

Control variables

As mentioned in the third chapter, the study has used control variables which are found in most empirical studies and more likely expected to have effect on Ethiopia's Metal and Engineering industry companies' financial performance. These are company size, asset tangibility and efficiency of management (Asset turn over). The following paragraphs discussed their result and their contribution as control variables to the study.

Company Size

Due to the capacity larger companies can exploit economies of scale and scope, they would be more efficient; have greater access to long term capital from financial institutions and they could have also a greater power in competitive market than smaller companies, this study predicted that company size has a significant and positive effect on financial

performance. The findings from table 4.3 and 4.4 confirm that there is a positive effect but it is statistically insignificant even at 10% significance level so that the fourth hypothesis of this study is rejected.

Although company size does not contribute for this study as a control variable, its positive effect is consistent with Abor (2005), Adekunle and Sunday (2010), Ahmed et.al (2012) and Osuji and Odita (2012) findings but contradicted with Memon et.al (2010).

Asset tangibility

The fifth hypothesis predicted that asset tangibility has a significant and positive effect on financial performance of Ethiopia's Metal and Engineering industry companies. As presented in table 4.3 and 4.4, it is clearly seen that asset tangibility has been found the most important factor in determining financial performance since its t-statistics value is the greatest of all variables in both equations as it exhibit -3.52 and -3.87 in the first and second equation respectively and highly statistically significant effect at 1% significant level. However, different from this study's expectation, it has a negative impact on performance. Thus, the fifth hypothesis is rejected.

This finding could be explained by argument of Memon et.al (2009) stating that if there is an inefficient use of fixed assets in operation, it would have created difficulty on company's performance. Therefore, from the finding it can be said that Ethiopia's Metal and Engineering industry companies have problem inefficiency on using fixed (tangible) assets in their operation. Memon et.al (2009), Adekunle and Sunday (2010) and Osuji and Odita (2012) findings are agreed with this study.

Asset turnover

Asset turnover; due to the argument that if the management is efficient in utilizing companies' assets to generate income the company will perform better otherwise it would expose the company for operational and financial difficulty, it is expected to has a significant and positive effect on financial performance. But, its t-statistic values of -0.79 and -1.37 with a p-value of 0.43 and 0.17 in tables 4.3 and 4.4 indicated that it is the least important among considered variables and statistically insignificant even at 10% significance level. Furthermore, its sign of coefficient notifies that it has a negative impact contradicted to this study prediction so that it does not contribute for this study as a control variable. However, prior studies indicates the more a company will be able to generate sales through it assets, the more efficient will be the company and profit will also be higher. Thus, the last hypothesis also rejected and this result is consistent to A. Chowdhury and S.P. Chowdhury (2010) but contradicted to studies by Adekunle and Sunday (2010) and Osuji and Odita (2012).

Chapter Five

5.Conclusion and Recommendation

This chapter consists of the study conclusions and recommendations and an indication for future researches;

5.1. Conclusions

The choice of fund sources to finance an organization's operation and investment activities is one of the major activities organization managers have to decide. This decision of managers in financing their firm's operation and investment could involve; borrowing of debt, raising new equity, or retaining of capital from earnings generated from operations; and selection from among them largely depend on the effect they have on the organizations' performance. As a result, this thesis aimed at examining the effect of capital structure on Ethiopia's metal and engineering industry companies' financial performance.

To achieve this objective, the study reviewed the residing giant capital structure theories to see the arguments how and why capital structure is related and in what manner it affects performance. Accordingly, three giant theories: static and agency cost of Trade-off theories and pecking order theory were reviewed and discussed in the thesis. Further, the study employed the quantitative research approach to investigate the casual and effect relationship of capital structure and financial performance in which audited financial statements of 10 sampled Ethiopia's metal and engineering industry companies for the

time span of six year (2007 to 2012) were collected and analyzed using a descriptive statistics, correlation analysis and most importantly a multivariate regression analysis by employing E-views statistical package. Beyond searching for a support for any effect of capital structure effects to the performance the thesis also tried to see whether any effect on financial performance could be seen if the maturity of debt differed, by decomposing the gross level of debt to short term maturity and long term maturity debt, and the thesis also used company size, asset tangibility and asset turnover, which are found in similar empirical studies, as control variables of the study. Now, the following paragraphs provide the conclusion of the findings of the study;

- Ethiopia's Metal and Engineering companies on average finance 57% their asset using debt. From this total level of debt they finance their operation with, 69.5% is accounted by short term debt indicating that short term debt source is an important sources of fund in Ethiopia. On the other hand, the industry companies invest less on tangible assets (less than 30% of their total assets) which could be the responsible for the low level of long term debt, since they are required as collateral by financial institutions to extend loan and/or no other sources of fund is available since no capital markets established in the country.
- Capital structure has been found to have a significant and positive effect on financial performance as measured by debt ratio in Metal and Engineering industry; so that it is essential to understand this reverse effect beyond that determining performance as a factor to a capital structure decision in Ethiopia.
- The investigation to determine effect of debt maturity choice on financial performance indicated that both short term and long term mature debt have the same positive effect in

the Metal and Engineering companies. However, only short term debt ratio has significant effect but not long term debt.

- The results of all capital structure measures; total debt, short term debt and long term debt ratios, supported that the metal and engineering industry follows the arguments Trade-off capital structure theories rather than pecking order theory.
- Finally, asset tangibility, a control variable to the study, has a significant and negative impact on financial performance and it has contributed well for the study as a control variable. On the other hand, company size and asset turn over were not found significant in the metal and engineering industry though they have took a positive and negative coefficients respectively. Thus they did not much contribute for the study as control variables.

