The Bond-to-Total Debt Ratio and its Impact on Firms' Performance

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Summary

In this study we are investigating whether the bond-to-total debt ratio impacts firms’ performance. We are also asking if this relationship might differ during economic states of recession, due to the impacts of the latest financial crisis. The choice of topic stemmed from the opening of the new First North Bond Market in Sweden, in combination with the implications of the Basel III Accords coming into force in the Swedish financial market this year. When firms have less access to bank loans but easier access to a bond market, it is important to know whether issuing bonds could have an impact on the firms. Due to the limited amount of data from the young Swedish bond market, the study was conducted on the Norwegian market, in which a well-developed and mature corporate bond market is established. The choice was further supported by the fact that the countries’ socio-economic and financial environments are quite similar.

Our methodological views of positivism and objectivism guided us through our literature review in search for theories. A deductive approach was taken in order to generate hypotheses to test. Grand theories of capital structure and contingency theories of performance determinants served as the basis for our selection of research method and theoretical framework. Due to the lack of a middle-range theory that explains the effects of the relationship we wanted to test, our aim was to fill in this research gap with our study.

In order to test the significance of the correlation between the ratio and performance, a quantitative study was conducted through a multiple regression analysis. The results were consistent, as none of the tests performed were able to give significant correlations for the relationship. We could thus conclude that, in the Norwegian context, the bond-to-total debt ratio did not seem to impact firms’ performance.

Our tests showed an insignificant relationship between the bond-to-total debt ratio and firm performance. This result indicates that practitioners within the field do not have to worry about whether bonds will impact their performance. It also indicates that grand theories within capital structure do not need to be supplemented with further explanation of how they are affected by bonds. Our insignificant results could therefore not contribute with a middle-range theory to the field of finance. However, our findings can still be considered filling in the missing pieces of understanding the link between debt structure and firm performance, hence constituting new knowledge.
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1. Introduction

In this initial chapter, the reader gains an insight to the chosen topic, the background behind it and why it is of great importance. The problematization discusses the existing knowledge and previous research within the field, points out the research gap and leads up to the research question. Furthermore, the purpose and delimitations of the research are presented before the contribution of it is set forth. Concluding this chapter is a short explanation of the disposition of the thesis.

1.1 Choice of Topic

In the aftermath of the financial crisis, the field of finance and what type of financial instruments to employ, has become the centre of interest and concern for researchers, policy-makers and players on the market. This thesis investigates whether the bond-to-total debt ratio could have an effect on a firm’s performance. This is valuable to know, in particular for Swedish firms, due to the fact that the new Basel III accords (further explained in section 1.2) start to apply on the Swedish market 2013.

One of the implications of the Basel III accords is that it will become more difficult for firms with lower creditworthiness to receive bank loans in order to finance their operations. It is therefore predicted that the use of market debt will increase, which justifies the investigation of whether there are implications of having a higher bond-to-total debt ratio for firms. The Swedish high-yield bond market has until recently been almost non-existent (Boisen & Karlsson, 2003), whereas the Norwegian high-yield bond market is mature and well developed (Oslo Børs, 2013). We believe findings in Norway might be helpful for firms in the Swedish financial market, as the countries have societies and market conditions that are rather similar. As the problem is that we do not know if having more bonds within the debt structure have any effect on firms’ performance, this study investigates if this relationship affects Norwegian firms’ performance in order to be able to give Norwegian firms, and maybe also Swedish firms, practical advice. Corporate culture of issuing bonds has not been that common in Sweden, however, as the new regulations come into force the predictions are that this will change. We discuss these issues further in section 1.2.

Previous studies within the fields of capital structure and performance determinants have been of great interest and widely researched. Other studies have shown whether a firm’s capital structure can impact its performance, however few have focused on the different debt instruments and whether they could affect a firm’s performance. Studies have been conducted based on different maturities of the debt (Titman & Wessels, 2012), although, the focus on what type of debt, and the bond-to-total debt ratio in particular, is an unexplored area. This therefore implies that there exists a research gap that needs to be explored. By conducting a study on this relationship, we contribute to the field of capital structure research. We will give a further understanding to the topic, specifically how the debt choices within the capital structure can affect a firm’s performance. The existing academic knowledge has succeeded in creating grand theories of capital structure and contingency theories for determinants of performance. We are however lacking some middle-range theory that can explain how the different types of debt within the capital structure ultimately affect the performance of firms. This
is how and where we contribute to the academic field of research with our study. These different types of theories are further explained in section 2.2.

By conducting a quantitative study on the Norwegian market, examining the correlation the bond-to-total debt ratio of the firms have with their performance (in terms of profitability), we hope to be able to learn more about what effects issuing bonds instead of borrowing from a bank could have for the Norwegian firms, and maybe also the Swedish firms, concerned with this issue. Not only is this issue of interest for the practitioners, but also for the policy-makers within the firms and the policy-makers in the financial markets who set the conditions for operating on the market.

1.2 Problem Background

During the last couple of decades the world of business have experienced more and more integration of financial markets due to technological development and improvements. This phenomenon is commonly referred to as globalisation. In general it has been seen as something positive and developing for the business life, as it brings a lot of new possibilities for firms. It has also enhanced the economic growth in developing countries. Recently, however, we have experienced more and more drawbacks due to the globalisation effect and negative aspects have surfaced (Levine Institute, 2013). Lower transaction costs and transportation costs have enabled businesses and production sites to move to other countries where labour costs are lower (Daniels et al., 2008, p. 194). This results in lost jobs in the country of origin, although, it also creates new job opportunities in the developing countries. However, this raises ethical issues that are becoming an increasingly important problem. For example, workers in developing countries are being paid less than workers in the home country, for performing the same job. At the same time, the international firms can offer the local workers slightly higher wages than the local firms, which creates competition for the local firms who find it difficult to retain workers, and thus survive. Further, multinational corporations and globally integrated enterprises are growing and becoming more common in our society due to the ease of globalizing today. Small local firms, who cannot exploit the opportunities that economies of scale bring, will have problems surviving when their operating costs are increasing (Daniels et al., 2008, p. 195).

As the globalisation has kept erasing barriers between countries, the demand for more integrated financial markets has risen and created a complex relationship of dependence between markets (Lane & Milesi-Ferretti, 2003, p. 1). The integration of financial markets was for a long time seen as something that enhanced opportunities for growth, and deregulation of financial markets was increasingly encouraged (Reger et al., 1992, p. 189). However, we recently learned that the risk of contagion grew into unexpected and unwanted levels. One of the biggest negative events in the financial history was the late 2007-2008 credit crunch and financial crisis that turned most of the world’s biggest economies into a recession (Bodie et al., 2011, p. 50). Risks spread throughout the financial system by increased securitization of assets, which means that assets with different risks were packaged together and sold off in shares to investors. Mortgage loans with low credit worthiness were packaged together into collateralized debt obligations (CDOs), which enabled the credit rating agencies to misunderstand the high risks of the complex security and rate them with an investment grade. The vastly spread risks across the world were uncovered when the mortgage loans defaulted and the
CDOs became worthless (Bodie et al., 2011, p. 46-49). The integration of the financial markets and the vastly spread risks across the world, revealed the devastating consequences that globalisation could incur on individual financial markets. The global financial crisis not only affected financial institutions and other big organisations, but in turn eventually also individual investors and private people as the value of their assets could decrease a great deal (Bodie et al., 2011, p. 50).

As the true reasons and the persistent consequences of the crisis were revealed, regulatory authorities saw a need for increasing financial regulations in order to prevent the same thing from happening again. The Basel Committee on Banking Supervision, which is a banking supervisory authority, consisting of member countries’ central bank governors, has continuously been working on setting up frameworks of regulations for the financial institutions to follow. The latest accords, Basel III, start to apply in 2013 in some countries, there among Sweden, and should be fully implemented by 2017. Basel III has not only included the previous frameworks for assessing market, credit and operational risks, but also tightened the capital requirements and included liquidity risk in terms of a coverage ratio (Bank for International Settlements, 2013).

The implications of this on the Swedish financial market are that banks will become more reluctant to give loans to firms with low credit accountability (Baldwin, 2012). It becomes interesting to see how it will affect the Swedish corporate culture that has long been in favour of taking on bank debt as primary finances (Boisen & Karlsson, 2003). As the implementation of the Basel III accords commends, the firms will therefore need to find alternative ways of financing their activities (the choice of finances are further explained in the theoretical chapter, section 3.1). The firms’ remaining financing choices are between raising more equity or issuing other types of debt instruments, if bank loans are unavailable. Given the choice between raising equity or issuing debt, as the pecking order theory introduced by Myers in 1984 says, firms prefer to issue debt, rather than raising equity (Myers, 1984). We will therefore most likely see an increase in the use of other debt instruments in Sweden after the Basel III accords come into force. The questions that appear are then; what type of other debt instruments will firms prefer, how will the capital structure change and what effect will this have on firms’ performance?

The different types of debt instruments available to a firm are outlined in the theoretical chapter, section 3.2.1. However, one good and cheap alternative of debt instrument is issuing corporate bonds, where companies borrow money from private investors and in return pay an interest to these investors. Firms that have lower credit worthiness and induce higher risks of defaulting on their loan payments issue what is referred to as high-yield or junk bonds. These high-yield bonds offer, as the name implies, a higher return to investors in order to compensate for the higher risks undertaken. The specifics of corporate bonds are presented more in detail in section 3.2.3 in the theoretical chapter. Issuing corporate bonds is not unconditional however. The existing security exchange markets have high demands on the issuing participants on their market, in terms of legal and disclosure requirements (Nasdaq OMX Group Inc., 2013). As high growth firms and SMEs might not have the same opportunity to fulfil these requirements, specific markets for high-yield bonds with lower registration requirements have emerged and enabled firms to access private investors more efficiently (Nasdaq OMX Group Inc., 2013).
Norway, Sweden’s neighbouring country have had their high-yield corporate bond market, Oslo ABM, running since 2005 and have experienced great success in volumes and reached a mature stage. The requirements for firms issuing bonds on Oslo ABM are constructed so that investors still have the information and fair conditions required in order to make good investment decisions, at the same time as the issuing firms can access funds as fast and easy as possible (Oslo Børs, 2013). Sweden has until recently been lagging behind in the area of high-yield bond markets, due to the low demand from firms. However, this might change as the Basel III accords have attracted the introduction of the first high-yield bond market in Sweden, the “First North Bond Market”. This market opened on December 10th 2012, as an answer to the new bank regulations, incorporating both Stockholm and Copenhagen OMX at the same time (Joons, 2012). According to Fredrik von Platen (2012), responsible for “First North Bond Market”, this is a good market for firms in need of capital. The high-yield bond market in Sweden is similar to the Norwegian Oslo ABM due to its flexible listing requirements (Nasdaq OMX Group Inc., 2013). There is therefore reason to believe that the market for corporate bonds in Sweden will increase, when looking at the Norwegian experience combined with the changing financial environment in Sweden. If the predictions are correct, the bond-to-debt ratio of Swedish firm’s will increase and change the componential allocation that capital structure theories are based on today.

1.3 Problematization & Research Questions

Capital structure is an issue that has been thoroughly researched for many decades, but is yet a phenomenon that puzzles both practitioners and researchers within the field. Capital structure is the division of a firm’s assets between debt and equity, and the focus of interest has been on how it affects different aspects of firms’ existence. Among the first and most famous theories dealing with capital structure choices was Modigliani and Miller’s Propositions I and II. Their Propositions regard the value of the firm and the cost of capital used to calculate its value (Modigliani & Miller, 1958). These propositions aim at explaining how and if the value of a firm could be affected by the choice of capital structure. In the field of financial research, people have tried to find the optimal capital structure, which could maximize the value of the company. Even though there still seems to be no proof of what an optimal capital structure is, we can conclude that capital structure affects the value of a firm. Theories on capital structure give us proof that debt in general has an effect on a firm’s performance, which therefore makes them necessary for our research.

The connection between the capital structure theories is that they all strive to prove how a firm selects its capital structure. This is an important issue as one goal for companies is to achieve high performance and profitability, and previous research has shown that capital structure is one of the determinants of firm performance. If and How capital structure affects performance still comprises a research gap in many countries and industries. Different studies on different populations have given contradicting results, which makes this issue an interesting one. Gleason et al. (2000), for example, found with their study that capital structure affects firms’ ability to perform, and that most firms would perform better by employing less debt. However, one of the contradicting studies, by Dessi & Robertson (2003), found that higher leverage has a positive impact on a firm’s performance instead. As we can see, the results vary and since the new market conditions implied by the Basel III accords might change firms’ capital structure, it is likely that they will also have an effect on their performance. However,
what the actual effect of this will be for Swedish firms in the future is still to be investigated, which suggests a research gap.

The question of whether the specific debt structure within the capital structure has any significant impact on firms’ performance is something that the studies mentioned above have not addressed. It is therefore interesting to look at the debt structure and if it affects a firm’s performance. Studies have been conducted on debt structure in terms of the different maturities of debt, and what the optimal debt maturity level is. Such studies include Leland & Toft (1996), where it is found that longer-term debt exploits the tax advantage of debt more than shorter-term debt does. Short-term debt, however, reduces what the authors refer to as “asset substitution” agency costs, and the optimal maturity structure of debt should be the balance between these different maturity advantages. Titman & Wessels (2012) are other researchers that have looked at the maturity structure of debt. They found that small firms have higher transaction costs, which make them employ less short-term debt in order to avoid transaction costs too often. Bigger firms, however, have generally lower transaction costs and hence can afford to take on more short-term debt. Other studies on debt structure looks at the optimal debt structure in terms of an optimal number of creditors to employ (Bolton & Scharfstein, 1996; Petersen & Rajan, 1994), optimal debt structure depending on tax brackets (Auerbach, 1985) and optimal debt structure depending on a firm’s bargaining strength (Hackbarth, et al., 2007).

What is yet to be researched is whether different types of debt employed by firms have an impact on firms’ performance. This is where we have found a research gap in the existing theory on the topic of capital structure and financial performance. This angle of research is extremely topical in today’s financial environment, as new regulations have altered the conditions for firms to finance their operations. When firms face new choices, we believe they benefit from knowing whether it matters for their performance what type of other debt instruments they employ.

Issuing corporate high-yield bonds will most likely be the new choice of financing due to easily accessible bond markets and the low costs associated with issuing bonds (further explained in section 3.2.3). This is one reason why we find it interesting to look at how the specific structure of bond-to-total-debt ratio affects firms’ performance. This is the ratio that we will be able to see significant increases in, if predictions are true. Another reason why we want to focus on the bond-to-debt ratio is due to its transparency. There are many ways other types of debt could be hidden off a firm’s balance sheet (Brealey, 2011, p. 381), which would create problems in terms of validating the results of our study. Bonds require market listings, which naturally unable any creative accounting practices that would hide assets from the balance sheet.

Finally, since the financial crisis has been one of the reasons for this choice of research topic, we believe that it would be interesting to see whether the bond-to-total debt ratio relationship with firm performance differ during different economic states. Simerly & Li (2000) showed that the capital structure’s effect on performance could differ depending on the financial climate the firm is operating in. This points us towards another research gap, namely whether the bond-to-total debt ratio has an effect on firms’ performance during a financial crisis.
Given the previous discussions, we have pointed out a number of research gaps and issues that have directed us towards the two research questions that we have generated. The combination of the lack of knowledge in: optimal capital structure theory, capital structure effects on performance, optimal debt type structure, new regulations and market conditions, are the main reasons behind our first research question. The lack of knowledge of specific debt types effect on performance in combination with current experiences from the financial crisis lay the ground for our second research question.

The two research questions are:

**“Does the bond-to-total debt ratio impact the performance of a firm?”**

**“Are there any significant differences on this relationship during economic states of recession?”**

It is important to ask both questions, as it is not certain that the answer to the first question holds under an economic state of recession. As the subsequent chapter 3 will show, in sections 3.4.1, 3.4.2 and 3.5 it is in general suggested that macro-economic conditions affect firm performance but that has not been tested for the relationship between the bond-to-total debt ratio and performance. Instead of having a main question and a sub-question, or having the second question as a mere purpose of our study, we have chosen to ask both research questions. The reason for this is because we believe the answer to the second question is not only a bi-product that might be interesting for someone to know, but it is something we want to know right now due to its topical status. We have therefore chosen to ask the two questions and assess them on an equally important level.