5.2. Recommendations;

Based on the findings and the conclusions of the study, the researcher forwards these recommendations to Ethiopia's Metal and engineering industry companies;

- As depicted in the conclusion, the industry capital structure was found in accordance with the trade off theories. According to this theory, inclusion of debt to the capital structure enhances the performance of a company since debt has the advantage of tax deductibility of interest payments and it also provides a company to reduce agency costs and inefficiencies. Therefore, the metal and engineering companies can take these advantages by employing more debt in their capital structure to finance their operations and investment. However, it needs a thorough consideration to what extent this actions should be taken because trade-off theory mentioned also that excessive utilization of debt would deteriorate the benefits of the tax deductibility of debt, increase cost of capital and problem of cash would exist, these all in turn lead the company to be exposed to bankruptcy risk. Thus, the researcher recommends that the industry should determine the optimal capital structure beyond understanding to the positive impact of debt.
- The result from the study indicated that Ethiopia's metal and engineering industry companies use less of long term debt in financing their assets. But its impact on performance is positive though it is insignificant. Therefore, the researcher recommends for these companies to exert an effort to access long term debt by using every possible means even to invest on tangible assets that assists them to secure debt using them as collateral and for the government to facilitate long term funds for metal and engineering

industry companies since it promotes the industry to achieve the Growth and Transformation Plan.

Future research directions

- ✓ As the objective of this thesis was to examine the effect of capital structure on Ethiopia's metal and engineering industry companies' financial performance and to determine which giant capital structure theory is followed in the country, this study restricted to this point. But it is once identified that Trade-off theory is followed, based on the argument of this theory one important question is remained unanswered by this study. This question is where does the optimal capital structure of the industry lay? It needs a further examination so that it could be one direction of future research.

- ✓ The other important issue which was not found exactly by this study is the question of availability of capitals to these companies in which they have the freedom to choose financing options to adjust their capital structure and what is the effect to lack a capital market in the country towards capital structure then to the performances of these companies?. This also requires an investigation along with capital structure studies.

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Appendices

Appendices

Appendix A- Heteroskedasticity tests

Appendix A-1

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	6.910227	Prob. F(4,55)	0.0001
Obs*R-squared	20.06820	Prob. Chi-Square(4)	0.0005
Scaled explained SS	32.10388	Prob. Chi-Square(4)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.760719	1.483162	-1.861374	0.0680
DR	1.433990	0.317684	4.513884	0.0000
SIZE	0.137123	0.079065	1.734295	0.0885
TANG	-0.380345	0.460666	-0.825643	0.4126
TURN	-0.092789	0.085609	-1.083871	0.2832

R-squared	0.334470	Mean dependent var	0.325702
Adjusted R-squared	0.286068	S.D. dependent var	0.640912
S.E. of regression	0.541536	Akaike info criterion	1.690839
Sum squared resid	16.12935	Schwarz criterion	1.865368
Log likelihood	-45.72518	Hannan-Quinn criter.	1.759107
F-statistic	6.910227	Durbin-Watson stat	1.946075
Prob(F-statistic)	0.000140		

Appendix A-2

Heteroskedasticity Test: White

F-statistic	3.987428	Prob. F(14,45)	0.0002
Obs*R-squared	33.22066	Prob. Chi-Square(14)	0.0027
Scaled explained SS	53.14438	Prob. Chi-Square(14)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	34.39920	34.47778	0.997721	0.3237

DR	-9.487278	9.857424	-0.962450	0.3410
DR^2	4.116030	1.210431	3.400467	0.0014
DR*SIZE	0.308656	0.517409	0.596541	0.5538
DR*TANG	3.037255	2.345926	1.294694	0.2020
DR*TURN	0.210661	0.658831	0.319749	0.7506
SIZE	-3.856271	3.742553	-1.030385	0.3083
SIZE^2	0.108946	0.102822	1.059555	0.2950
SIZE*TANG	-0.585920	0.659456	-0.888490	0.3790
SIZE*TURN	-0.012299	0.138942	-0.088520	0.9299
TANG	10.85247	12.40313	0.874978	0.3862
TANG^2	-2.297261	2.702128	-0.850167	0.3997
TANG*TURN	-0.467882	0.976666	-0.479061	0.6342
TURN	0.572651	2.513592	0.227822	0.8208
TURN^2	-0.083694	0.070971	-1.179268	0.2445

R-squared	0.553678	Mean dependent var	0.325702
Adjusted R-squared	0.414822	S.D. dependent var	0.640912
S.E. of regression	0.490278	Akaike info criterion	1.624631
Sum squared resid	10.81677	Schwarz criterion	2.148217
Log likelihood	-33.73892	Hannan-Quinn criter.	1.829434
F-statistic	3.987428	Durbin-Watson stat	2.629467
Prob(F-statistic)	0.000199		

Appendix A-3

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	6.335996	Prob. F(5,54)	0.0001
Obs*R-squared	22.18487	Prob. Chi-Square(5)	0.0005
Scaled explained SS	29.59000	Prob. Chi-Square(5)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.325537	1.228792	-1.892539	0.0638
SDR	1.333761	0.296841	4.493186	0.0000
LDR	1.094575	0.393989	2.778189	0.0075
SIZE	0.117719	0.065338	1.801705	0.0772
TANG	-0.343647	0.415027	-0.828009	0.4113
TURN	-0.115074	0.073580	-1.563923	0.1237

R-squared	0.369748	Mean dependent var	0.292497
Adjusted R-squared	0.311391	S.D. dependent var	0.535288
S.E. of regression	0.444195	Akaike info criterion	1.309533
Sum squared resid	10.65469	Schwarz criterion	1.518968
Log likelihood	-33.28599	Hannan-Quinn criter.	1.391454
F-statistic	6.335996	Durbin-Watson stat	2.047845
Prob(F-statistic)	0.000107		

Appendix A-4

Heteroskedasticity Test: White

F-statistic	7.559851	Prob. F(5,54)	0.0000
Obs*R-squared	24.70560	Prob. Chi-Square(5)	0.0002
Scaled explained SS	32.95213	Prob. Chi-Square(5)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample: 1 60
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.092331	0.594438	-1.837587	0.0716
SDR^2	1.770804	0.355743	4.977768	0.0000
LDR^2	2.597183	0.807275	3.217222	0.0022
SIZE^2	0.002862	0.001750	1.635357	0.1078
TANG^2	-0.398471	0.579134	-0.688045	0.4944
TURN^2	-0.022239	0.014634	-1.519712	0.1344

R-squared	0.411760	Mean dependent var	0.292497
Adjusted R-squared	0.357293	S.D. dependent var	0.535288
S.E. of regression	0.429135	Akaike info criterion	1.240548
Sum squared resid	9.944460	Schwarz criterion	1.449983
Log likelihood	-31.21644	Hannan-Quinn criter.	1.322469
F-statistic	7.559851	Durbin-Watson stat	2.211210
Prob(F-statistic)	0.000019		

Appendix B- Autocorrelation tests

Figure B-1 Rejection and non rejection regions for DW test (when DR used as independent)

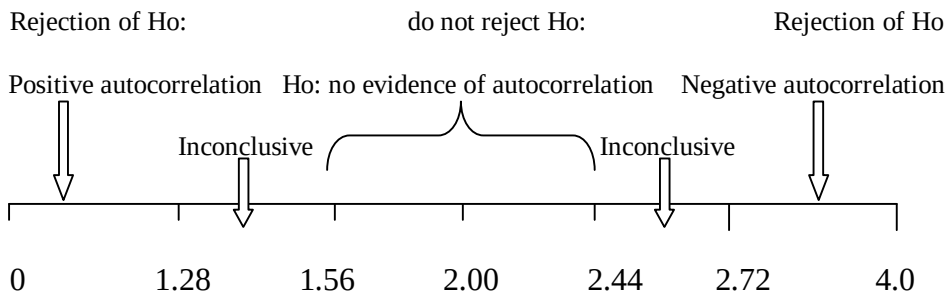
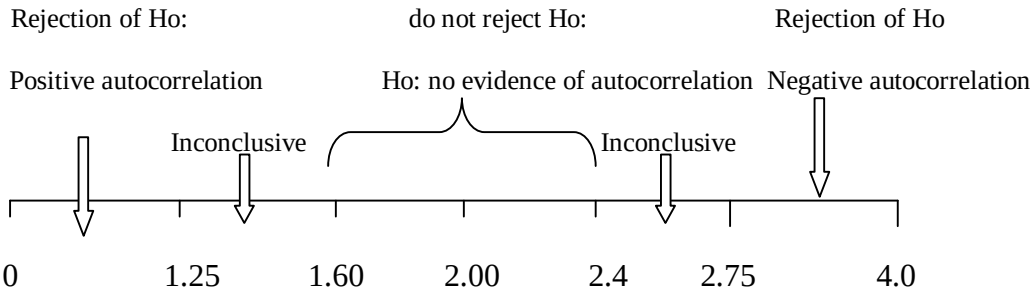


Figure B-2 Rejection and non rejection regions for DW test (when SDR and LDR used as independent)



AppendixB-3

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.645647	Prob. F(4,51)	0.0439
Obs*R-squared	10.31063	Prob. Chi-Square(4)	0.0355

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 1 60
Included observations: 60
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.438757	1.582041	0.277336	0.7826
DR	-0.114977	0.339583	-0.338583	0.7363
SIZE	-0.024164	0.084374	-0.286386	0.7757
TANG	0.124062	0.490097	0.253137	0.8012
TURN	0.023697	0.091099	0.260123	0.7958
RESID(-1)	0.444646	0.140910	3.155524	0.0027
RESID(-2)	-0.170286	0.151633	-1.123010	0.2667
RESID(-3)	0.075160	0.153733	0.488900	0.6270
RESID(-4)	-0.117549	0.144236	-0.814974	0.4189

R-squared	0.171844	Mean dependent var	-4.61E-16
Adjusted R-squared	0.041937	S.D. dependent var	0.575519
S.E. of regression	0.563322	Akaike info criterion	1.827552
Sum squared resid	16.18394	Schwarz criterion	2.141704
Log likelihood	-45.82656	Hannan-Quinn criter.	1.950434
F-statistic	1.322823	Durbin-Watson stat	1.943040
Prob(F-statistic)	0.253685		

Appendix B-4

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.144572	Prob. F(2,52)	0.0514
Obs*R-squared	6.473738	Prob. Chi-Square(2)	0.0393