In order to answer our research questions, we study a population consisting of Norwegian firms who have issued bonds between 2007 and 2011 on the Norwegian high-yield bond market Oslo ABM, and firms listed on the Norwegian stock market Oslo Børs. The questions will therefore be addressed and answered in the Norwegian context with answers that might be beneficial for Swedish firms. We use a multiple regression model with control variables in order to check the correlation between the bond-to-total debt ratio and firm performance, which will help us answer our research questions. However, it should be pointed out that Sweden and Norway were hit differently during the crisis. Due to Norway’s oil resources, and the continuously high demand for it, they were able to better withstand the financial crisis compared to Sweden (Ekonomifakta, 2009). Therefore, any significant findings on this relationship during this period in Norway should be considered with caution by Swedish firms.

1.4 Purpose

The purpose of this study is to investigate whether the proportion of a firm’s amount of bonds to its total debt has any effect on its performance. We want to investigate whether it is beneficial for a firm to have a lower or higher level of its debt in bonds, and thus find out whether the construction of a firm’s debt components has an effect on its financial performance. The purpose is to contribute with knowledge both to practitioners within the field who struggle with capital structure decisions, as well as to the academic field of capital structure and performance. The purpose of the second
research question is to find out whether our findings from the first research question would be any different during times of economic recession.

The idea is that this information could be beneficial for Norwegian firms that are considering what type of financing to use. In addition, it might also be beneficial for Swedish firms who due to the introduction of the Basel III regulations might have difficulties retrieving a bank loan, and thus needs to find alternative sources of financing. The purpose of this study is therefore also that it might give the Norwegian firms, and hopefully also the Swedish firms, information about whether issuing more bonds affects their financial performance.

1.5 Delimitations

This thesis studies firms listed on the Norwegian markets Oslo ABM and Oslo Børs, in order to measure the relationship between bond-to-total debt ratios against the performance of the firms. By including firms from Oslo ABM we make sure that firms who have issued bonds are part of our sample, and adding firms from Oslo Børs to our sample provide us with ordinary Norwegian firms that may or may not have issued bonds. This enable us to tell whether the firms’ performance differ as a result of their different bond-to-total debt ratios. Only Norwegian firms (domestic or international) and non-financial institutions (such as banks) are studied, due to their different operational function on the market. The data collection is also limited on a time interval for the observations, due to the availability of data to be kept sufficient.

The reason why we chose to perform our study in Norway was because their bond market is efficient, flexible and mature, with most issuers from the Nordic countries (Oslo Børs, 2013). This is suitable for us as a study like ours have to be executed in a country that has an existing and established bond market. It would not be possible to carry out our study in a country where the bond market is close to non-existing. This is also the reason why our study cannot be executed in Sweden, where the bond market is not yet well established. Another reason why we chose Norway is due to the similarities between Oslo ABM and the First North Bond Market that recently opened in Sweden and Denmark. They both provide a flexible bond market for firms that wish to issue bonds, and the results from the Norwegian market might be seen as a predictor of how the results will be for firms listing in Sweden and the First North Bond Market. These findings might therefore be useful for Swedish firms when evaluating what source of financing they should employ. In addition, they will most definitely be useful for Norwegian firms when evaluating what source of financing to employ.

We are fully aware that the results from this study cannot be fully transferred to Sweden, as Norway and Sweden are not the same country. A study can only be generalized for the country in which it has taken place, given that the quality criteria have been fulfilled. However, we do believe that the results in Norway can to a certain extent be useful for Swedish firms. The reason why we believe this is that Norway and Sweden are two rather similar countries, however with certain differences in the industry structures. Sweden and Norway are both Nordic countries with similar languages, a big public sector and social welfare services. Both countries are also dependent on international trade and exert high taxation (The Nordic Council & Nordic Council of Ministers, 2013). Further, if we look at the division of firms between the different industries/categories on Oslo Børs and Nasdaq OMX Nordic (Swedish firms),
expressed in percentage, they are rather similar (Oslo Børs, 2013; Nasdaq OMX, 2013). This indicates that there are some similarities between the countries. Even though the Norwegian bond market is more mature, we believe that the implementation of the new regulations will most likely increase the Swedish bond market and create a culture where bonds are more commonly used. We therefore believe that the result from our study on Norwegian bonds can be useful for Swedish firms.

The study is delimited to only analyse one type of capital structure component on the liability-side of the balance sheet, which is bonds. The reason is because many studies have attempted to explain how capital structure as a whole impacts the performance of firms, and also how different types of maturities of debt affect performance. However, little has been focused on the specific characteristics of debt instruments. The focus on bonds, rather than other debt instruments, is due to the transparency of bonds, which some other debt instruments are lacking, and the present expectations on bonds upswing in the Swedish market.

1.6 Contribution

Our study is a contribution to the academic research topic on capital structure and its relationship with firms’ performance. It digs deeper into this relationship by investigating whether the components within debt have an impact on a firm’s performance. This is a relationship that is yet to be investigated, and the results therefore contribute to this area of research. As there are many grand theories existing on capital structure and contingency theories on determinants of performance, we might be able to contribute with a middle-range theory that can explain if a specific debt instrument, namely bonds, affects firms’ performance. We have found middle-range theories explaining other factors and characteristics of debt and their effect on firm performance, but there is a gap when it comes to theories explaining how debt types, and especially bonds, affect performance. It is also found to be missing middle-range theories explaining whether this relationship could change during different economic states, which is a research gap we also address and contribute with knowledge to. Our chosen area of research fills the gaps of research that we have found in existing capital structure and performance theory.

This study is also aimed at giving a practical contribution to practitioners within the field of business. This research could help firms in their future capital structure choices. By examining the impact the bond-to-total debt ratio has on Norwegian firms performance, the firms will be able to use this information when deciding how to finance their operations. In addition, Swedish firms within the new financial context applied from 2013 could possibly also use this information when deciding how to finance their operations in the future. Our study will help the firms realize the effects that issuing bonds might have on their future performance. Not only is this valuable information for the Norwegian and the Swedish firms, but also other countries, that are similar in terms of financial and economic environments and social behaviour, that could make use of this information.
1.7 Disposition

In the following chapters, we have chosen to split up the methodological part into a theoretical method and a practical method, with the theories relevant for this thesis presented in between. We believe this suits the research better because it follows more naturally to deal with the theoretical chapters before deciding upon the practical method used to go about and conduct the study. By first dealing with our methodological views and strategies for literature review, we can understand the relevant theories presented better. By reviewing the theories before selecting practical method for the study, we are able to gain more knowledge on the topic, the variables to consider, and learn what methods other researchers have successfully employed. After having dealt with theoretical and practical issues, we present the empirical part, analysis of the results and discuss the findings. Thereafter we analyze the quality of our research, before we present the conclusion where the research questions are answered. Finally, the limitations of our study and suggestions for further research are presented.
2. Theoretical Research Methods and Methodology

In this chapter, the reader is introduced to the methodology considered for this research. The initial section gives the reader an understanding of the role of theory, the process and aim of this sort of business research and what kind of knowledge contribution it applies. In the second section, we discuss what type of theory this study is concerned with, in order to clarify the theoretical focus of this research. The two following sections then present and clarify our ontological and epistemological considerations that influence our research. Lastly in this chapter we present the relevance of our literature review, how we searched for the resources and how we were critical to the resources used as a basis for this research.

2.1 Research Methods for Business Administration

Scholars and readers of this research might have very different backgrounds and have many different views upon existence in the world, how knowledge is determined and the role of theory when it comes to both research and reality. In order for the reader of this thesis to be able to follow our reasoning, choice of research methods and knowledge creation, we explain and argue for the views on the methodological assumptions that have influenced this research.

Research within business administration is a practice that somewhat differs from other academic research methods/approaches. Gibbons et al. suggest two types of categories for knowledge production, which are referred to as Mode 1 and Mode 2 (cited in Saunders et al, 2009, p. 6). Mode 1 is supposedly making a distinction between theoretical knowledge and practically applied knowledge and the academic audience is viewed as the primary consumer of knowledge. Theory is said to be derived based on existing knowledge in a straight manner and little does it emphasize the practical applicability of it (Bryman & Bell, 2011, p. 6).

The second mode on the other hand, is trying to mix the academic and practical contribution and use both fields to derive readily applicable theories to be of advantage for practice. It is more of a process bouncing between what is known and what is practised in order to produce knowledge. The audience is therefore of a wider base as well, where practitioners, academics and policy-makers are involved (Bryman & Bell, 2011, p. 6).

The two modes are supposed to complement each other, rather than compete with each other. However, in the field of business research, Tranfield and Starkey (1998, cited in Bryman & Bell, 2011, p.7) argues that the more natural and suitable way of producing knowledge seem to be the process used in Mode 2. For this Degree Project, one of the criteria for the knowledge developed is that it should deal with solving practical problems. This is not in line with Mode 1, which made a distinction between theoretical knowledge and practically applied knowledge. We therefore use a Mode 2-approach for our research, since we use existing theory to generate hypotheses, that we thereafter can test in practice and generate knowledge that could be referred to both in academics and
the real business world. As our main audience are the firms in the market, focusing on the practical applicability of the knowledge we produce with this study is of great focus.

2.2 Linking Theory and Research

When considering our view on the connection between theory and research, we first have to define what sort of theory we are thinking about. There is a common distinction between what Merton (1967, cited in Bryman & Bell, 2011, p.8), in his “On Theoretical Sociology”, called middle-ranged theories and grand theories. At the end of the spectrum, closest to reality, we can find what is referred to as contingency theories. These are theories that are only applicable for a certain organisation or person’s behaviour and can thus not be generalized (Pinder & Moore, 1979, p. 100). Grand theories are more general and abstract when relating theory with research findings, more constituting a perspective on theory. Grand theories are difficult to use in order to explain social concepts and relationships because they are far away from what real empirics tells us. The gap between grand theories, contingency theories and empirical findings is where the middle-ranged theories find their place. Middle-ranged theories aim at explaining and understanding the social patterns in specific situations, such as management and business operations (Bryman & Bell, 2011, p. 9). Pinder and Moore (1979, p. 100) further explain middle-ranged theories to “predict and explain only a subset of all organizational phenomena”. One middle-ranged theory can therefore be based on one set of assumptions about an organisation, which makes the practical advice of that middle-ranged theory completely different from another.

In our research field, we need to find a number of different middle-ranged theories explaining parts necessary around our topic, to use as a framework in order for us to be able to draw conclusions and generate hypotheses. Our findings of this research might then in itself constitute a middle-ranged theory, explaining the specific relationship between debt structure and firm performance. This way of creating a middle-ranged theory is in accordance with how Pinder and Moore (1979, pp. 100-101) suggest one of the strategies to be. By combining the two other approaches of developed theories for particular phenomena with theories for particular populations, we can create our new middle-ranged theory for the subject studied.

Having dealt with what kind of theories we deal with in our research, it is in order to discuss the matter of whether we collect data to build a new theory, or to be able to test existing theory. That is, will we conduct a study based on induction or deduction? As we create a conceptual framework based on existing theory, collect data and look at what the relationship’s strength in our findings tells us, our approach certainly is of a deductive theory (Saunders et al., 2009, p. 124). Based on our findings we will be able to confirm or reject our hypotheses. Depending on the results of the hypotheses tests, we will discuss and reflect on what the reasons for the results could be and what the consequences of them are for the middle-range theory and practice. The implications of our study constitute the academic contribution, which will be compared with the old theories. The deduction of hypotheses helps guide us in the choice of process to collect the data, which is discussed in chapter 4, the Practical Method. However, as we will try to transfer the knowledge gained from the Norwegian market on to the Swedish market, this could be seen as an inductive part of our research and the purpose (Saunders et al., 2009, p. 124).
2.3 Research Philosophy

When conducting research it is important to determine the research philosophy that is adopted. As it carries significant assumptions regarding how a researcher views the world, and it will therefore support and validate the research strategy and the methods that are adopted as part of that strategy (Saunders et al., 2009, p. 108). Understanding the philosophies and terms that we are using is very important. They all have different purposes and if they are not understood correctly they cannot be applied properly. If the philosophies and terms are not applied properly researchers generate studies that cannot be defended (Grix, 2002, p. 176). We have therefore evaluated and created an understanding of the different research philosophies, in order to adopt the philosophies that are most suitable for our research. Our research philosophies are presented below.

2.3.1 Ontological Considerations

Ontology is the philosophical view on social phenomenon’s existence or being that the researcher holds. It is the study about what we perceive is real and what is not (Ryan, et al., 2002, p. 13). The view on whether or not social phenomena are created by the social beings in the world, or if social phenomena exist objectively by itself, is a central point of departure for research (Bryman & Bell, 2011, p. 20). The view we as researchers have on entities existence is of great importance for the process of conducting and assessing our research. It will influence the way we believe knowledge can and should be determined, i.e. our epistemology. Our view is that social phenomena, such as an organisation or the macro economy, exists independently from the social actors and should be referred to as tangible objects. This view is commonly referred to as objectivism (Saunders et al., 2009, p. 110). It is the complete opposite of subjectivism, where it is believed that we as social beings are continuously creating and affecting the characteristics and behaviour of social phenomena (Saunders et al., 2009, p. 110). An objectivistic view of the world allows us to test the relationship strength between variables’ and the firm’s performance. In addition, it enables us determine if the bond ratio has an effect on performance, which answers our research question. If we were to use subjectivism, we would focus on how these social phenomena interact, and how they are created by the social actors within them. This would enable us to answer how and why the relationships interact the way they do, but this is not the purpose of our research question. A subjective view is thus impossible for us to have, in order to conduct this research, as it does not help us answer the research question.

Why we here in our research believe that an organisation, for example, exists separately from its members, is because we want to focus on the strength of a relationship between two variables. Our purpose is not to answer why the relationship exists, but rather to answer if it exists, which is why we need to look at the existence of the phenomenon objectively. We must therefore believe that a firm has a specified and standardized way of operating, following its rules and procedures for achieving its goal independently in order to interpret it. The human beings, who are the social actors participating in these parts, are only doing their job and if they do not follow the mission of the firm they are replaced. This means that we as social beings do not continuously create and affect the characteristics and behaviour of social phenomena, which further proves why subjectivism is not consistent with our research.

The debt structure of the firm exists independently of its actors and is decided in order to enable the firm to reach its goal, which should be profit maximization. By having an
objective ontological view on social phenomena’s existence, we are able to justify our findings on the relationship between a firm’s debt structure and its performance, in accordance with our epistemological view that is presented below.

2.3.2 Epistemological Considerations

When conducting research, we need to clarify what we believe should be or is considered acceptable knowledge in the world of social sciences, and more specifically business science. Social science differs from natural science in a sense that people can have different views upon how knowledge is determined as fact. In our study, we have a positivistic view on the construction and consideration of what is knowledge. Positivism believes that social sciences can be studied in the same way as natural sciences are studied, meaning that only what we can experience and confirm with our senses is to be considered knowledge (Saunders et al., 2009, p. 112-113).

Existing theory on the phenomenon will help us generate hypotheses that are then to be tested and proven before it can be considered acceptable as general knowledge (Saunders et al., 2009, p. 113). This view of knowledge and the way it is confirmed is therefore coherent with our way of thinking about knowledge and how we will create knowledge with our research findings. We use theory to generate hypotheses about our subject, which we confirm or reject by tests with real data that we can observe on the market. However, we must keep in mind that the theories used might not be correct, and that the hypotheses formulated based on those theories can consequently be incorrect. It is therefore possible to accept a hypothesis that is incorrect even when the test indicates that it is correct, this is referred to as a Type I error (Saunders et al., 2009, p. 452). This can also incur if the data collection is not collected in a proper manner. We must therefore make sure that we are careful and consistent when collecting our data. This view, on how we create knowledge, is also coherent with the deductive approach we use.