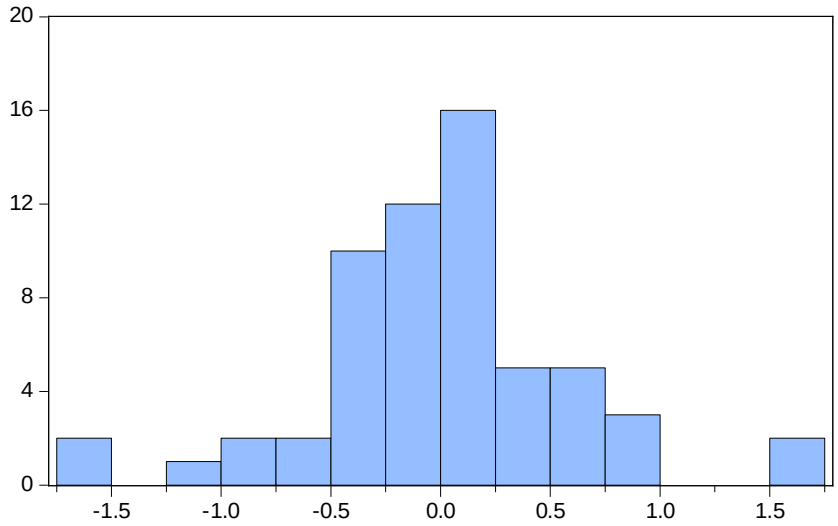
Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 1 60
Included observations: 60
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.519504	1.548556	0.335476	0.7386
SDR	-0.084954	0.370303	-0.229417	0.8194
LDR	0.127972	0.495812	0.258105	0.7973
SIZE	-0.030211	0.082525	-0.366082	0.7158
TANG	0.008269	0.513377	0.016107	0.9872
TURN	0.031247	0.091966	0.339763	0.7354
RESID(-1)	0.352286	0.142114	2.478895	0.0165
RESID(-2)	-0.133934	0.138779	-0.965087	0.3390

R-squared	0.107896	Mean dependent var	-1.35E-15
Adjusted R-squared	-0.012195	S.D. dependent var	0.545394
S.E. of regression	0.548709	Akaike info criterion	1.761070
Sum squared resid	15.65626	Schwarz criterion	2.040316
Log likelihood	-44.83210	Hannan-Quinn criter.	1.870298
F-statistic	0.898449	Durbin-Watson stat	1.974995
Prob(F-statistic)	0.514797		

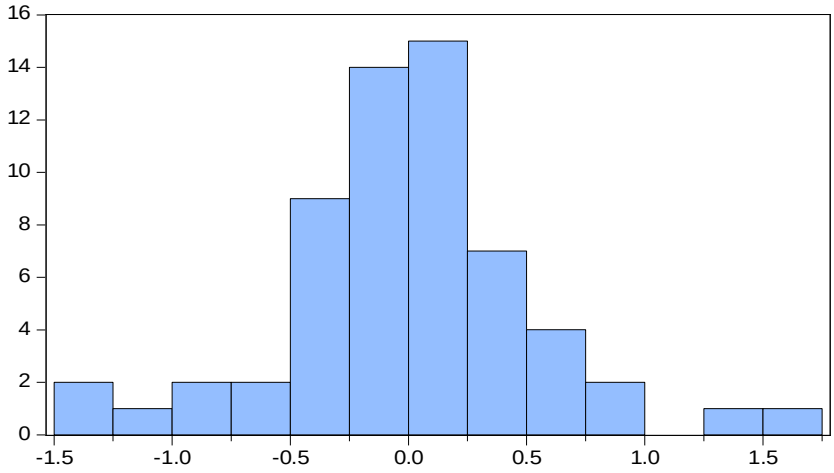
Appendix C Normality test

Appendix C-1 Normality test result (DR used as independent variables)



Series: Standardized Residuals	
Sample 2007 2012	
Observations 60	
Mean	1.05e-16
Median	0.000145
Maximum	1.741858
Minimum	-1.517791
Std. Dev.	0.575519
Skewness	0.187478
Kurtosis	4.807643
Jarque-Bera	8.520413
Probability	0.014119

AppendixC-2 Normality test result (SDR and LDR used as independent)



Series: Standardized Residuals	
Sample 2007 2012	
Observations 60	
Mean	-3.16e-16
Median	0.005295
Maximum	1.508762
Minimum	-1.336612
Std. Dev.	0.545394
Skewness	0.131827
Kurtosis	4.293314
Jarque-Bera	4.355434
Probability	0.113300

Appendix C-3

Heteroskedasticity Test: ARCH

F-statistic	1.569072	Prob. F(5,49)	0.1864
Obs*R-squared	7.590677	Prob. Chi-Square(5)	0.1803

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 6 60
Included observations: 55 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.238970	0.120124	1.989366	0.0523
RESID^2(-1)	0.297279	0.142779	2.082100	0.0426
RESID^2(-2)	0.160978	0.148020	1.087540	0.2821
RESID^2(-3)	-0.102453	0.149044	-0.687401	0.4951
RESID^2(-4)	-0.096233	0.147986	-0.650281	0.5185
RESID^2(-5)	0.038246	0.142732	0.267960	0.7899

R-squared	0.138012	Mean dependent var	0.343638
Adjusted R-squared	0.050054	S.D. dependent var	0.664606
S.E. of regression	0.647760	Akaike info criterion	2.072075
Sum squared resid	20.56004	Schwarz criterion	2.291057
Log likelihood	-50.98206	Hannan-Quinn criter.	2.156757
F-statistic	1.569072	Durbin-Watson stat	1.989655
Prob(F-statistic)	0.186374		

Appendix D Multicolinearity tests

Appendix D-1 Pearson's correlation matrix among explanatory variables

Correlation Probability	DR	SIZE	TANG	TURN
DR	1.000000			

SIZE	0.081196	1.000000		
	0.5374	-----		
TANG	0.262419	0.058294	1.000000	
	0.0428	0.6582	-----	
TURN	0.038625	-0.305818	-0.424691	1.000000
	0.7695	0.0175	0.0007	-----

Source: E-views output

Appendix D-2 Pearson's correlation matrix among explanatory variables

Correlation Probability	SDR	LDR	SIZE	TANG	TURN
SDR	1.000000				

LDR	-0.354644	1.000000			
	0.0054	-----			
SIZE	-0.106492	0.220207	1.000000		
	0.4180	0.0909	-----		
TANG	-0.229139	0.580800	0.058294	1.000000	
	0.0782	0.0000	0.6582	-----	
TURN	0.411110	-0.420677	-0.305818	-0.424691	1.000000
	0.0011	0.0008	0.0175	0.0007	-----

Appendix E Hausman and redundant fixed-effect tests

Appendix E-1

Correlated Random Effects - Hausman Test
Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	5.533728	4	0.2368

Period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DR	1.803812	1.651190	0.005209	0.0345
SIZE	0.101547	0.118649	0.000717	0.5231
TANG	-2.588895	-2.574201	0.012501	0.8954
TURN	-0.012832	-0.050987	0.000513	0.0920

Appendix E-2 Correlated Random Effects -Hausman test

Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	6.933533	5	0.2256

Appendix E-3

Period random effects test equation:
Dependent Variable: ROE
Method: Panel Least Squares
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.688892	1.695801	-0.995926	0.3241
DR	1.803812	0.355307	5.076772	0.0000
SIZE	0.101547	0.090633	1.120428	0.2679
TANG	-2.588895	0.516722	-5.010229	0.0000
TURN	-0.012832	0.096447	-0.133045	0.8947
	Effects Specification			
Period fixed (dummy variables)				

R-squared	0.502632	Mean dependent var	0.408660
Adjusted R-squared	0.413106	S.D. dependent var	0.774115
S.E. of regression	0.593042	Akaike info criterion	1.943908
Sum squared resid	17.58493	Schwarz criterion	2.292966
Log likelihood	-48.31725	Hannan-Quinn criter.	2.080444
F-statistic	5.614351	Durbin-Watson stat	1.315478
Prob(F-statistic)	0.000024		

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	11.503488	4	0.0215

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DR	0.003939	0.938813	0.101231	0.0033
SIZE	0.045524	0.114314	0.013680	0.5564
TANG	-0.877057	-1.763015	0.085830	0.0025
TURN	0.055226	-0.009817	0.004595	0.3373

Appendix E-3

Cross-section random effects test equation:
Dependent Variable: ROE
Method: Panel Least Squares
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.229655	2.890532	-0.079451	0.9370
DR	0.003939	0.506657	0.007774	0.9938
SIZE	0.045524	0.158165	0.287826	0.7748
TANG	-0.877057	0.583418	-1.503308	0.1396
TURN	0.055226	0.120362	0.458829	0.6485

Cross-section fixed (dummy variables)

R-squared	0.701034	Mean dependent var	0.408660
Adjusted R-squared	0.616543	S.D. dependent var	0.774115
S.E. of regression	0.479362	Akaike info criterion	1.568242
Sum squared resid	10.57024	Schwarz criterion	2.056922
Log likelihood	-33.04726	Hannan-Quinn criter.	1.759392
F-statistic	8.297193	Durbin-Watson stat	1.826955
Prob(F-statistic)	0.000000		

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section and period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	328.275136	4	0.0000
Period random	0.000000	4	1.0000
Cross-section and period random	16.600425	4	0.0023

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DR	0.003939	0.912299	0.066495	0.0004
SIZE	0.045524	0.113520	0.010764	0.5122
TANG	-0.877057	-1.736073	0.034872	0.0000
TURN	0.055226	-0.008198	0.002516	0.2061

Appendix E-4

Cross-section random effects test equation:
Dependent Variable: ROE
Method: Panel EGLS (Period random effects)
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.229655	2.822527	-0.081365	0.9355
DR	0.003939	0.494737	0.007961	0.9937
SIZE	0.045524	0.154444	0.294761	0.7695
TANG	-0.877057	0.569692	-1.539528	0.1305
TURN	0.055226	0.117531	0.469883	0.6407

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	0.000000	0.0000
Idiosyncratic random	0.468084	1.0000

Weighted Statistics			
R-squared	0.701034	Mean dependent var	0.408660
Adjusted R-squared	0.616543	S.D. dependent var	0.774115
S.E. of regression	0.479362	Sum squared resid	10.57024
F-statistic	8.297193	Durbin-Watson stat	1.826955

Prob(F-statistic)	0.000000		

	Unweighted Statistics		
R-squared	0.701034	Mean dependent var	0.408660
Sum squared resid	10.57024	Durbin-Watson stat	1.826955

Period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DR	1.141203	0.912299	-0.015140	NA
SIZE	0.060079	0.113520	0.001067	0.1018
TANG	-1.731051	-1.736073	-0.025724	NA
TURN	0.053720	-0.008198	-0.000840	NA

Appendix E-5

Period random effects test equation:
Dependent Variable: ROE
Method: Panel EGLS (Cross-section random effects)
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.891310	2.180478	-0.408768	0.6845
DR	1.141203	0.403893	2.825507	0.0068
SIZE	0.060079	0.118977	0.504959	0.6158
TANG	-1.731051	0.513763	-3.369357	0.0015
TURN	0.053720	0.102258	0.525343	0.6017

	Effects Specification		
		S.D.	Rho
Cross-section random		0.313339	0.3094
Period fixed (dummy variables)			
Idiosyncratic random		0.468084	0.6906

	Weighted Statistics		
R-squared	0.291534	Mean dependent var	0.408660
Adjusted R-squared	0.164010	S.D. dependent var	0.551408
S.E. of regression	0.504166	Sum squared resid	12.70915
F-statistic	2.286115	Durbin-Watson stat	1.554930
Prob(F-statistic)	0.030974		

	Unweighted Statistics		
R-squared	0.448443	Mean dependent var	0.408660
Sum squared resid	19.50081	Durbin-Watson stat	1.013385

Cross-section and period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DR	0.244788	0.912299	0.095215	0.0305
SIZE	-0.214509	0.113520	0.034133	0.0758
TANG	-0.703363	-1.736073	0.073137	0.0001
TURN	0.145762	-0.008198	0.004269	0.0185