Another element needed for positivism is that the scientific research must be conducted objectively, in a “value-free way” (Saunders et al., 2009, p. 11). This means, we as researchers must be completely impartial and have no presumptions about the relationships and phenomenon studied, in order to be able to analyse the findings objectively and create valid knowledge. The objectively tested and confirmed knowledge, reached by the deductive approach, is thereafter used as a base for constructing new theories if needed, which complies with the last element in our research approach of induction, as described in the section above. Since we do not have any preconceived beliefs about the subject, we believe we can be as objective as possible. Our positivistic view is transparent throughout the entire thesis. The appropriateness of the theories will be discussed based on our views, as well as how we analyse and conclude our findings.

The purpose of our research is to objectively see whether or not a firm’s bond structure has an impact on its performance, so our positivistic view is therefore clear. We do not aim at explaining what causes what and why, in the relationships we might find, which is more an element of realism. However, in order to be able to test if this relationship exists, we have already assumed that the bond-to-total debt ratio is the independent variable that will affect the dependent variable firm performance. Hence, we are not investigating the causality, we are only asking if this type of relationship exists. Realism
and Positivism are very close, but different, views. Both views support the natural science approach to determine what is knowledge applied on social sciences, where only what can be proven by our senses is accepted. What distinguishes realism from positivism is the view upon the observers’ state of mind. Realists believe that the process of learning affects objectivism, this ultimately means that the researcher becomes subjective (Fisher, 2007, p. 42).

The core view of our state of mind is that social science can be studied as natural science. This is why the view of interpretivism has not been considered at all. Interpretivism is a view where one clearly puts a distinction between the way knowledge within the social sciences and natural sciences are determined. Interpretivists’ appreciate that people are subjective and acts on social behavioural patterns. This is why interpretivists’ believe social phenomena must be studied with a completely different logic than natural objects in order to understand, rather than to explain (Bryman & Bell, 2011, p. 16-17). We can thus conclude that by applying a positivistic view we are able to answer our research questions better than if any other view was applied.

2.4 Literature Review

Doing a literature review is one of the most important steps when conducting a research. There are many reasons to why it is important, one being that you do not want to conduct a study on something that has already been researched, because you want to be able to present something new. A literature review also gives you an opportunity to learn from other peoples’ mistakes and conduct research in a more proper manner. You can learn about methodological approaches, find variables that you normally would not have considered, and also learn what is relevant for our type of research (Bryman & Bell, 2011, p.103).

In the initial stage of our research project, we were able to get an overview of our topic of interest - capital structure - when reviewing the existing literature. This has helped us increase our credibility as knowledgeable researchers within the field of study. We were able to learn what the recent concerns have been, as well as what have always been the concerns within the field. The literature review helped us find research gaps, which we then could use as a basis for justifying our research question. This enabled us to argue for its significance to both academics and practitioners. Looking at recent studies, older theories and academic research articles also helped us figure out what the appropriate research design would be for our study and how the relevant data should be collected.

Doing a literature review is quite heavy work and consumes a lot of time, as the focus should be on interpretation of other peoples work. Two broad classifications of doing a literature review are systematic review and narrative review. If the focus of your research is on understanding, having an inductive approach to it, a narrative research where the search is more wide and focusing on gaining a general impression could be appropriate. If the focus is rather on generating knowledge, by using a deductive approach, a systematic review suits well, where the search is very focused on the specific subject (Bryman & Bell, 2011, p. 96-100).

A systematic review should be clearly defined and structured in a pre-specified way, but is very difficult and time-consuming to conduct for students writing their thesis. A panel
should for example be involved during the review for discussions on the validity of sources and how to narrow the search with what key words. The main idea of a systematic review is that it should provide an audit trail of all the researcher's decisions and criteria for scrutinizing and deciding on relevant sources, in order for the review to be fully transparent and replicable (Bryman & Bell, 2011, p. 96-100).

In our case, as we already had our topic of interest clear, and are focusing on generating a hands-on practical knowledge for practitioners within financial decisions, as well as complementing the capital structure puzzle with further knowledge, we felt that doing a systematic review to the best of our ability would be appropriate and time-saving. We had quite good basic knowledge within the field from our university studies. We could therefore start from the angle of using key words for our initial search, in order to narrow down the topic and eventually finding a research gap. The key words we used in our searches were: capital structure, performance, debt, leverage, bonds, high yield, firms, performance measures, performance determinants, capital structure determinants, debt performance, and combinations of these.

We started our literature review by searching for recent student thesis’s within the field, by using the student thesis portal Diva (Uppsala Universitet, 2012), in order to see what had recently been the focus of study in Sweden and what sources had been used. By looking at thesis’s we were also able to see what relevant theories had been used. We could confirm these theories with our own knowledge from previous studies of capital structure, for example that some of the oldest and most famous theories were still valid and relevant. By writing down the sources of the theories that we came across, we noticed which the most commonly used sources were and we could thus review them further.

Next we complemented our initial search by looking for academic articles covering our topic in our university’s online library database (for example EBSCO host) and Google Scholar. We also searched for top journals within the finance field that could give us more clues about recent focuses within our field of interest. The academic journals we looked into were; The Journal of Finance, The Journal of Financial Economics, The Review of Financial Studies, Strategic Management Journal, The Journal of Finance & Quantitative Analysis and The European Journal of Finance. We crosschecked our list of interesting journals with the Academic Journal Quality Guide (Harzing, 2013) in order to verify their credibility as academically approved sources.

When having dealt with the sources for capital structure, and had found the research gap of linking debt structure with firm performance, we could start doing the same process as explained above, for the literature on determinants of firms’ performance and performance measures. We also needed to search for theories and sources covering debt structure alternatives and especially bonds, as this would be the focus within the debt structure.

The extensive search for theories in the literature and previous studies, with relation to our thesis topic, generated in an extensive amount of possible references to use. We had to be critical and make judgements about what to include in order to narrow the resources down and only keep what would actually be relevant for our study. Important sources that had been constantly reoccurring were kept, as the reliability therefore ought to be high. Studies that had not been significantly proven were abolished and also the
ones covering relationships including financial institutions (for technical and environmental reasons). The remaining sources were then checked for peer-reviews and number of citations in order to ensure the accountability of them. The literature review and the selection of sources and references then served as a basis for explaining the theories behind our research topic, and help us generate hypotheses to test. The literature review also helped justify the practical research methods used (which are explained in chapter 4) and the collection, analysis, interpretation and discussion around our findings. Critique against the theories and literature covered are presented in section 3.5 - Theory Discussion & Recent Studies.

The search for literature, theories and articles is an ongoing process throughout the whole research (Saunders et al., 2009, p. 60). In order to certify our process of linking theory with research, not replicating others work, and staying on track to the deductive approach, we stay updated of new publishing’s that could be dealing with our question during the whole research period. We kept looking for literature and new articles throughout the whole research period to certify our work.
3. Theory

The reader is now presented with the relevant theories used as a base for this research article. Three main topics (Capital Structure, Debt Structure and Performance) provide the basis for a theory discussion that acts as the tool for generating the hypotheses presented in the end of this chapter. As our topic has not been previously researched, the theories presented are covering knowledge that will help us motivate and generate the hypotheses. Each theory is ended with a motivation for why it is applicable for our research. Where appropriate, the relevant gaps are pointed out to support our research questions.

3.1 Capital Structure Theory

A firm can finance its operations with either debt or equity. If a firm finances its operation with debt, it is borrowing money from a lender for a certain period of time with a promise to pay the money back. In return the lender receives interest payments on the loan. Equity financing is when shareholders buy shares in the company, becomes owners and in return receive a portion of the firm’s profit. The mixture of debt and equity that a company chooses is referred to as its capital structure (Brealey et al., 2011, p. 32).

As we will see below a firm’s capital structure is an important issue, it has among other things an impact on a firm’s performance (Li & Simerly, 1998, Geroski et al., 1993, Lööf & Heshmati, 2006). If a firm is financed only with equity, it is called an unlevered firm, and if a firm is financed with both debt and equity it is referred to as a levered firm. The leverage a firm takes on is referred to as financial leverage, and it is measured by leverage ratios or debt ratios. Firms use the ratios to monitor their leverage, and to make sure that they are at a satisfactory level. One of the most common ones used is the total debt ratio or the long-term debt ratio. The total debt ratio is calculated by dividing the firm’s total amount of debt with its total amount of assets, using the formula below (Brealey et al., 2011, p. 744-745).

Equation 1. Total Debt Ratio

\[
\text{Total Debt Ratio} = \frac{\text{Total Liabilities}}{\text{Total Assets}}
\]

Brealey et al., 2011, p. 744-745

In finance we talk about the optimal capital structure, which is the capital structure that maximizes a firm’s value. Determining an optimal capital structure is very difficult, and there is no one capital structure theory that is optimal for all firm’s within all industries (Brealey et al., 2011, p. 492). However, it is common for firm’s to use target ratios when determining their capital structure. Firm’s within different industries have different target ratios that they strive to achieve and keep. Industries with tangible assets tend to have higher debt-ratios, as they can use their assets as collateral for loans. Whereas industries that have intangible assets usually have less debt, since they do not have any collateral that can be used in case of a default (Brealey et al., 2011, p. 486).
In addition to target ratios there are other factors that affects a firm’s choice of capital structure. According to Titman & Wessels (1988) factors that can affect a firm’s capital structure are size, profitability, transaction costs and “uniqueness” of a firm’s line of business. An article by Harris & Raviv (1991) summarizes variables that up to that time had been proven to influence capital structure, and those were volatility, profitability, fixed assets, probability of bankruptcy, non-debt tax shields, firm size, investment opportunities, uniqueness of the product, and advertising expenses. In addition, a study by Heshmati (2001) found that the size of the firm, along with growth, tangibility, size, profitability, non-debt tax shields and age affects a firm’s capital structure. We can thus see that there are many different variables that can have an effect on a firm’s capital structure.

In this thesis we are investigating whether the type of debt within the capital structure has an impact on a firm’s performance. In order to do so we must first understand the theories that explain a firm’s choice of capital structure, to see when and why a firm chooses debt rather than equity to finance its operations. These theories are presented below.

3.1.1 Modigliani & Miller (M&M)

In 1958 Franco Modigliani & Merton H. Miller wrote the article “The cost of capital, corporate finance and the theory of investment”. This article introduced two propositions that had an enormous impact in the field of finance, and that today can be found in finance textbooks used by universities around the world. The propositions regard a firm’s capital structure and its cost of capital in a perfect capital market. The perfect capital market assumes that there are no taxes, no transaction costs and that the borrowing and lending rate is the same for corporations and individuals.

Five years after Modigliani and Miller introduced Proposition I & II they published the article “Corporate Income Taxes and the Cost of Capital: A Correction”. It was an extension and correction of the Propositions that they had introduced five years earlier, where taxes had been included. The inclusion of taxes had an effect on both of the propositions. Below, an explanation of the two propositions, with and without taxes, will be presented.

3.1.1.1 Proposition I

Proposition I state, “the market value of any firm is independent of its capital structure...” (Modigliani & Miller, 1958, p. 268). This means that regardless of how a company is financed, whether it is by equity or a mixture of debt and equity, the value of the firm will remain the same. As we can see in Figure 1 below, the value of the levered and unlevered firm is the same. A company will therefore not benefit from substituting one for the other. Although, keep in mind that these propositions assume a perfect capital market.
When Modigliani and Miller introduced taxes into their proposition in 1963 the result was altered. It was shown that it was beneficial for firms to include debt in their capital structure (Modigliani & Miller, 1963, p. 434). Firms that are partly financed by debt can deduct the interest it pays on its debt, from the tax it has to pay on its income. This is referred to as a tax shield (Penman, 2010, p. 303). It creates a higher total value for a firm that is financed with debt and equity, a leveraged firm, than for a firm that is financed only with equity, an unleveraged firm. Modigliani and Miller claim was thus that it is beneficial for firms to include debt as a mode of financing (Modigliani & Miller, 1963, p. 434).

3.1.1.2 Proposition 2

The second proposition that was introduced by Modigliani and Miller in 1958 regards the cost of equity. The cost of equity is the return that the firm’s shareholders demand on their investment, their required return. According to Modigliani and Miller’s proposition the cost of equity will increase as the proportion of leverage increases, creating a linear relationship between the two (1958, p. 271).

In addition, a firm’s cost of equity is used to calculate the weighted average cost of capital (WACC), which the firm’s average required return to both its shareholders and bondholders. The overall required return of the firm. The WACC is often used by firm’s when evaluating whether an investment is profitable or not, given that it has the same risk as the firm (Brealey et al., 2011, p. 500; Drury, 2005, p. 251). According to Modigliani and Miller this rate is also independent of a firm’s capital structure (1958, p. 268-269). The equation for the WACC (excluding taxes) can be seen below:
Equation 2. PRE-TAX WEIGHTED AVERAGE COST OF CAPITAL (WACC)

\[ WACC = r_E(E/A) + r_D(D/A) \]

Berk et al., 2012, p. 385

Now that the WACC equation have been presented it is easier to understand why it does not change even though debt is increased. The reason for that is that the interest that the firm has to pay on debt is lower than the cost of equity. So when the cost of equity increases, due to an increase in debt, it is offset by the bigger weight that is put on the interest (Brealey et al., 2011, p. 452-453). A better way of understanding how the WACC and the cost of equity change as the capital structure changes is by illustrating them graphically. Figure 2 below demonstrates this relationship:

Figure 2. Modigliani & Miller Proposition II (without taxes)

\[ \text{Hillier et al, 2010, p. 409} \]

The relationship between the cost of equity and the capital structure does not change when taxes are added. However, the WACC does change when taxes are included and Equation 2 above is modified to Equation 3:

Equation 3. AFTER-TAX WEIGHTED AVERAGE COST OF CAPITAL (WACC).

\[ WACC = r_E(E/A) + r_D(1-T_C)(D/A) \]

Berk et al., 2012, p. 391

As mentioned earlier, adding debt creates a tax shield that increases the total value of the firm. For the equation above this means that adding more debt decreases the “debt side” of the equation, however, it will also increase the cost of equity and thus the “equity side”. What the final effect is will depend on what is the bigger, the increase or the decrease. The tax shield tends to be stronger than the increase when the debt level is
low. However, when the debt level reaches a certain level the increase in the cost of equity will be higher than the reduction from the tax shield due to the increased risk of default on the debt payments. The result is a WACC curve that is U-shaped, as demonstrated in Figure 3 below:

Figure 3. Weighted Average Cost of Capital Curve.

Why M&M in our thesis?
M&M shows how the value of a firm affects its choice of capital structure, and that the amount of debt that a firm holds affects its value. This is important knowledge, as a firm wants to maximize its value and its performance. These propositions therefore indicate that having debt (up to a certain level) will increase the value of the firm. In this thesis we want to take this one step further, to see whether the type of debt also will matter to performance. However, in order for that investigation to be justified, there must be proof that debt in general has an effect on a firm’s performance, which these Propositions gives us when taxes are included.

3.1.2 Pecking Order Theory
According to Myers (1984, p. 2) the pecking order theory was first introduced in 1961 by Donaldson, but was later altered and modified by Myers and Maljuf in 1984. The theory regards what type of financing a firm prefers when it is in need of more funding, whether it is internal or external. According to the theory, firms prefer internal funding, that is internally generated funds, rather than external funding. If internal funding cannot be extracted and external funding has to be used, the firm will prefer to issue debt rather than equity (Myers, 1984, p. 2).

The reasons why firm’s have that order of preference have to do with asymmetric information. Asymmetric information occurs because managers have more information than the shareholders about the state of the firm and how well it is doing. The result is therefore that the shareholders will base their belief on the firm’s future on the manager’s actions. The manager’s actions are believed to signal information about the state of the firm. Issuing shares sends a message that the shares are overvalued, whereas
issuing debt does not send any message. Debt issuing is therefore favoured over equity issuing (Brealey et al., 2011, p. 488).

Why Pecking Order in our thesis?
The theory shows in what order financing is preferred, which is important for the determinacy of a firm’s capital structure. It is also shows why debt is preferred over equity and the asymmetric information component on different debt instruments will help justify our hypotheses. Further, depending on what the results of our tests will be our research might be able to give an indication of whether the type of debt the firms utilize should have a pecking order as well.