Appendix E-6

Cross-section and period random effects test equation:
Dependent Variable: ROE
Method: Panel Least Squares
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.194747	3.925578	1.068568	0.2915
DR	0.244788	0.522957	0.468084	0.6422
SIZE	-0.214509	0.217307	-0.987125	0.3294
TANG	-0.703363	0.602340	-1.167716	0.2497
TURN	0.145762	0.124764	1.168297	0.2494

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.745921	Mean dependent var	0.408660
Adjusted R-squared	0.634374	S.D. dependent var	0.774115
S.E. of regression	0.468084	Akaike info criterion	1.572223
Sum squared resid	8.983211	Schwarz criterion	2.235432
Log likelihood	-28.16670	Hannan-Quinn criter.	1.831641
F-statistic	6.687061	Durbin-Watson stat	2.014988
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	4.338251	(9,46)	0.0004
Cross-section Chi-square	36.871825	9	0.0000

Appendix E-7

Cross-section fixed effects test equation:
Dependent Variable: ROE
Method: Panel Least Squares
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.869576	1.632549	-1.145188	0.2571
DR	1.651190	0.349682	4.721974	0.0000
SIZE	0.118649	0.087029	1.363325	0.1783
TANG	-2.574201	0.507065	-5.076671	0.0000
TURN	-0.050987	0.094231	-0.541082	0.5906

R-squared	0.447275	Mean dependent var	0.408660
Adjusted R-squared	0.407076	S.D. dependent var	0.774115
S.E. of regression	0.596080	Akaike info criterion	1.882772
Sum squared resid	19.54214	Schwarz criterion	2.057301
Log likelihood	-51.48317	Hannan-Quinn criter.	1.951040
F-statistic	11.12673	Durbin-Watson stat	1.327045
Prob(F-statistic)	0.000001		

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	4.362095	(9,41)	0.0005
Cross-section Chi-square	40.301099	9	0.0000
Period F	1.448664	(5,41)	0.2276
Period Chi-square	9.761118	5	0.0823
Cross-Section/Period F	3.442263	(14,41)	0.0010
Cross-Section/Period Chi-square	46.632943	14	0.0000

Appendix E-8

Cross-section fixed effects test equation:
Dependent Variable: ROE
Method: Panel Least Squares
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.688892	1.695801	-0.995926	0.3241
DR	1.803812	0.355307	5.076772	0.0000
SIZE	0.101547	0.090633	1.120428	0.2679
TANG	-2.588895	0.516722	-5.010229	0.0000
TURN	-0.012832	0.096447	-0.133045	0.8947

Effects Specification			
Period fixed (dummy variables)			
R-squared	0.502632	Mean dependent var	0.408660
Adjusted R-squared	0.413106	S.D. dependent var	0.774115
S.E. of regression	0.593042	Akaike info criterion	1.943908
Sum squared resid	17.58493	Schwarz criterion	2.292966
Log likelihood	-48.31725	Hannan-Quinn criter.	2.080444
F-statistic	5.614351	Durbin-Watson stat	1.315478
Prob(F-statistic)	0.000024		

Appendix E-9

Period fixed effects test equation:
Dependent Variable: ROE
Method: Panel Least Squares
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.229655	2.890532	-0.079451	0.9370
DR	0.003939	0.506657	0.007774	0.9938
SIZE	0.045524	0.158165	0.287826	0.7748
TANG	-0.877057	0.583418	-1.503308	0.1396
TURN	0.055226	0.120362	0.458829	0.6485

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.701034	Mean dependent var	0.408660
Adjusted R-squared	0.616543	S.D. dependent var	0.774115
S.E. of regression	0.479362	Akaike info criterion	1.568242
Sum squared resid	10.57024	Schwarz criterion	2.056922
Log likelihood	-33.04726	Hannan-Quinn criter.	1.759392
F-statistic	8.297193	Durbin-Watson stat	1.826955
Prob(F-statistic)	0.000000		

Appendix E-10

Cross-section and period fixed effects test equation:
Dependent Variable: ROE
Method: Panel Least Squares
Sample: 2007 2012
Periods included: 6
Cross-sections included: 10
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.869576	1.632549	-1.145188	0.2571
DR	1.651190	0.349682	4.721974	0.0000

SIZE	0.118649	0.087029	1.363325	0.1783
TANG	-2.574201	0.507065	-5.076671	0.0000
TURN	-0.050987	0.094231	-0.541082	0.5906

R-squared	0.447275	Mean dependent var	0.408660
Adjusted R-squared	0.407076	S.D. dependent var	0.774115
S.E. of regression	0.596080	Akaike info criterion	1.882772
Sum squared resid	19.54214	Schwarz criterion	2.057301
Log likelihood	-51.48317	Hannan-Quinn criter.	1.951040
F-statistic	11.12673	Durbin-Watson stat	1.327045
Prob(F-statistic)	0.000001		

Appendix F-1

Dependent Variable: ROE
Method: Least Squares
Sample: 1 60
Included observations: 60
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.869576	1.641236	-1.139127	0.2596
DR	1.651190	0.634683	2.601597	0.0119
SIZE	0.118649	0.089678	1.323052	0.1913
TANG	-2.574201	0.753303	-3.417220	0.0012
TURN	-0.050987	0.067764	-0.752416	0.4550

R-squared	0.447275	Mean dependent var	0.408660
Adjusted R-squared	0.407076	S.D. dependent var	0.774115
S.E. of regression	0.596080	Akaike info criterion	1.882772
Sum squared resid	19.54214	Schwarz criterion	2.057301
Log likelihood	-51.48317	Hannan-Quinn criter.	1.951040
F-statistic	11.12673	Durbin-Watson stat	1.253454
Prob(F-statistic)	0.000001		