3.1.3 The Static Trade-off Theory & Financial Distress Costs
The static trade off theory is a theory that tries to explain how a firm can obtain an optimal capital structure, by adjusting their debt and equity levels so there is a balance between the benefits from their tax shield and their financial distress costs. A firm’s tax shield was explained above as the tax savings the firm receives due to the interest it has to pay. Financial distress costs occur when a firm cannot meet or have difficulties meeting the promises it has made to its creditors. According to the theory, the optimal capital structure is reached when the present value of the tax shield is just offset by the present value of the financial distress costs (Myers, 1984, p. 4). It is explained in Equation 4, where $V_L$ is the value of a levered firm and $V_U$ is the value of an unlevered firm:

Equation 4. STATIC TRADE OFF THEORY EQUATION.

$$V_L = V_U + \text{PV(Interest tax shield)} - \text{PV(Financial distress costs)}$$

Berk et al., 2012, p. 480-481

When debt levels are moderate the risk of financial distress is low, the present value of financial distress will therefore also be low. At that point the marginal benefit from the tax savings will be higher than the financial distress cost, and it is beneficial for firms to issue debt. However, as the debt level increases so will the risk of financial distress. It will finally reach a point where the marginal increase in the financial distress cost will offset the marginal tax savings from the tax shield. At this point it will no longer be beneficial for a firm to increase their debt level, as it would mean that the financial distress cost would exceed the tax savings. They have thus reached their optimal debt level (Brealey et al., 2011, p. 475-476). This is best illustrated in Figure 4 below:
The point on the graph where the marginal benefit from increasing debt is just offset by the marginal increase in the financial distress cost has a relation to the weighted average cost of capital (WACC) discussed above. It is the point where the firm value is maximized, and it is therefore also the lowest point on the U-shaped WACC-curve since that point also maximizes value (Hillier, 2010, pp. 443-444). However, firms can have different optimal debt levels due to higher or lower levels of financial distress costs and tax rates. Risky firms with higher financial distress costs cannot keep as much debt as firms with low financial distress costs (Myers, 1984, p. 8-9). This means that the position of the curve illustrated in the graph above will vary depending on how much financial distress costs a firm possesses. Firms with higher distress costs will be positioned lower than the firms with lower financial distress costs (Berk et al., 2012, pp. 481-482). This is illustrated in Figure 5 below:

Figure 5. The Optimal Debt Level with Different Financial Distress Costs
Now that the theory has explained how the firm obtains the optimal capital structure, there is one question that remains. Do firm’s keep these structures? The answer to that question is no. There are random events that occur, which moves the firm away from its optimum and to continuously bring the firm back to it, is costly (Myers, 1984, p. 5). However, there are studies that have found evidence of support of the theory such as Graham & Harvey (2001), and studies that are against it, such as Miller (1977).

Why Static Trade Off Theory in our thesis?
Static trade off theory explains why firms choose different capital structures. It also shows the effect of debt and when it is beneficial. Again it is necessary to show that debt has an impact on performance in order to justify our research, which this theory does.

3.2 Debt Theory

3.2.1 Debt Instruments
A firm issuing debt will give its creditors the primary claim on the assets in case of default. From the creditors perspective, lending capital is therefore a less risky alternative for investment, rather than buying equity. However, the return on debt is lower due to its lower risk, whereas the return on equity could be much higher due to its higher risk of not being repaid the principal amount invested at all (McLaney, 2009, p. 219). From the firm’s perspective, issuing debt signifies that a contract will be entered and the firm is obligated to repay the principal amount at some point in time. During the time until repayment, the creditors often claim some interest on its capital to compensate for it being lent out. Even though the creditors are ensured by having the first claim on assets in case the firm defaults, there is always a risk of the firm becoming insolvent, meaning the assets are worthless, and the creditor might not be able to recover its principal amount. The insolvency risk is higher for firms having a lot of intangible assets, as it cannot be seen as collateral. In addition, debt can be further defined and categorized according to its prioritization of being repaid. Senior debt must be repaid before any junior debt can be repaid. Senior debt holders, such as banks, therefore take on the lowest risk (McLaney, 2009, p.14-15).

There are different types of debt a firm can issue and different debt instruments to choose from. A broad separation is made between market debt (issued to the public) and non-market debt (bank loans). The most common ways of debt financing are borrowing money (bank loan or other loans), issuing bonds, preferred stock, collateralized debt obligations (CDOs), commercial papers, or banker’s acceptances. The specifics of bonds will be further explained in section 3.2.1. Preferred stock is kind of a hybrid between common shares and debt. It has a higher claim on the firm’s assets and earnings than common shares, and is entitled to a fixed dividend (like an interest), although, the holders has no voting rights in the firm. CDOs are sold as a security consisting of a pool of different types of asset-backed debt instruments, with different maturities and different risks associated with them. CDOs therefore consist of different tranches, with different risks and claims. This type of security has become less popular, since it has been blamed for causing the recent financial crisis of 2008, as it spread the risks across financial institutions like a contagion. A commercial paper regularly do not have a maturity longer than 9 months, and its purpose is to enable the firm to meet any current obligations, such as accounts payable, that the firm is temporarily unable to. This type of debt is unsecured, and lower credit rated firms will have problems finding
buyers, without issuing it at a high discount. It is a quick and easy way of financing current liabilities since it usually does not have to be registered with the financial authorities. Banker’s acceptances are similar to commercial papers in the sense that they are short-term finances. However, they usually do not have a maturity longer than six months. This type of debt is also guaranteed by a bank and can be traded on the secondary market, which makes it more liquid and easy to issue (Bodie, et al., 2011, p. 46-47, 58-59, 71, 469-472).

Debt could be attained in many different ways, and another common way of categorizing debt is based on its different maturities. There are short-term debt, long-term debt and convertible debt. Short-term debt is defined as payments due within one year and is found under current liabilities on the balance sheet. This could be short-term bank loans, but also longer-term loans that are due within one year, as well as other outstanding debt maturing within a year. This account is very important for determining the risk of default, and bankruptcy, for the firm, as it will affect the choice of capital structure. When determining a firm’s financial health, the current liability account should not exceed the amount of cash and cash equivalents available in the firm, since this will mean that the firm cannot meet its current obligations. Long-term debt is then defined as any debt obligations that is not due within one year and is filed under non-current liabilities on the balance sheet. This also includes any possible leases the firm has (Brealey et al., 2011, p. 734-735). Convertible debt is a very special form of debt that means the outstanding debt has an option of becoming converted into common shares of the firm. Convertible debt mostly comes in the form of a convertible bond, that states in its bond indenture (contract) when, for how much and into how many shares the bond can be converted. If the option to convert the debt into shares is exercised, there will be a dilution effect on the firm’s share value among existing shareholders (Bodie, et al., 2011, p. 470-471).

Why debt instruments in our thesis?
Presenting the different debt instruments available for a firm when deciding to issue debt will create an understanding for the reader about the deeper complexity of capital structure choices that exist. And since we want to investigate whether the specific type of debt a firm chooses to issue will have an impact on its performance, it is important to introduce the instruments.

3.2.2 Debt Structure
A firm’s debt structure depends on a lot of different factors, which existing theories on capital structure, such as trade-off theory fails to point out. Many of the theories presented above try to show the optimal level between debt and equity, but none include the different effects of the mix of debt. Bolton and Scharfstein (1996) claim that there is an optimal number of creditors to employ depending on a firm’s credit rating, as well as an optimal pattern of claimants rights’ distribution. The optimal debt structure should be when the costs of financial distress are as low as possible, at the same time as the loss in value, if the firm is liquidated, should be as low as possible. In their article, Bolton and Scharfstein (1996) show that firms with low credit rating should borrow from just one creditor in order to keep liquidation values as high as possible. This is because it will keep the interest of getting as much out of liquidation as possible only to one creditor, and it is often the case that assets are worth more when considered together than when sold separately. For highly credit rated firms, it is the opposite. If they borrow from
several creditors, they will make it less attractive to be set into strategic default from the creditors perspective. Credit default is already not likely due to the high credit rating, which is why strategic default is the concern. Borrowing from several creditors also enables the different distribution of seniority to claim, which should also prevent financial distress costs. Other factors affecting the choice of debt structure are a firm’s technology and the market outlook for its assets (Bolton & Scharfstein, 1996). Hackbarth, et al. (2007) also suggests that firms with weak bargaining positions in financial distressful situations, such as small and young firms, should always prefer to be exclusively financed with bank debt to optimize its debt structure, since it will imply the lowest financial distress costs for the firm. Petersen and Rajan (1994) also concluded that small firms will encounter lower costs and more flexibility for credit if having few and close relationships with creditors. Having many creditors and the debt structure spread out would increase the cost of borrowing and decrease the availability of funding for small firms. Rauh and Sufi (2010) also points out that lower credit rated firms have their debt more spread out among the different debt instruments and this is also the case for firms who drops in credit quality.

Another factor, as pointed out by Auerbach (1985), is the importance of a country’s prevailing tax laws, when it comes to the determination of a firm’s specific debt structure. As the corporate tax bracket will decide what the beneficial amount of the tax shield will imply, this is certainly an important factor for firms to consider when employing different types of debt. The specific debt structure that a firm chooses to employ can also vary over time depending on the current needs of the firm. Titman & Wessels (1988) found that, in terms of maturity of the debt employed, small firms have higher transaction costs, hence employ less short-term debt and more long-term debt. Bigger firms, however, have generally lower transaction costs, due to the effects of economies of scale, and hence can afford to take on more short-term debt.

Why debt structure in our thesis?
As it is a type of debt structure we want to investigate, it is important to present the existing theory on debt structure choices. The theories have helped us point out a research gap and will also help us generate our hypotheses.

3.2.3 Bonds
A bond is a debt instrument that a firm can issue in order to raise funds for its operations. The buyer of the bond acts as a lender who lends money to the firm for a pre-specified time period, and who receives interest payments during this time. This interest that the buyer earn, can come in different forms. The most common form is to regularly (annual, semi-annual or quarterly) receive a coupon, which is an amount calculated by the bond’s coupon rate (interest rate) times its principal amount (face value) (Bodie, et al., 2011, p. 468-469), as seen in Equation 5:

Equation 5. THE VALUE OF THE COUPON

\[
\text{Coupon payment} = \text{Coupon Rate} \times \text{Face Value}
\]

Bodie, et al., 2011, p. 468
The face value is the bond’s principal amount, which is to be paid back to the buyer when the bond reaches its maturity. The buyer of the bond will therefore pay the principal amount for the bond, receive it at maturity and earn coupons as interest during the time outstanding. Sometimes, bonds can be sold with no coupons attached to it. In this case it is called a zero-coupon bond. In order to attract buyers, this zero-coupon bond is sold at a discount, compared to its face value, which means the buyer will earn an implicit interest by paying for example $950 for a bond with a face value of $1000. The discount amount, or implicit interest, should reflect the prevailing market interest rates plus the firm’s risk premium. If the buyer believes it can earn better interest elsewhere on the market, it will not buy the bond. However, sometimes a bond can be sold at a premium as well, but this is rather uncommon for corporate bonds, as they are not risk-free. Government bonds, such as notes (long-term) and bills (short-term), have been considered risk-free for many years and could be sold at a premium whenever the existing market rates allows (Bodie, et al., 2011, p. 468-469).

From the firm’s perspective, one of the advantages of issuing bonds is that when the funding line from a bank or other creditors will not allow for more finances, there is the choice of turning to the public market for raising money. Either if the firm is in a risky position, which demands higher credit worthiness, or if it has exhausted all of its existing credit lines, it can get more fixed-income funds from the bond market. Another advantage of issuing bonds is that it is a more flexible way of getting finances, as there is no set limit on how much or to what rate, a firm can raise money. The only limit is the one the market puts on the firm. It is the market that decides what the lowest interest rate that it will demand will be, and how much funds the investors will be interested in (Berk et al., 2012, p. 440-443). It is also flexible in the way that the firm can buy back its bonds easily and cancel the debt (Berk et al., 2012, p. 446-447).

The disadvantages of issuing bonds instead of taking credit, is that a bond will most likely be more expensive for the firm to issue than taking a bank loan. The prevailing interest rates the banks can offer are lower and therefore cheaper, than the ones the public market will demand for investing in the firm. The higher interest rates for bonds is also due to asymmetric information (as explained above in section 3.1.2), when the public has less information about the firm than a bank would have when considering granting credit to the firm. However, the interest rates on bonds are typically lower than equity holders require. The effect on corporate governance is also another issue, since issuing bonds will give more claimants’ rights in case of liquidation (McLane, 2009, p.235-239).

When issuing a bond, the terms and conditions of it has to be stated in the bond indenture, that is the contract. In the bond indenture the characteristics of the bond are specified, such as maturity, coupon rate, coupon frequency, face value and other terms. A bond can also be issued as a convertible bond, which means that at a pre-specified point in time the holder has the option to convert the bond into common shares of the issuing firm. This is valuable for the holder, as it can choose to exercise the option if it is more profitable to have the shares than keeping the bond. From the firm’s perspective, a convertible bond is appealing when it wants to avoid speculation on its traded shares, since the holders will choose to convert into shares if the firm can prove that they are continuously doing well. If converted, the firm also do not have to pay the full amount of interest and face value to the holders. However, the existing shareholders value will become less due to the dilution effect of the conversion. Another option for
the issuing firm is to issue a callable bond, which means that the firm will have an option to end the bond and pay back the face value before it reaches maturity. This is usually stated at a pre-specified date in the bond indenture. The option to call the bond back is valuable to the firm, as it will avoid further coupon payments, but it is however expected to pay a premium to the holders for calling it early. Another advantage for the firm to issue a callable bond, is that if the market rates go down during the outstanding time of the debt, it will be cheaper for the firm to call back existing bonds and re-issue new bonds at a lower interest rate (Bodie, et al., 2011, p.468, 470-471, 599-600).

Depending on a firm’s credit rating, it will be referred to as angel (investment grade) bonds or high-yield (junk/speculative grade) bonds. A high-yield bond is rated BB+ or lower by Standard & Poor and Fitch, and rated Ba1 or lower by Moody’s (The Economist Newspaper Limited, 2013). A high-yield bond is, as the name implies, offering a much higher yield to its investors than angel bonds. This is due to the firms issuing these high-yield bonds are riskier, in terms of its operations or due the fact that they are small, young or high-growth firms which makes the predictability of the firm’s profitability more unsure. An investor buying a bond from such company will require a higher return for taking on its risks. The default rates of high-yield bonds are higher than for investment grade bonds. From the firm’s perspective, issuing high-yield bonds offers additional funding resources when higher credit loans from banks are hard to attain or when huge amounts of resources are needed. In addition, it also offers the firm an option to default on its interest payments (Bodie, et al., 2011, p.489-491)

Why bond theory in our thesis?
In order to understand how issuing bonds for a firm could possibly affect its performance, we need to first understand how this type of instrument works and what its characteristics, terms and advantages are.

3.2.3.1 The Bond-to-Total Debt Ratio
There is no existing theory or definition for the relationship that we want to measure, which is the amount of a firm’s debt that consists of bonds. We have therefore come up with a definition that explains what we want to investigate. We have called it the bond-to-total debt ratio. As the name implies, it is calculated in the same way as the debt-equity ratio that was explained in section 3.1. What the bond-to-total debt ratio tells us, is how big portion of the total debt employed by the firm, consists of bonds issued. The formula below presents the way the ratio is calculated.

Equation 6. THE BOND-TO-TOTAL DEBT RATIO

Bond-to-total debt ratio = Total amount of bonds outstanding / Total debt outstanding

3.3 Performance measures
A firm’s performance can be measured in many different ways, depending on what the firm wishes to measure. For example, you can measure the performance of individual divisions of the firm, or the performance of the firm as a whole (Berk & DeMarzo, 2011, p. 28-30). In this thesis we will not focus on performance measurements for
different divisions of the firm, instead we want to look at aggregate performance measurements for the entire firm. The performance of a firm’s stock is another way in which a firm’s performance can be measured. However, we want to investigate the financial performance of the firm in terms of profitability and we will therefore only include financial performance measures that measure that in this part.

According to Berk & DeMarzo (2011, p. 28), IFRS and US GAAP refers to the income statement as the statement of financial performance. It is in that statement that a firm’s revenues and expenses during a period are reported, and information of the profitability of the business of a firm can be extracted from it (Berk & DeMarzo, 2011, p. 30). It is therefore plausible to believe that ratios extracted from the income statement are good measures of a firm’s financial performance, and of the firm’s “overall financial health” (Bodie et al., 2011, p. 491). However, it is important to not analyze a firm’s performance based solely on information from a firm’s income statement (Alexander & Nobes, 2010, p. 122-123).

Some common profitability ratios that are presented by finance books and used by credit rating firms are; gross margin, operating margin, net profit margin, return on assets (ROA), return on equity (ROE), return on capital (ROC), return on investment (ROI) & return on capital employed (ROCE) (Berk & DeMarzo, 2011, p. 30-31; Bodie et al., 2011, p. 812-817). In our model we will not be able to use all of these measures. It is not necessary to use them all in order to get any significant findings, and by including more than, let us say three, measures will only complicate the model.

In the following section we will present the profitability measures that we will use in this study to measure the firm’s performances. The selection of measures is based on what is most commonly used for this type of studies and the relevance for our study. We will give you an introduction to the measures, explain what they measure, and finally explain why this measure is relevant for our study.

### 3.3.1 Profitability Measures Relevant For Our Study

#### 3.3.1.1 Return on Assets (ROA)

Return on assets (ROA) is according to Penman (2010, p. 369) a measure that is commonly used to measure the profitability of a firm’s operations. ROA “measures the income available to debt and equity investors per dollar of the firm’s total assets” (Brealey et al., 2011, p. 740). That is, it measures how profitable the firm is in terms of its assets. As mentioned above, it also indicates the “overall financial health” of a firm (Bodie et al., 2011, p. 491). We consequently believe that ROA is a good measure to use to evaluate a firm’s financial performance. In addition, it is a measure that has been used by many other researchers when evaluating the effect of capital structure on a firm’s performance (e.g. Li & Simerly, 1998; Gleason et al., 2000). It will therefore be used in our regression model as a measure of financial performance. The equation used to calculate ROA is presented in Equation 7 below:
Equation 7. RETURN ON ASSETS (ROA)

\[
\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}}
\]

Hillier et al., 2010, p. 59

3.3.1.2 Return on Equity (ROE)

Another ratio that gives an indication of a firm’s “overall financial health” is Return on equity (ROE) (Bodie et al., 2011, p. 491). It is a ratio that is used by analysts to evaluate the performance of a firm. ROE shows the income generated for the shareholder’s by the equity, which is the financing provided by the shareholders (Alexander & Nobes, 2010, p. 124). It can give an indication of whether a firm is able to find profitable investment opportunities (Berk & DeMarzo, 2011, p. 32), something that is of great importance for firms that want to stay competitive. ROE can be calculated on a before and after tax basis, however in our thesis we will only use the after tax ROE as it shows the return available to shareholders (Alexander & Nobes, 2012, p. 124-125). Studies that have investigated the capital structure’s effect on performance have also used ROE as a measure of performance (e.g. Li & Simerly, 1998), we therefore believe that it justifies why we will use it as a measure of financial performance in our regression model. Below the equation used to calculate a firm’s ROE, Equation 8, is presented:

Equation 8. RETURN ON EQUITY (ROE)

\[
\text{ROE} = \frac{\text{Net Income}}{\text{Total Equity}}
\]

Hillier et al., 2010, p. 59

3.3.1.3 ROCE

Return on capital employed (ROCE) measures how efficiently a firm is using all of its resources. It differs from ROE in that it accounts for the financing made available by long-term borrowing, such as bonds. It therefore shows how efficient the firm is as a whole, “rather than from the point of view of any particular subset of users, such as the owners” (Alexander & Nobes, 2010, p. 125). It should not be confused with another measure that has the same abbreviation, return on common equity (ROCE), which measures something else. In our case ROCE measures basically how much wealth that is generated by the amount that has been invested for the longer term, and is therefore a popular profitability measure. It will tell us the effectiveness of the assets that long-term creditors and shareholders together have provided. It is sometimes called the primary ratio due to it representing what the core goal of most businesses is (McLaney, 2009, p. 53-54).

This is a performance measure that previous studies similar to ours have not used, however, no other study have investigated the relationship that we will investigate either. According to Li & Simerly (1998, p.170) “There is equal lack of consistency among researchers on which performance measure to choose”, which indicates that several different measures can be used and researchers do not have to cleave to a few specific ones. Our thesis will investigate whether the type of debt that a firm employs has an effect on its performance, we therefore believe that it would be suitable and
relevant to use a performance measurement that calculates a firm’s performance based on the capital it employs. ROCE is calculated by using Equation 9 below:

Equation 9. RETURN ON CAPITAL EMPLOYED (ROCE)

\[
\text{ROCE} = \frac{\text{EBIT}}{(\text{Total Assets} - \text{Current Liabilities})}
\]

McLaney, 2009, p. 53

3.4 Capital structure & Performance

In our thesis we want to investigate whether the amount of bond-to-total debt that a firm has will have an effect on its performance. There is no previous research done on this issue, which is pointing at the research gap we want to fill in. However, there are many studies on whether capital structure as a whole has an impact on firms’ performance. Capital structure has proven to be a determinant of performance, even though the results between studies in different countries have varied. Studies that have found that the debt has a positive impact on a firm’s performance include Dessi & Robertson’s (2003) study on UK panel data, and Margaritis & Psillaki’s (2007) study on firms in New Zealand. On the other hand, there are also studies that have found debt to have a negative impact on a firm’s performance. Li & Simerly (1998) found that higher debt generated a lower economic performance for industrial US firms. In addition, Majumdar & Chhibber (1999) found that performance and debt are negatively related for firm’s in India, and Gleason et al. (2000) found that a higher debt-level in European firm’s resulted in a poorer performance.

As we can see there are varying results when it comes to the effect that capital structure, or more specifically the debt level, has on performance. The studies above are performed in different countries, which shows that the effect that capital structure has can vary depending on the country. This is consistent with Gleason et al. (2000) who found that a firm’s capital structure will vary depending on culture. However, we should point out that the majority of the studies listed above indicate that a lower debt-level is beneficial for the firm.

As there are many other factors that can have an impact on a firm’s performance, we need to consider these in our theoretical chapter as well, in order for us to be able to conduct a reliable study. Being aware of the other variables affecting firm performance will enable us to discuss co-dependence among factors and any problems relating to the reliability of the test we will conduct. In order to be able to build a reliable regression model, other determinants than capital structure must be included as control variables (further explained in the Practical method, section 4.7). To determine whether the firm’s type of debt has an impact on their performance we must discuss and consider which ones will be applicable as control variables for our sample. The next section will therefore introduce additional variables that could have an effect on firms’ performance.

3.4.1 Other Determinants of Performance

In broad sense, there are organizational, environmental and people factors that can affect a firm’s performance. These factors work together in a synergy that creates an organizational climate, which ultimately affect how well the firm can perform. Hansen & Wernerfeldt (1989) suggest that organizational factors could be structure, systems,
size and history of a firm; environmental factors could be sociological, political, economic and technical factors; and people factors could be skills, personalities and age within a firm.

In order to be able to determine what the most useful factors of firm performance would be to use as control variables in our regression model, we must discuss not only their effect, but also their measurability or ability to be categorized as variables. Due to our objectivistic ontological view on social phenomena, such as an organization, we can also rule out other factors, such as people factors. We do not focus on determining how the different characteristics of the members of an organization affect firm performance, simply because we see them as participants in the set of tasks within an organisation. People factors should not influence the way the work tasks are done, as they are designed so that if people do not comply with the expected performance, they are replaced by the organisation. Environmental factors are viewed as a part of the macro economy, which is in itself viewed as an objectively existing phenomenon that we as social actors cannot affect. The macroeconomic factors could thus be used as determinants of performance, according to our views. This is also the part of theory that supports our second research question, as we thus can conclude that different economic states are macroeconomic factors that affect firms’ performance.

A few of the most acknowledged determinants of performance are firm size, industry and market share (Hansen & Wernerfeldt, 1989). Firm size seems quite intuitive as a variable that affects a firm’s performance. The size of the firm affects operational costs, the ability to generate profit, and it therefore affects the firm’s performance. Li & Simerly (1998), among others, were also able to prove the effect of firm size on a firm’s performance. Hansen & Wernerfeldt (1989) also mentions a couple of other variables that have proven to affect firm performance, such as growth; capital intensity; concentration and advertising intensity of firms. However, they point out that these could be categorized into an industry variable. In addition, Schmalensee (1985) proved that the type of industry chosen could explain the biggest differences between firms’ performance, in terms of ROA. Firm size and industry variables fall under organizational factors and can thus be viewed objectively. Furthermore, Hansen & Wernerfeldt (1989) show the importance of relative market share as a performance determinant. The argument for its importance is that it is viewed as having a relative competitive advantage, which is assumed to be a result of, for example, learning effects that enhances performance. The bigger the market share a firm possesses, the bigger is the chance of higher performance. Relative market share as a determinant of performance would fall under environmental factors as the relative market share depends on factors outside the organization, i.e. how many other players there are on the market. We could thus use the relative market share as a control variable.

Research and development (R&D) is another factor connected to firms’ financial performance and goes under organizational factors. R&D and innovation has proven to be a very important factor in order to perform well and survive on the continuously developing market (Mehran, 1995; Geroski et al., 1993). This positive relationship, between innovation and performance, was supported by Lööf & Heshmati’s (2006) study. It therefore appears that firms who are more innovative perform better than firms with a lower level of innovation. However, R&D is the factor that incurs actual costs, and there is contradicting findings on what effect it has on performance. According to Mehran (1995) there is a positive relationship between R&D and sales, which would
indicate that firms could improve their performance by increasing their R&D. This conclusion is contradicted by Lööf & Heshmati (2006), who could not prove that there is a positive relationship between R&D and sales. Instead, they found that there is an insignificant relationship between the two. It is therefore questionable whether R&D has an impact on a firm’s performance.

Another factor that can have an impact on performance is Agency cost. The concept was defined by Jensen & Meckling in 1976 and regards the issue of separation between ownership and control within public firms, where the firm is owned by its shareholders and run by its manager. This can create conflicts between the manager and the shareholders as they may want different things, which are referred to as agency problems (Brealey et al., 2011, p. 40-41) and these incur agency costs (Jensen & Meckling, 1976). The costs stem from monitoring and giving the manager the right incentives, as well as the value loss for the shareholders from the manager acting in its own interests. Increases in leverage has shown reducing effects on agency costs (Grossman & Hart, 1982), which speak for increases in firms' ability to perform. CEO stock ownership has also proven to enhance profitability of firms (Li & Simerly, 1998; Mehran, 1995). Mehran (1995) also found that firm’s who have CEOs with their compensation based on performance tend to produce a higher return for their shareholders. However, these variables would be classified as organizational factors, as well as people factors, and since they are people factors they are not used as a variable in our regression model. In addition, they are costs and variables that are hard to measure and are therefore not considered when we determine the control factors for our regression model.

How a firm deals with the problems of separation between ownership and control, are tightly connected to firm strategy in other aspects as well. Li & Ye (1999) found that firm strategy, together with a closer relationship between the firm’s Chief Executive Officer (CEO) and its Chief Information Officer (CIO) impacts a firms performance. However, even though these are certainly organizational factors affecting firms’ financial performance, they are also people factors. We will therefore not be able to measure and incorporate them in our regression model that helps us answer our research question.

The nature of a firm in terms of its risk is another factor that can affect firm performance. We know from basic corporate finance that with higher risk, higher return is expected. However, there is no insurance that higher risk will produce higher returns (McLaney, 2009, p.219). As Andrew Likierman (2007, cited in Neely, 2007, p. 261) puts it: “It is impossible to separate measuring the performance of a company from the risks that the management takes to achieve it”, when he discusses the relationship between the two. It therefore seems natural to include company risk as a determinant of performance.

3.4.2 Determinants of Performance Applicable for Our Research

An economic model that incorporates the common determinants of performance is expected to explain 15-40 percent of the variance in profitability between firms. The remaining variance would be due to measurement errors, random effects and other macroeconomic factors that are uncontrollable (Hansen & Wernerfeldt, 1989). This is also supported by Li & Ye’s (1999) study, which found that a “dynamic environment”
gives firms different conditions to be able to perform. This supports our investigation on whether the bond ratio affects performance differently during different economic states.

Firm size, industry and company risk are factors that we are able to measure, define and use in a manageable way in our model. Firm size has been measured on many different grounds in previous research, and it is said that it does not matter which measure of firm size is used. However, Shalit & Sankar (1977) proved that it does matter for the outcome, as the different measures are not interchangeable. The one measure that is proven the most interchangeable to use as a measure for firm size, is however the amount of assets (Shalit & Sankar, 1977). Except for firm size, industry and company risk, market share is one of the most commonly used determinants of performance and is therefore also included in our model. It is not proven what kind of impact R&D has on firm performance and therefore we are not including it in our model. Agency costs, ownership structure and strategic corporate governance factors are hard to measure and concern people factors hence we do not include these as control variables.

Based on the discussion above and what the most commonly used determinants of performance have been in previous studies within this field, we selected our control variables. The ones we chose to include as control variables were: firm size, industry, market share and company risk. These act as independent variables alongside with the bond-to-total debt ratio and the capital structure. The performance measures act as dependent variables, but this is further explained in section 4.5.

3.5 Theory Discussion & Recent Studies

By discussing the usefulness of the relevant theories presented above, we enhance our credibility as researchers and clarify our standpoint in the subject. This discussion helps explain the validity of the choice of theories and guide us towards stating our hypotheses. By discussing the sources and their usefulness based on the criteria for our ontological and epistemological views as researchers, we ensure a well thought-through theoretical framework. Our interpretation of what we believe the theories suggest together with other present knowledge will constitute the basis for our hypotheses-generation, which this section builds up to.

As outlined before, capital structure theory is dated far back in history, with Modigliani and Miller being one of the founders of the subject. Along with the Pecking order theory and the Static trade off theory, these provide us with a set structure of functions for the firm when deciding on different levels of debt. Based on our ontological view as objectivists, these theories are therefore useful in our thesis as they provide us with the basic framework for understanding where the smaller components of debt, that we want to investigate, fit into this framework. It is also evident to point out that we believe the knowledge provided by these theories are based on what we can, with our senses, observe in reality, which falls well into our epistemological view as positivists.

The second part of theories covering debt and its different characteristics and functions are by nature objective and fit into the framework set out by the grand theories of capital structure. There is not much to discuss about its relevance as theories for our thesis, as without this presented knowledge, the reader would not understand the relationships investigated in this research. This goes also for the performance measures discussed as they were presented in their section.
As for the determinants of performance, their relevance for our thesis was already discussed and they were chosen for the regression model based on our ontological view. The studies leading up to their confirmation as determinants of performance are seen as having a knowledge creation in accordance with our epistemology as well, as the tests performed can be confirmed with our senses. We would like to argue that our theoretical framework hereby is well thought-through, coherent with our methodological views and credible as basis for our hypotheses generation and research.

Studies on whether the capital structure as a whole impacts a firm’s performance have been conducted on different populations in different countries. As these might be helpful only for our hypotheses generation, they are not transferrable onto the Swedish business environment. Two Master students at the University of Umeå (Önel & Gansuwan, 2012), performed a study last year where a multiple regression model, much like ours, was used to determine whether capital structure influences firm performance in the Swedish context. The findings indicated a negative relationship between leverage and firm performance. By using dummies for the years of the financial crisis, they were able to compare any differences during economic states, but did not find any significant difference on the relationship.

It is interesting to depart from the study conducted on the Swedish market when discussing the hypotheses for our thesis. The fact that no difference between economic states could be proven surprises us. Because it contradicts what Leland (1994) found, that during periods when the risk-free interest rate is higher (such as economic booms) the debt levels of firms are able to be higher due to greater tax shields. Greater debt levels are sustained despite the higher interest costs in such periods, and the bankruptcy costs are also perceived less risky. This would also imply that during periods with lower interest rates, such as economic recessions, it would be less profitable to sustain high debt levels, as the tax shield will go down, despite the cheap cost of debt financing. In terms of bond financing, this would imply that during economic recessions, having more bonds than other debt (bank loans) should be more costly, since it is associated with higher interest rates. However, Leland (1994) also found that firms, who do have high bankruptcy costs, have lower interest rates as they keep lower levels of debt and hence have lower risk.