Appendix F-2

Dependent Variable: ROE
Method: Least Squares
Sample: 1 60
Included observations: 60
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.419054	1.513583	-1.598230	0.1158
SDR	2.102956	0.673802	3.121030	0.0029
LDR	0.712168	0.551338	1.291708	0.2020
SIZE	0.143878	0.080504	1.787211	0.0795

TANG	-2.028712	0.583326	-3.477832	0.0010
TURN	-0.120830	0.087068	-1.387777	0.1709

R-squared	0.503625	Mean dependent var	0.408660
Adjusted R-squared	0.457665	S.D. dependent var	0.774115
S.E. of regression	0.570085	Akaike info criterion	1.808576
Sum squared resid	17.54981	Schwarz criterion	2.018010
Log likelihood	-48.25727	Hannan-Quinn criter.	1.890497
F-statistic	10.95776	Durbin-Watson stat	1.422469
Prob(F-statistic)	0.000000		

Appendix G

Lower and upper 1% critical values for Durbin–Watson statistic

	k_ = 1		k_ = 2		k_ = 3		k_ = 4		k_ = 5	
T	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU
15	0.81	1.07	0.70	1.25	0.59	1.46	0.49	1.70	0.39	1.96
16	0.84	1.09	0.74	1.25	0.63	1.44	0.53	1.66	0.44	1.90
17	0.87	1.10	0.77	1.25	0.67	1.43	0.57	1.63	0.48	1.85
18	0.90	1.12	0.80	1.26	0.71	1.42	0.61	1.60	0.52	1.80
19	0.93	1.13	0.83	1.26	0.74	1.41	0.65	1.58	0.56	1.77
20	0.95	1.15	0.86	1.27	0.77	1.41	0.68	1.57	0.60	1.74
21	0.97	1.16	0.89	1.27	0.80	1.41	0.72	1.55	0.63	1.71
22	1.00	1.17	0.91	1.28	0.83	1.40	0.75	1.54	0.66	1.69
23	1.02	1.19	0.94	1.29	0.86	1.40	0.77	1.53	0.70	1.67
24	1.04	1.20	0.96	1.30	0.88	1.41	0.80	1.53	0.72	1.66
25	1.05	1.21	0.98	1.30	0.90	1.41	0.83	1.52	0.75	1.65
26	1.07	1.22	1.00	1.31	0.93	1.41	0.85	1.52	0.78	1.64
27	1.09	1.23	1.02	1.32	0.95	1.41	0.88	1.51	0.81	1.63
28	1.10	1.24	1.04	1.32	0.97	1.41	0.90	1.51	0.83	1.62
29	1.12	1.25	1.05	1.33	0.99	1.42	0.92	1.51	0.85	1.61
30	1.13	1.26	1.07	1.34	1.01	1.42	0.94	1.51	0.88	1.61
31	1.15	1.27	1.08	1.34	1.02	1.42	0.96	1.51	0.90	1.60
32	1.16	1.28	1.10	1.35	1.04	1.43	0.98	1.51	0.92	1.60
33	1.17	1.29	1.11	1.36	1.05	1.43	1.00	1.51	0.94	1.59
34	1.18	1.30	1.13	1.36	1.07	1.43	1.01	1.51	0.95	1.59
35	1.19	1.31	1.14	1.37	1.08	1.44	1.03	1.51	0.97	1.59
36	1.21	1.32	1.15	1.38	1.10	1.44	1.04	1.51	0.99	1.59
37	1.22	1.32	1.16	1.38	1.11	1.45	1.06	1.51	1.00	1.59
38	1.23	1.33	1.18	1.39	1.12	1.45	1.07	1.52	1.02	1.58
39	1.24	1.34	1.19	1.39	1.14	1.45	1.09	1.52	1.03	1.58
40	1.25	1.34	1.20	1.40	1.15	1.46	1.10	1.52	1.05	1.58
45	1.29	1.38	1.24	1.42	1.20	1.48	1.16	1.53	1.11	1.58
50	1.32	1.40	1.28	1.45	1.24	1.49	1.20	1.54	1.16	1.59
55	1.36	1.43	1.32	1.47	1.28	1.51	1.25	1.55	1.21	1.59
60	1.38	1.45	1.35	1.48	1.32	1.52	1.28	1.56	1.25	1.60
65	1.41	1.47	1.38	1.50	1.35	1.53	1.31	1.57	1.28	1.61
70	1.43	1.49	1.40	1.52	1.37	1.55	1.34	1.58	1.31	1.61
75	1.45	1.50	1.42	1.53	1.39	1.56	1.37	1.59	1.34	1.62

80	1.47	1.52	1.44	1.54	1.42	1.57	1.39	1.60	1.36	1.62
85	1.48	1.53	1.46	1.55	1.43	1.58	1.41	1.60	1.39	1.63
90	1.50	1.54	1.47	1.56	1.45	1.59	1.43	1.61	1.41	1.64
95	1.51	1.55	1.49	1.57	1.47	1.60	1.45	1.62	1.42	1.64
100	1.52	1.56	1.50	1.58	1.48	1.60	1.46	1.63	1.44	1.65
Note: T, number of observations; k_, number of explanatory variables (excluding a constant term).										
Source: Brooks (2008)										