The period that this thesis is investigating includes a financial crisis, or a recession. According to the National Bureau of Economic Research a recession is “a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales.” (National Bureau of Economic Research, 2013). Given this definition it is reasonable to say that the performance of firms tend to decline during a recession. This is in line with the result of Leland (1994), that economic states have an impact on firms’ performance. If the performance of a firm varies during different economic states, there is also a possibility that the factors that effect firm performance have a different impact during the different economic states. In our case this means that even if the bond-to-total debt ratio does not have an impact on performance in general (the first question), it is still possible that it can have an impact on performance during the recession (second question). It is therefore important to ask both of our questions, and formulate hypothesis that will consider both scenarios.
Generating hypotheses requires careful considerations of the evidence and theories we have been provided with. There are many things pointing towards that higher bond-to-total debt ratios would both be negatively and positively related to firms’ performance, also during economic states of recession, which makes this research even more unpredictable. Hypothetically, if a firm becomes financially distressed, or has problems with payments to their creditors, having a bigger proportion of bonds to the total debt could be seen as both advantageous and disadvantageous. Bank loans will always be repaid sooner or later since renegotiations can be held, but having a bond means having an option to default on payments. For high-yield bonds, this is also more likely to happen due to its higher risk, and is therefore more valuable. If the option to default on payments is worth more than the financial distress costs associated with bank loans, having issued bonds could raise the firm performance. This could be thought of in terms of the Static trade-off theory to help imagine how it works. More debt would mean higher financial distress costs that offset the tax shield benefits. But if bonds do not incur more financial distress costs, debt levels might be able to increase without raising the distress costs.

Bonds are also a much more flexible instrument to use for issuing debt, in terms of how much to raise and to what interest rate. It is the market that decides its boundaries. Having issued bonds also means that the firm is able to buy back the debt on the market whenever it wants, which could lower the amount of interest payments and raise performance. It is also possible to buy back the bonds and issue new bonds at lower rates, which lowers the firm’s costs and implicitly would raise the performance. This also goes for having issued the bond in its more flexible form as either convertible or callable. If the interest rate can be lowered by the exercise of a call or the conversion of the bond to shares, the firm can benefit. This in turn would imply that times when interest rates are in the upper bound, such as normal or booming states of the economy, it could be more beneficial to issue bonds than taking on expensive bank loans. Later, when the rates would eventually go down again, such as during recessions, the interest rate can easily be adjusted down to more beneficial levels to the firm.

These flexible options that come with the bond, are not available for bank loans. A bank loan often have a premium penalty that you have to pay in case you want to cancel the loan and pay it back before maturity, and renegotiating the interest rates are merely impossible. Another issue that we might consider in the new financial environment of the Basel III Accords is whether the higher capital requirements for banks in Sweden also will mean that they will charge higher interest rates from firms. This would then imply that bond rates that traditionally have been higher, due to the asymmetric information related to market based securities, might not become that much more expensive than taking a bank loan.

However, if firms who issue bonds mostly do so because they cannot receive bank loans or do not want to raise equity it means, according to the Pecking order theory, that they have a lower credit rating and are a smaller or younger firm. These types of firms, who will seek to issue bonds on the high-yield bond markets, will then have higher liquidation costs due to the engagement of more claimants (Bolton & Scharfstein, 1996). In addition, they will also have weaker bargaining positions in financially distressful situations, implying the lowest costs for the firm if bank debt is exclusively employed (Hackbarth, et al., 2007). Petersen and Rajan (1994) also concluded that small firms encounter lower costs and more flexibility for credit if having few and close
relationships with creditors. Having many creditors and the debt structure spread out would increase the cost of borrowing and decrease the availability of funding for small firms.

The findings discussed points towards it being disadvantageous for these typical high-yield firms to issue bonds. However, the historical default rates on specifically high-yield bonds are not that high, and nowadays the default rates are at the historical low (MBSC Securities Corporation, 2013). Also, high-yield bonds performed relatively well during the heavy recession in the 80’s, but default rates were higher in the milder recession in the 90’s (Helwege & Kleiman, 1997). In addition, high-yield bonds have also performed relatively well during recovery periods of economic states (MBSC Securities Corporation, 2013).

3.6 Hypotheses

Generated from the theories, existing evidence from recent studies and our theory discussion, we have formed our theoretical framework that we believe is applicable for our research purpose. This theoretical framework generation has enabled us to come up with our hypotheses. These are the null and alternative hypotheses we have stated, that helps us answer our research questions:

$H_{0(1)}$: There is no relationship between the bond-to-total debt ratio and the performance of a firm.
$H_{a(1)}$: There is a relationship between the bond-to-total debt ratio and the performance of a firm.

$H_{0(2)}$: There is no different relationship between the bond-to-total debt ratio and the performance of a firm, during economic states of recession.
$H_{a(2)}$: There is a different relationship between the bond-to-total debt ratio and the performance of a firm, during economic states of recession.
4. Practical Research Method

In this part we present our practical research method to provide a complete picture of how our study was conducted. We explain the research design used and the strategy of our research. In addition, we also describe our population and sampling method. The data collection process is then thoroughly spelled out, followed by an explanation of our regression model. In order to provide the reader with transparent research a section that describes how the tests were conducted is presented.

4.1 Research Method

A research method can be seen as “central support for the trustworthiness and significance of claims made in scholarly work” (Huff, 2009, p. 181). This means that whether the research one produces should be regarded as acceptable and trustworthy is dependent upon the method used. There are two research methods that are most commonly used, a quantitative and a qualitative method (Huff, 2009, p. 181). In this thesis we used a quantitative research method, which is a method that often emphasises on quantification of the collection and analysis of data. It most often consists of positivism as it views the social reality as external and objective. Further, it also takes a deductive approach, as theories are tested rather than generated. A qualitative method has a more inductive nature, where the aim is to create new theories. It goes more towards interpretivism and constructionism, and focuses more on words rather than on numbers (Bryman & Bell, 2011, p. 26-27). As our research question asks the question “Does”, it is investigating whether there is a relationship between certain variables. This type of question is most often answered with the help of quantitative data. A qualitative method would not be able to generate sufficiently valid and reliable results, as the sample would be too small to be able to generalise the findings to a whole population. This method is more appropriate when this type of question is answered on an individual level. As we want to answer this question on a general level, we have utilised a quantitative research method, where the focus is on numbers and testing hypotheses.

4.2 Research Strategy & Research Design

There are many things that affect a researcher’s choice of strategy, and using one strategy does not prohibit you from including another one. The importance is therefore not the name of the strategy but that it helped us answer the research question and reach our objectives (Saunders et al., 2009, p. 141). In this study we gathered primary data from firms financial statements in order to find the data that we needed to build our regression model. This way of gathering data is consistent with an archival research strategy, as the primary source of our data collection was administrative records and documents (Saunders et al., 2009, p. 150). In addition, in our study we try to determine whether there is a casual relationship between variables, specifically whether a firm’s bond-to-total debt ratio has an effect on its performance. Studies that investigate this relationship are referred to as explanatory studies, and we can thus claim that our research has an explanatory nature (Saunders et al., 2009, p. 140). In addition to our explanatory and archival research strategy we have conducted a longitudinal study, where we collected data for our variables over a five-year horizon. A longitudinal study
is a research design that includes a series of observations of the same phenomena over a given period (Saunders et al., 2009, p. 155). In our study we also observed the variables at the same time period for different firms, which gave our research a cross-sectional feature as well. Cross-sectional designs study a particular phenomenon at a particular time (Saunders et al., 2009, p. 155), which is consistent with how our variables have been studied.

4.3 Population

Our population constitutes all registered Norwegian firms that operate domestically or internationally, regardless of ownership structure, age or growth potential. Financial institutions were however excluded from our population due to reasons that are explained further in section 4.4.2. By registered firms we mean all types of firms with the jurisdiction to issue bonds, which are limited liability companies, public limited companies and limited partnerships. Sole proprietorships were excluded, as they are not able to issue bonds in their current form.

4.4 Sampling Method

In order for us to carry out the investigation we wanted we needed data on Norwegian firms during a certain time period or time span (the specific period is introduced below). We specifically needed data on; firms that had bonds during the period, and firms that did not have bonds at all during this period. It was necessary for us to include firms within both of these categories in order for us to answer our research question “Does the bond-to-total debt ratio impact the performance of a firm?”. If we only included firms that had bonds sometime during the period the investigation would have been different, and our research question would then have needed to be altered. Thus, firms from both categories were necessary. However, we did not want the sample to be overrepresented by firms that did not have bonds at all, as it could reduce the chances of getting a statistically significant result. Our belief was that we would get a better result, and thus a better answer to our research question, if a larger portion of the firms included in the study had issued bonds sometime during the time period. Especially since it was the bond-ratios impact on a firm’s performance that we wanted to investigate. We believed that drawing a random sample from the Oslo Børs would provide us with a sample where the majority of the firms did not have bonds at all, and it was therefore not a possibility for us. Instead we used a revised version of a stratified random sample, since we needed a bigger proportional representation of firms who had issued bonds. An equally large sample was drawn from two stratas, Oslo ABM and Oslo Børs. Adding these two “sub-samples” provided us with one complete sample. Even though, this meant that our sample was overrepresented with firms that have bonds, we were able to collect a sample that would give us a better answer to our research question by using this method.

4.4.1 Sample Size

Our sample comprises in total 85 Norwegian firms, of which 42 was collected from Oslo ABM and 43 from Oslo Børs.
4.4.2 Firm Qualification

There were certain criteria that the firms had to fulfil in order for us to be able to include them in our sample. The criteria were:

1. Complete data for the entire period had to be available
2. The firms had to be non-financial institutional firms
3. The firms had to be Norwegian

The first criterion is easy to justify, as the study cannot be conducted if information is missing. Firms could therefore only be included if they had financial reports available for the entire period, and if the reports contained all the necessary information (including information about bonds). The reason why financial institutional firms were excluded from our investigation was because they usually have higher debt ratio than other firms, and we believed that their inclusion could therefore provide us with faulty and misleading results. They also have a different function and aim within the business environment. It was therefore better to exclude them from our investigation. Finally, the third criterion was justified as our population is Norwegian firms, and firms from other countries should therefore not be included.

4.4.3 Sampling Approach

We started our sampling from Oslo ABM in order to be certain that some of the firms used in our sample had issued bonds during the period. Because as mentioned above, we needed firms with and without bonds to be able to answer our research question, and a random sample from Oslo Børs might not provide us with enough firms that have issued bonds. The first step in our data collection was therefore to collect data about all firms that are or have been listed on Oslo ABM from when they opened in 2005 until present (2013-03-21). Oslo ABM were very helpful, they sent us a document with a list of all the firms that are or have been listed during that period. The document that we received contained very useful information about each bond, specifically; the name of the issuers, the ISIN number, the symbol, the name of each bond, the issue date and the expiration date. We now had the information necessary to find the first part of our sample.

After excluding the financial and foreign firms from the list we were left with 100 firms that had, or had had bonds issued on the Oslo ABM between the years 2005-2013(March). However, the problem was that many of the firms did not have financial reports from before 2007 and many firms had not released their report from 2012 yet. We therefore decided to set our time period to 2007-2011, as it seemed to be the period that would give us the biggest sample. There were 43 firms that had issued bonds during that time period and that fulfilled our criteria listed above. Out of those 43 firms, there were 27 firms that had bonds listed during the entire time period.

However, we still needed to include firms that did not have bonds during this period in our sample. To retrieve those firms we conducted a random sample of firms listed on the Oslo Børs in excel. Although, we excluded financial firms and firms that were listed on Oslo ABM and Oslo Axess. The random sample in excel gave all the firms a random number, and the firms were then sorted by the random number that they had been given starting with the lowest number. The first 43 firms on that list, that fulfilled our criteria’s, were added to our sample. We now had a total of 86 firms in our sample that
we needed to collect data for. However, as the data collection proceeded, we decided to exclude one firm from the Oslo ABM sample, due to its gigantic asset size (it was ten times larger than the second largest firm). We believed that it would become too much of an outlier and create biased results. Our final sample size was therefore 85 firms; where 30 firms had bonds during the entire period, 33 firms did not have bonds at all, and the remaining 22 firms had bonds sometime during the five-year period.

4.5 Data Collection

In order to perform a regression analysis we needed data for the different variables that we were going to use. The variables were ROA, ROE, ROCE, size, industry, industry risk (company risk), debt-ratio and bond-ratio. One variable that we originally planned to include in our model was market share. However, as we were unable to retrieve information of the different firms’ market share it could not be included as a variable in our model. In addition, our initial objective was also to use company risk as a variable in the model. Although, as some of the firms did not have a stock or a historical stock return we could not calculate the beta for each individual firm, and we were unable to find another good measure of company risk. As a result, we used an industry risk measurement instead. This meant that we would have one independent variable for industry risk and one for industry. Having two variables that are so similar and highly correlated creates multicollinearity. The regression model that we used assumes that there is no multicollinearity, and having variables that are highly correlated can affect the accuracy of the regression (Park, 2011). We could therefore not include two variables that were so similar. The solution was to use the industry risk variable as a variable for risk as well as industry.

After data for all the variables had been gathered it was entered into an excel spreadsheet as a panel. Each firm was given a number from 1 to 85 and entered vertically five times (for each of the years of data collected) below each other. On the horizontal line, the different dependent and independent variables were entered next to each other. At the far right, we also added a few dummy variables, which we are explained more thoroughly further on. The following paragraphs explain how data for the different variables were retrieved.

4.5.1 Financial Statements’ Numbers and Ratios

Some data was collected from the firms’ financial statements where we for each year retrieved information about each firm’s; return (profit of the year), EBIT (operating result), Assets (size), Equity, Debt, Capital Employed (assets minus current or short-term liabilities) and amount of bonds. All the values that we retrieved were book values. With this information we could calculate the ROA, ROE and ROCE for each firm. Profit of the year was used to calculate ROA and ROE, together with Assets or Equity. EBIT and Capital Employed were used to calculate ROCE. The capital structure ratio was calculated by the total debt ratio, and the bond ratio by the bonds to debt ratio. If the financial statements were not presented in NOK they were translated into NOK using the exchange rate that prevailed at the end of that year, which is the exchange rate used by the firms in their financial statements when converting currencies. We were unable to find the information in a database like Thomson Reuters. In order to get the appropriate and the sufficient amount of data we therefore went through the 86 firms’ financial statements, over a five-year period.
4.5.2 Industries and Risk

We used the Oslo Børs’s listed share indices in order to determine what industries the different companies should be categorized into. It was the biggest indices, which covered the smaller related industries, that we used in order to keep the number of industry categories down to a manageable number. Some of the firms were part of the indices, and were therefore easy to assign to an index. The ones that were not part of an index were assigned an industry based on their core business. The industry categories available from the indices on the market were, by industry name and ticker (Oslo Bors, 2013):

- Energy (OSE10GI)
- Materials (OSE15GI)
- Industrials (OSE20GI)
- Consumer Discretionary (OSE25GI)
- Consumer Staples (OSE30GI)
- Health Care (OSE35GI)
- Financials (OSE40GI)
- IT (OSE45GI)
- Telecommunication Services (OSE50GI)
- Utilities (OSE55GI)

The industry risk was calculated based on the historical performance of the industry indices on Oslo Børs, excluding Oslo Axess and any combination index including both markets. These indices were fortunately the ones that had the most historical data available. The risk measure we used was the beta. The beta measures how much the industry index moves if the market index moves by 1. In order to calculate the beta we therefore needed to decide what would be the best measure of the market. It is important to choose a relevant market index for the type of data analysed. As we were investigating the performance of Norwegian companies it was appropriate to use a Norwegian market index. It is also relevant to use a market index that represents the market you are looking at, in order not to capture any other market movements in other places of the world that would not normally affect the companies operating in the market chosen for analysis. We therefore decided to use the Oslo Børs All-shares index, since it represents all traded companies on the Norwegian Oslo Børs market. It also simplified the calculations, as it was already in the same currency, which is a necessity when calculating beta. To calculate the industry and market risk, for every year between 2007 and 2011, we used the historical daily returns for each index with four years of data, counted from the end of the financial year of each year. To calculate 2007 year’s data we used the daily returns between 2004.01.01 - 2007.12.31, for 2008 we used data between 2005.01.01 - 2008.12.31 and so on, ending with 2011 where we used 2008.01.01 - 2011.12.31. The beta is then calculated by dividing the covariance of the industry index with the market index, by the variance of the market index. The formula can be seen in Equation 10 below, where $\sigma_{im}$ is the covariance between the market return and the stock/index return, and $\sigma^2_m$ is the variance of the market return:
Equation 10. BETA CALCULATION

\[
\text{Beta (}\beta) = \frac{\sigma_{im}}{\sigma^2_m}
\]

Brealey et al., 2011, p. 204

4.6 How Access was Achieved

In order for us to be able to run our regression and test our hypotheses we needed access to a statistical program. We decided to use a software called Stata, as we were recommended to use it for our type of data. Stata is a user-friendly program for excel-typed panel data that easily can be converted into Stata and use for panel data multiple regression models. The Stata software had been installed in our university computer labs, which enabled us to access the program and run the tests. How the access to the data needed was achieved is described thoroughly above in section 4.4.3.