raw data of the study							
comp-yr obs.	ROE	DR	SDR	LDR	size	tang	turn
1 - 07	-0.05862	0.612972	0.216223	0.396749	18.58565	0.496313	0.329568
1 - 08	0.329411	0.540402	0.200041	0.340361	18.81339	0.369495	0.800579
1 - 09	0.156146	0.542865	0.150823	0.392042	18.93464	0.282445	0.680868
1 - 10	0.192451	0.498098	0.201069	0.297029	18.98591	0.338815	0.648221
1 - 11	0.199468	0.623835	0.297343	0.326492	19.43035	0.209787	0.557323
1 - 12	0.134683	0.684741	0.481488	0.203252	19.70439	0.14504	1.051278
2 - 07	0.393666	0.54576	0.54576	0	17.66272	0.138434	1.356153
2 - 08	0.769996	0.684063	0.684063	0	18.0258	0.149124	1.213615
2 - 09	0.802783	0.582255	0.579607	0.002648	18.07054	0.125736	1.430316
2 - 10	0.156819	0.601152	0.600895	0.000257	18.12224	0.101055	0.787113
2 - 11	-0.01055	0.760392	0.196525	0.563867	18.97733	0.653483	0.403856
2 - 12	-0.01694	0.785599	0.366356	0.419243	19.07163	0.688915	0.50288
3 - 07	1.007212	0.830294	0.590612	0.239681	18.19183	0.091823	0.98602
3 - 08	1.337637	0.900063	0.641332	0.258732	18.74891	0.051072	0.955976
3 - 09	3.244338	0.910684	0.760363	0.150321	18.86127	0.045566	1.313472
3 - 10	2.391365	0.932645	0.831365	0.10128	19.14347	0.139232	0.854948
3 - 11	2.912125	0.946203	0.779759	0.166444	19.32552	0.298668	0.914679
3 - 12	2.230837	0.955675	0.573578	0.382097	19.56191	0.253116	0.884264
4 - 07	0.072184	0.516321	0.516321	0	18.77032	0.310047	1.589906
4 - 08	0.118415	0.629268	0.629268	0	19.11562	0.308425	1.674254
4 - 09	0.041571	0.674359	0.072514	0.601845	19.27446	0.280378	1.175178
4 - 10	0.043058	0.155736	0.106839	0.048897	19.4676	0.230654	1.18887
4 - 11	0.013775	0.055152	0.055152	0	19.36255	0.405203	0.730826
4 - 12	0.056353	0.219561	0.219561	0	19.58852	0.317064	0.511236
5 - 07	-0.20637	0.77729	0.350717	0.426573	18.54031	0.772249	0.129622
5 - 08	-1.48985	0.936109	0.297507	0.638601	18.6452	0.722764	0.256291
5 - 09	-1.15762	0.932893	0.382846	0.550048	17.98981	0.543611	0.897141
5 - 10	0.903526	0.840719	0.315003	0.525715	17.88142	0.532011	0.713909
5 - 11	0.915477	0.787226	0.429233	0.357994	17.86581	0.503274	0.950491

5 - 12	0.203277	0.707415	0.434719	0.272695	17.73872	0.34859	0.590145
6 - 07	0.142941	0.690197	0.690197	0	16.98326	0.398049	0.824268
6 - 08	0.106421	0.53262	0.53262	0	16.63654	0.541182	1.537988
6 - 09	0.222346	0.534964	0.534964	0	16.83222	0.422391	0.790763
6 - 10	0.237075	0.555343	0.555343	0	17.01792	0.389207	1.124358
6 - 11	0.371766	0.517062	0.517062	0	16.96658	0.412796	1.375086
6 - 12	0.362108	0.606639	0.479933	0.126706	17.42904	0.305413	1.068609
7 - 07	-0.18864	0.586723	0.139278	0.447445	16.77585	0.497015	0.353665
7 - 08	0.021979	0.546446	0.162436	0.384009	16.83413	0.456354	0.475735
7 - 09	0.090033	0.495474	0.212033	0.283441	17.06618	0.355943	0.471681
7 - 10	0.331435	0.450611	0.377304	0.073308	17.16322	0.305577	1.017355
7 - 11	0.073277	0.147395	0.097238	0.050157	18.39911	0.10411	0.290096
7 - 12	0.070255	0.133835	0.066221	0.067614	18.3937	0.172781	0.373038
8 - 07	0.591819	0.755428	0.728001	0.027428	18.09686	0.279975	3.435438
8 - 08	0.102283	0.604753	0.580985	0.023768	18.1376	0.266337	4.494416
8 - 09	1.464515	0.604176	0.586867	0.017308	18.3406	0.215899	1.916856
8 - 10	0.817539	0.543429	0.529641	0.013788	18.43912	0.223148	2.042448
8 - 11	0.518431	0.543245	0.529137	0.014109	18.26808	0.27008	2.194795
8 - 12	0.739341	0.51441	0.506112	0.008299	18.61258	0.246984	2.542753
9 - 07	0.385034	0.348255	0.348255	0	18.36865	0.118272	1.721861
9 - 08	0.42452	0.150792	0.150792	0	18.4765	0.116141	1.732281
9 - 09	-0.03309	0.03229	0.03229	0	18.29218	0.143268	0.842124
9 - 10	-0.05611	0.069679	0.069679	0	18.31448	0.140109	0.820421
9 - 11	0.012859	0.385627	0.008888	0.376739	18.71358	0.496314	0.408437
9 - 12	-0.12312	0.737754	0.495864	0.24189	19.41653	0.374129	0.082096
10 - 07	0.334317	0.577151	0.577151	0	16.143	0.033986	2.894417
10 - 08	0.402443	0.511198	0.511198	0	16.20084	0.06002	3.303439
10 - 09	0.213539	0.51224	0.51224	0	16.68538	0.15229	2.208782
10 - 10	0.213662	0.475685	0.235065	0.24062	16.88259	0.125475	2.512686
10 - 11	0.226887	0.282939	0.083985	0.198954	16.72978	0.162993	0.345752
10 - 12	0.757104	0.751886	0.529975	0.22191	17.22151	0.094233	4.625117