4.7 Building our Regression Model

Before we could test our hypotheses, we had to be sure that we were using the right model in order to generate a sufficient result. We knew we were going to do a multiple regression to test whether or not the bond-to-total debt ratio has any significant impact on a firm’s performance. The reason why a multiple regression model was necessary was because we used several independent variables. A multiple regression model builds on Equation 11:

Equation 11. MULTIPLE REGRESSION MODEL

\[
Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + ... + \beta_iX_i + \varepsilon
\]

Park, 2011

where \( Y \) is our dependent variable; \( \beta_0 \) is the intercept; \( \beta_1, \beta_2, \beta_3 \ldots \beta_i \) are coefficients; \( X_1, X_2, X_3 \ldots X \) are independent variables; and \( \varepsilon \) is an error term.

4.7.1 Preparing the Data

The panel data was simply copied from the excel spreadsheet into Stata’s spreadsheet. We only had to type in the name of the variables on the top horizontal axis in order to be able to recognize what data to use when typing in the commands. The names of our independent variables were: company, year, size (total assets), risk (industry risk), DA (debt/assets) and BD (bond/debt). Our dependent variables were: ROE, ROA and ROCE.

To be able to use commands for panel data in Stata, we first needed to determine the cross-sectional variable (companies) and the time-series variable (years). This was done by typing: \textit{tsset company year}

We could then command the descriptive summary statistics of our panel data, which would display the mean, standard deviation, minimum and maximum of our variables.
for (T) companies over (n) years. Our total number of observations was (N). The command used was: \textit{xtsum roe roa roce size risk DA BD}

\subsection*{4.7.2 Type of Data}
Panel data means that we have n entities over T periods, which multiplies into N number of observations. In order for the panel data to be ideal, the time variables should be measured with the same intervals over the whole period. If the panel has many n and few T, it is called a short panel. If it is the opposite, it is called a long panel. Since our T was small, and our n was relatively high, we believe our panel was somewhat short. The data was also fixed because the set of n did not change for different T. We have measurements for all n and for all T, so our panel should have been a balanced one. However, when some cells have a zero frequency (which some of our observations naturally had) it makes the panel unbalanced, which can create issues for estimation and computation. However, the software is expected to be able to handle this type of data (Park, 2011).

\subsection*{4.7.3 Evaluation of Data Quality}
When the data had been well arranged cross-sectionally and time-serially, we were able to get a strong impression of whether any fixed and/or random effects were present. This is one of the criteria to check for the panel data’s quality (Park, 2011). As we strongly believed that the years had a specific significance on the variables for those years, and that the firms were not identical in operations and should have some intellectual differences, we could conclude that we should have both some fixed and random effects.

Moreover, it was important to verify that all \( n \) and \( T \) were consistent and that all variables had been measured in the same way. We also had to evaluate whether any of the \( n \) or \( T \) were too large or small, in order to minimize the risk of invalidity and Type II Error (Park, 2011). We believe our sample did not constitute a too large \( n \) or \( T \) for running the tests, neither should the number of observations be too small for our tests.

\subsection*{4.7.4 Choice of Model}
When having panel data, we can examine if there is individual-specific effects (group effects) and/or time effects that might affect, and have its own correlation, with the dependent variable tested in a regression model. Group effect simply means that a specific company will have its own effect on the variables (regressors) for that company over all the years observed. The companies cannot be seen as standardized and a company is in itself a variable that should be incorporated into the model. This could be due to the effects of intelligence or personality in a company that is not reflected in any of the explanatory variables. The same goes for the time effects, which states that a specific year will have its own effect on all the variables measured for that year. Its effect differs from year to year and should therefore be one of the variables in the model (Park, 2011).

By examining if these effects exist, we were able to deal with any individual effect or heterogeneity that might have been present in our data, by choosing the right effect in our regression model. The two models available for this are called fixed effects model or random effects model. The fixed effects model should be used when checking if there
are different intercepts in a multiple regression for the different groups (companies) or times (years). A random effect model, on the other hand, checks whether there are different error variance components in the groups or times. The way in which these models checks for the different effects of the group or time variable, is by creating dummies for either one of the variables (one-way model) or both of the variables (two-way model). So it means that the dummy variables will be a part of the intercept in a fixed effect model, whereas they will be a part of the error term in the random effect model (Park, 2011).

Basically, a fixed effect model or random effect model is just an ordinary least squares (OLS) regression model with a set of dummy variables. If no individual effect exists, the OLS is a sufficient model that will produce good estimates for the parameters. There are, however, a few assumptions that need to be fulfilled in order for an OLS multiple regression model to work efficiently, which will be presented in the next section (Park, 2011).

4.7.4.1 Assumptions for Ordinary Least Squares Model

1. The dependent variable should be linearly related to the independent variables and the error term.
2. The expected value of disturbances (i.e. individual effect) should be zero, so they do not have any correlation with the regressors.
3. Homoskedasticity should prevail, i.e. the variance is the same for all disturbances, which should also be nonautocorrelated.
4. The observations should have been measured with no errors and not be random such as if measured several times, the observations are still the same.
5. Independent variables should have no multicollinearity.

(Park, 2011)

When we looked at our panel data, we could instinctively tell that we did have individual effects both for the companies and for the years. But in order to be sure, there was a test for testing homoskedasticity we could run by typing in the command: `rvfplot, yline(0)` which provided us with scatterplots of the patterns for the residuals plotted against the fitted values for each of our dependent variables (see Appendix 4). If there is no pattern, the OLS model is enough, but as we could actually detect patterns, it proves that individual effects could be detected. This means that the assumptions 2 and 3 are violated. Assumption one was assumed to hold, as we would have not believed in our model otherwise. Assumption four was also assumed to hold, as we trusted that our data had been collected rightfully. However, one always has to be aware of the possibility of human faulty. Assumption five, multicollinearity, was tested for in two ways. First we ran the command: `correlate DA size BD risk` and the highest correlation was 0.2914 between risk and BD (see Appendix 2). In order to be sure that this was not a significant correlation, we ran a vif-test by the command: `vif` where the result told us that the highest vif-score was 1.14 for BD and the mean vif-score was 1.10 (see Appendix 2). In order for multicollinearity to exist, the vif-score should have exceeded 10. We could therefore conclude that our multiple regression model would not violate assumption five.
4.7.4.2 Fixed Effect Model

As we already had concluded that we had some group effects and time variable effects, the fixed effects model would be the most appropriate one for us to use. But in order to be convinced about our choice, there is a test called the Hausman specification test that would tell us which model that would be better to employ (Park, 2011). The test was performed by the command: `hausman fixed random`, after having stored the random effect regression as random and the fixed effect regression as fixed. The Hausman null hypothesis is that the individual effects are not correlated with other regressors. Our result of this test had a p-value of 0.0486 for the dependent variable ROE, 0.0004 for ROA and 0.0005 for ROCE (see Appendix 5). This was sufficiently below the significance level of 0.05, which enabled us to reject H0 and confirm that a fixed effect model would be more relevant for explaining our results (Park, 2011). The fixed effect model can be seen in Equation 12 below:

Equation 12. FIXED EFFECT MULTIPLE REGRESSION MODEL

\[
Y = (\beta_0 + u_i) + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \ldots + \beta_iX_i + \varepsilon
\]

Park, 2011

where \(u_i\) is the individual effect of the dummy variables.

As there are several estimations for the fixed effects model, it was important for us to understand what impact the estimation we used in our regression model in Stata had on the output produced. We used the command: `xtreg, fe`, which provided us with a one-way (group) “within” estimation of the individual effects. As each choice has advantages and disadvantages, it is important to understand what these are in order to be able to discuss our findings thoroughly by keeping this knowledge in mind. This estimation model presents the same parameter estimates as any other model, which is what we are mainly concerned with in order to answer our research question. It also gives correct sum of squared errors (SSE), but other statistics, such as mean squared errors (MSE), standard errors of the estimates (SEE), standard errors of the parameter estimates, will be incorrect (smaller). Additionally, the R² (coefficient of determination) will also not be reported correctly. However, this estimation model will provide us with an F-test, which is more important to the model than the R² is, not saying that R² is unimportant. R² indicates how much of the variance of the dependent variable that can be explained by the regression model. The F-test tests the null hypothesis that none of the dummy variables has an impact on the dependent variable, which means that if the P-value of this test is significant (below 0.05), we can reject this null hypothesis and conclude that at least one of the dummy variables are related to the dependent variable. In practice, this means that the fixed effect model, compared to an OLS, is significantly better and was the best model we could use in order to explain the relationships. As long as the F-test is significant, we should be able to conclude that our R² would not have been better if another model had been used (Park, 2011).
4.8 Running the Tests

4.8.1 Multiple Regression Including All Observations

We started our tests by doing a multiple regression test with a 95 % confidence level for each of the dependent variables, by including the three control variables along with our main independent variable bond-to-total debt ratio. This was done by the command: `xtreg roe/roa/roce size DA risk BD, fe` (where the / only separates the variables for the three different tests).

Then we created year dummy variables in order to be able to test our second hypothesis. We created dummies for each of the years, except for one (2011) that has to be dropped when testing in the model. They were named `y07, y08, y09, y10`. We also created a dummy variable for the two years of 2008 and 2009, called `y0809`, since these were the years we believed the recent financial crisis hit the Norwegian market. Why we believed these were the significant years, was argued for by looking at the data and the Oslo Børs All Shares index, where we could observe the most significant downturn and recession during these years.

To test our second hypothesis, we ran the same test as above, with the 95 % confidence level., only by including the dummy variable of the crisis as well. `xtreg roe/roa/roce size DA risk BD y0809, fe`

In order to check whether one or more years were actually more significant than others, we ran a last test including all of the single year dummies as well, by the command: `xtreg roe/roa/roce size DA risk BD y07 y08 y09 y10, fe`

4.8.2 Multiple Regression Excluding Outliers

As we had noticed a few values in our data that were looking very much bigger and smaller than the other data, we suspected that they could be outliers. Outliers may have significant impact on the outcome of tests and should therefore be excluded in order to eliminate their biasing effect. We decided to run the tests again, once by excluding mild outliers and once by excluding heavy outliers.

To calculate what should be considered a mild or heavy outlier, we first had to calculate the interquartile range (IQ) for each of the variables. This was done in Excel by calculating the 75th percentile (Q3) and subtracting it by the calculated 25th percentile (Q1). The IQ is then multiplied by 1.5 for the mild outliers and multiplied by 3 for the heavy outliers. We then added these values to the Q3 and subtracted these values from the Q1 to get the cut off value for the outliers. As a regression model assumes a normal distribution of the variables (Park, 2011), we had to check for normality by creating histograms for these, which we did in Stata. We could observe normality in ROE, ROA, ROCE and DA but with some possible outliers (see Appendix 3). Size and BD were heavily skewed to the right; we were therefore unable to cut off any outliers from these variables. The risk variable was hard to tell if it had any specific pattern at all. However, as we could see that none of the risk values would exceed the cut off values for the outliers, there was no point considering this variable any further. This was also the case for the DA variable’s heavy outlier’s cut off values, which enabled us to only run the outlier test with mild cut off values.
The variables and values we finally could apply to our regression model as outliers can be seen typed in black, as the values that were not applicable were typed in red (see Appendix 1). We then applied the cut off values for the mild and heavy outliers to our sample by including them in our regression model. This was done easily in Stata by only adding the command: if roe/roa/roce >=(lower cut off value) & roe/roa/roce <=(higher cut off value) & DA >=(lower cut off value) & DA <=(higher cut off value) in the end of the command, but before .fe. These tests were run once excluding the mild outliers, and once excluding the heavy outliers.

4.8.3 Complimentary Tests

Due to the fact that the estimation of the multiple fixed effect regression model we chose to run, would produce an incorrect $R^2$, we ran a complimentary test that would give us a correct $R^2$ and adjusted $R^2$, by typing in the command: 
\[ \text{di e(r2) e(r2_a)} \]

The result of this test provided us with an $R^2$ that was no different from the original $R^2$, which meant that we could omit these results and use the $R^2$ from our original tests instead.

4.9 How we Proceeded to Analysis

All the tests’ output were copied from Stata and put into Word documents that we could use as appendices. The most relevant data that would help us answer our hypotheses were put into tables that we could display in our Empirical Results chapter. This would enable the reader to get a better overview and for us to be able to better discuss the important findings. In addition, a full quality and ethical assessment of the research is discussed and presented in chapter 7.
5. Empirical Results

This part presents our empirical results. Before the results of our tests are presented we show the summary statistics and the distribution of our variables. This gives a better overview and understanding of the results. The conditions that must apply in order for us to be able to reject our hypotheses is then introduced. Next the results from our tests are presented, including the tests that excluded outliers. Finally we disclose whether the hypothesis can be rejected or not, and whether the bond-to-debt ratio has an effect on firms performance.

5.1 Evaluation of Our Data

First a reminder of the number of observations is provided.

\[ N \text{ (total amount of observations)} = 425 \]
\[ n \text{ (number of group variables)} = 85 \]
\[ T \text{ (number of time variables)} = 5 \]

Table 1 below shows a summary of the statistics commonly used to evaluate the variance of the different variables used in our model. This includes the Minimum and Maximum values, Mean, Median and Standard Deviation for each variable.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Min</th>
<th>Mean</th>
<th>Max</th>
<th>Median</th>
<th>Stdev</th>
</tr>
</thead>
<tbody>
<tr>
<td>roe</td>
<td>-8,6322</td>
<td>-0,0042</td>
<td>5,2066</td>
<td>0,0636</td>
<td>0,8777</td>
</tr>
<tr>
<td>roa</td>
<td>-3,0316</td>
<td>-0,0135</td>
<td>0,6445</td>
<td>0,0258</td>
<td>0,2601</td>
</tr>
<tr>
<td>roce</td>
<td>-47,8933</td>
<td>-0,1479</td>
<td>2,8982</td>
<td>0,0277</td>
<td>2,4086</td>
</tr>
<tr>
<td>size</td>
<td>20</td>
<td>6307</td>
<td>47249</td>
<td>3314</td>
<td>8347</td>
</tr>
<tr>
<td>D/A</td>
<td>0,0129</td>
<td>0,5609</td>
<td>1,3651</td>
<td>0,5988</td>
<td>0,2165</td>
</tr>
<tr>
<td>risk</td>
<td>0,293</td>
<td>0,856</td>
<td>1,246</td>
<td>0,947</td>
<td>0,2165</td>
</tr>
<tr>
<td>B/D</td>
<td>0,0000</td>
<td>0,1395</td>
<td>0,9666</td>
<td>0,0000</td>
<td>0,2182</td>
</tr>
</tbody>
</table>

In order to get a better understanding of these figures and the distribution of the data, histograms for each variable are presented in Figures 6-12 below.

Figure 6. ROE Distribution of Data  Figure 7. ROA Distribution of Data
As we can see, the performance variables, ROE, ROA & ROCE, and the Debt/Asset variable appear to be normally distributed excluding some outliers. The Size and Bond/Debt variables are heavily skewed to the right, whereas the distribution of the Risk variable appears to have no clear pattern.
5.2 Conditions for the Tests

Having been provided with the knowledge of what our data looks like, we now need the knowledge of what conditions that must apply in order for us to be able to reject our null hypotheses. First we need to determine that the tests that we have performed are suitable for our data. This is determined by the F-value. The F-value is found in the F-table using the notation $F(d_1, d_2)$, where $d_1$ is the numerator degrees of freedom and $d_2$ is the denominator degrees of freedom (Moore et al., 2011, p. 441). Our $d_2$ is 340, and our $d_1$ is 84, which gives us an F-value of 1.3107. If the F-values of our tests are higher than 1.3107 and the significance ($P>F$) is less than 0.05, we can conclude that the test is suitable for our data.

When we have concluded that the test is suitable for our data we need to determine whether or not we can reject our null hypotheses. Our first null hypothesis stated that there is no relationship between the bond-to-total debt ratio and performance. Whether or not a relationship exists can be determined by looking at the t-value and the significance ($P>t$) for the BD-variable in the tests that exclude y0809. If the t-value is less than -1.96 or higher than 1.96 and $P>t$ is less than 0.05, we can reject our null hypothesis. This implies that there is a statistically significant relationship between the bond-to-total debt ratio and performance. However, if our t-value is between -1.96 and 1.96 we cannot reject our null hypothesis, which implies that there is no statistically significant relationship between the bond-to-total debt ratio and performance. The same conditions apply for the second null hypothesis. The only difference is that we will check the BD-variable for the tests that include y0809, which is the year dummy for the crisis.

5.3 Results

The test statistics from the tests performed can be seen in the tables presented below. R-squared is fairly low for most of the tests, with ROA having the highest R-squared. As mentioned in our practical method, this will be discussed further in the analysis. However, we can see in table 2 that all tests had a significant F-value as they were all above 1.3107.

Table 2. Summary of Tests Performed

<table>
<thead>
<tr>
<th>Summary of tests performed</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>P&gt;F</td>
<td>$R^2$</td>
<td>N</td>
</tr>
<tr>
<td>ROE</td>
<td>1.6</td>
<td>0.0019</td>
<td>0.0270</td>
<td>425</td>
</tr>
<tr>
<td>ROA</td>
<td>3.76</td>
<td>0.0000</td>
<td>0.1724</td>
<td>425</td>
</tr>
<tr>
<td>ROCE</td>
<td>1.48</td>
<td>0.0083</td>
<td>0.0803</td>
<td>425</td>
</tr>
<tr>
<td>ROE y0809</td>
<td>1.6</td>
<td>0.0020</td>
<td>0.0276</td>
<td>425</td>
</tr>
<tr>
<td>ROA y0809</td>
<td>3.76</td>
<td>0.0000</td>
<td>0.1750</td>
<td>425</td>
</tr>
<tr>
<td>ROCE y0809</td>
<td>1.48</td>
<td>0.0087</td>
<td>0.0823</td>
<td>425</td>
</tr>
</tbody>
</table>

The next table shows the results for the Bond/Debt-variable used in our tests. The tests that excluded y0809 check the first hypothesis, and the tests that included y0809 check the second hypothesis.
Table 3. Results of the Bond/Debt Correlation to Firm Performance.

| Test        | t  | P>|t|  | Coeff.   | Std.Err. |
|-------------|----|------|---------|----------|
| ROE Bond/Debt | 1,47 | 0,142  | 0,5837  | 0,3966   |
| ROA Bond/Debt | -1,89 | 0,060  | -0,1798 | 0,0951   |
| ROCE Bond/Debt | -1,76 | 0,080  | -1,9049 | 1,0830   |
| ROE y0809 Bond/Debt | 1,5  | 0,134  | 0,5976  | 0,3982   |
| ROA y0809 Bond/Debt | -1,81 | 0,072  | -0,1724 | 0,0954   |
| ROCE y0809 Bond/Debt | -1,82 | 0,070  | -1,9748 | 1,0865   |

The table shows that the Bond/Debt-variable was not statistically significant in our tests, neither during the entire period nor during the crisis. At 95 % confidence level we therefore fail to reject both of our null hypotheses. Although, we can see that the t-value of the variable is closer to -1.96 for the ROA and the ROCE tests.

There were however other variables that were significant. For the tests including ROE, size was a significant variable. Size had a t-value of 2.15, and during the crisis the t-value was 2.14. Size & Debt/Assets were both significant for the ROA tests. Size had a t-value of 2.92 and Debt/Assets had a t-value of -7.44. During the crisis size had a t-value of 2.91 and Debt/Assets had a t-value of -7.49. The only significant variable for the ROCE tests was Debt/Assets. The t-value was -5.12, and -5.06 during the crisis (see Appendix 6).

5.3.1 Results Excluding Outliers

As described in the previous part of our thesis, we also performed tests where we excluded heavy and mild outliers. The table below shows the test statistics from those tests. As we can see, all of these tests have a significant F-value as well. The R-squared is however still low.
Table 4. Summary of tests Excluding Heavy & Mild Outliers

| Summary of tests Heavy & Mild Outliers * | F | P>|F| | R² | N |
|------------------------------------------|---|--------|---|---|
| ROE                                      | 3,73 | 0,0000 | 0,0810 | 390 |
| ROE                                      | 3,4 | 0,0000 | 0,0714 | 365 |
| ROA                                      | 3,26 | 0,0000 | 0,0527 | 397 |
| ROA                                      | 4,33 | 0,0000 | 0,0731 | 371 |
| ROCE                                     | 7,36 | 0,0000 | 0,0477 | 395 |
| ROCE                                     | 6,56 | 0,0000 | 0,0398 | 379 |
| ROE y0809                                | 3,73 | 0,0000 | 0,0827 | 390 |
| ROE y0809                                | 3,37 | 0,0000 | 0,0723 | 365 |
| ROA y0809                                | 3,26 | 0,0000 | 0,0565 | 397 |
| ROA y0809                                | 4,31 | 0,0000 | 0,0755 | 371 |
| ROCE y0809                               | 7,38 | 0,0000 | 0,0542 | 395 |
| ROCE y0809                               | 6,62 | 0,0000 | 0,0554 | 379 |

* black text = heavy outliers, blue text = mild outliers

The significance of the Bond/Debt-variable in the tests with outliers can be seen in the table below. The variable was not significant when the outliers were removed either. We can therefore safely say that we fail to reject our null hypotheses. As neither of the tests were significant at the 95 % confidence level it felt unnecessary to run the tests at the 99 % confidence level as well, as it would also show an insignificant result for the Bond/Debt variable.

Table 5. Results of the Bond/Debt Correlation to Firm Performance Excluding Heavy & Mild Outliers

| Results Bond/Debt Heavy & Mild Outliers * | Model | t | P>|t| | Coeff. | Std.Err. |
|------------------------------------------|-------|---|--------|------|---------|
| ROE                                      | Bond/Debt | 0,27 | 0,787 | 0,0275303 | 0,1018989 |
|                                           | Bond/Debt | 0,50 | 0,620 | 0,0397187 | 0,0800968 |
| ROA                                      | Bond/Debt | -0,50 | 0,614 | -0,0204744 | 0,0405699 |
|                                           | Bond/Debt | 0,90 | 0,368 | 0,0285697 | 0,0317134 |
| ROCE                                     | Bond/Debt | -0,17 | 0,863 | -0,0066091 | 0,0382135 |
|                                           | Bond/Debt | 0,23 | 0,814 | 0,0079464 | 0,0338229 |
| ROE y0809                                | Bond/Debt | 0,19 | 0,849 | 0,0195082 | 0,1025242 |
|                                           | Bond/Debt | 0,44 | 0,660 | 0,0354678 | 0,0806139 |
| ROA y0809                                | Bond/Debt | -0,62 | 0,537 | -0,0251827 | 0,040779 |
|                                           | Bond/Debt | 0,90 | 0,368 | 0,0285697 | 0,0317134 |
| ROCE y0809                               | Bond/Debt | -0,30 | 0,764 | -0,0114882 | 0,0382914 |
|                                           | Bond/Debt | 0,05 | 0,961 | 0,0016306 | 0,0337314 |

* black text = heavy outliers, blue text = mild outliers
When the outliers were excluded there was one variable that was significant for all tests, namely the Debt/Assets-variable. The t-value for that variable ranged between -4.87 and -3.06 (see Appendix 7).
6. Analysis & Discussion

In this part we analyse the results presented in the empirical part above. First we discuss the implications of the result, what it means for both academics and practitioners, and how it is connected to previous research. The second section analyzes possible explanations for the result, and the last section discusses whether our regression model was suitable for this type of research.

6.1 The Implications of our Result

As the results above show, we were not able to reject our null hypotheses. This means that no significant relationship was found and there was no difference on the relationship between different economic states. Due to this fact, we will from here on not discuss the two findings separately. In addition, there was no difference in the significance level of the bond-to-total debt variable when outliers were excluded. Of course, a model that excludes outliers is better and will overall give more significant results. However, as it did not change the results for our research questions, we therefore do not need a separate discussion for the results with excluded outliers either. The insignificant result is also the reason why the empirical chapter is not very extensive, as the results were unanimous.

Now that we have concluded that the bond-to-total debt ratio does not appear to affect the performance of a firm significantly according to our tests, we must discuss what this actually means and how it is related to previous knowledge. The fact that we were unable to reject our null hypotheses implies that for a firm’s performance during any economic state, it does not matter whether a firm has a higher or lower proportion of bonds in their debt structure. Despite the fact that our sample was over-represented by firms having bonds, we still believe that it was representative of the population and thus generalizable. In practice, this means that the Norwegian firms should generally not have to be concerned that bonds would have a significant effect on their performance. Issuing bonds will therefore neither injure nor benefit the firm. If it had been a significant result it would have been either beneficial or disadvantageous for a firm to issue bonds. This is something that would have been useful for them to know when making decisions about what type of debt to use. Further, we can add that we cannot say whether any other type of debt would have an impact on firms’ performance, as we did not test those relationships.

If a significant relationship had been detected it would have suggested that the academic field of capital structure and firm performance could be further developed. It would have implied that the different types of debt that a firm employs matters. This would have meant that theories cannot simply focus on the composition of the capital structure; they would have had to consider the composition of their debt structure as well. Further, this would have implied that theories such as the pecking order theory, Modigliani & Miller’s propositions, and the static trade off theory could have been expanded. However, as we did not detect a significant relationship there is nothing that suggests that these theories need to be supplemented. Although, as other variables were included in our model as control variables we were able to detect if any of them had a significant impact on firm performance. The Debt-to-Assets ratio proved to have a
significant and negative relationship to firm performance. This relationship both contradicts and confirms previous findings. It contradicts Dessi & Robertson (2003) and Margaritis & Psillaki (2007) who found the relationship to be positive. In addition, a higher firm performance might also lead to a higher value of the firm. This means that the negative relationship between debt and firm performance that our tests revealed in a way actually contradict Modigliani & Miller’s proposition I as well. Further, the result therefore both confirms and contradicts the static trade off theory. That theory says that debt can be beneficial up to a certain level where it becomes disadvantageous for the firm, whereas our results says that a higher debt level and thus an increase in the debt level will lower the firm’s performance. Our findings confirmed what Lee & Simerly (1998), Gleason et al. (2008) and Majummdar & Chhibber (1999) had previously also found, a negative relationship between debt and firm performance. We can thus conclude that the Debt/Assets ratio does have an impact on firm performance, however, not that the amount of bonds within the leveraged firm would matter.

As mentioned in our Theoretical chapter, we are lacking a specific theory that explains the relationship between the different debt instruments and firm performance. This lack of theory constituted one of our research gaps. One of our academic contributions was to fill this lack between the grand theories on capital structure and the contingency theories on determinants of firm performance. As discussed above, if our findings would have shown a significant relationship between the bond-to-total debt ratio and firm performance, we would have been able to elaborate on, and contribute with some kind of middle-range theory. However, our insignificant results naturally unable us to fulfil this contribution. Even though we could not contribute with a middle-range theory on the missing gap between the existing knowledge, it does not mean our study was unnecessary. In a way, our findings of insignificance can still be considered filling in the missing pieces of understanding the link between debt structure and firm performance. We have learned that bonds do not impact firm performance, at least in the Norwegian context, within the choices of debt structure. This also constitutes theoretical knowledge.

### 6.2 The Insignificant Result

If we further discuss our results and try to understand the implications of it, we need to discuss why we did not get significant results. There is the possibility that we might have failed to reject our hypothesis when it in fact should have been rejected, which is called a type II error (Bryman & Bell, 2011, p. 354). This would have meant that our alternative hypotheses were actually true, although our model was not able to detect this relationship. Further, it would also have meant that the hypotheses could have been accepted if other variables were included. We do not know whether this is the case. However, as we were unable to utilise some of the control variables that we originally planned to use we must consider this as a possibility. As we mentioned above we were unable to retrieve information about the firms’ relative market share and company risk. As a result we had to omit market share as a variable, and use industry risk instead of company risk. Due to the correlation between industry and industry risk, we had to merge these two variables. It is therefore plausible to believe that we would have gotten a different result if we could have utilised the original control variables. There is therefore a chance that a type II error has occurred. However, it is also possible that a type II error has not occurred, and that our results are in fact true.
We must also consider whether there are other factors that could have generated the insignificant result. This first thing we must consider is whether we have employed the correct theories and studies for this research. We would like to argue that the theories and studies used are in fact credible and relevant for our research. As we wanted to test a new concept, any exact applicable theory did not exist. We therefore had to turn to the grand theories within capital structure, the contingency theories for determinants of performance, and previous studies within these areas. As they are all valid and applicable for our study, we believe that the theoretical choice is legit and cannot be blamed for the insignificant result.

Another possible explanation to why we did not get significant results could be the influence that our ontological and epistemological views had on our choice of theory and variables. It might be possible that our research could have required a more realistic, interpretivistic or subjective view in order to be able to employ other variables that might have been able to generate a significant result. However, we do not know if that is the case. We have thoroughly argued why our methodological views are necessary in order for us to answer our research questions. It is therefore not reasonable to claim that a different view would have been better.

Finally, if the result should in fact have been significant there is a possibility that the model and the variables that we used were not applicable on this specific population. If the model had been used on a different market it might have generated a significant result. The Norwegian market might have needed more variables, or completely different variables in the model in order to be able to detect significant relationships. It is also possible that the time period for our data was too short to generate a significant result. However, it might also be the case that there is no significant relationship and that our results are in fact correct. We have continuously argued for our choices during the research process and believe that we have been able to show a valid result. In the next chapter we will further discuss and reflect upon the quality criteria for our research.

6.3 The Regression Model

When analysing our results it is important to reflect upon the model that we have used. This can be done by evaluating and discussing the R-squared statistic and the F-values of the tests. As we concluded in our theoretical chapter a model such as the one we have used, can usually explain between 15-40% of the variation in the results. We can therefore use these parameters to examine whether our R-squared was high or low. The R-squared for all our tests ranged between 2.7 and 17.5. It was only two tests that scored above 15%, as seen in the tables in the previous chapter. This means that most of our tests generated a low R-squared statistic. The interpretation of this is that only the model can only explain a small proportion of the variation in the dependent variables. There are many things that could explain the low R-squared, which is now discussed.

One reason for why the R-squared scored low could be that we were not able to include all the intended variables in our model. If we had been able to include the variables that we had originally planned to include, it is likely that the R-squared statistic would have been higher. It is also possible that the model did not include enough variables to be able to explain the variation in the dependent variable, or that we in fact should have needed to use completely different variables. If we were to speculate on what these other explanatory variables could have been, the inclusion of for example commodity
prices or an oil index might have been appropriate. Norway is a country where the oil constitutes a large proportion of their gross domestic product (GDP), and the price of oil might therefore also be a variable that affects the firms’ performance in their market. This also means that the whole model might not have been suitable for the Norwegian population in order to be able to explain the variation in the performance. Although, as we could not find any theory or previous study that could justify the inclusion of such a variable in our model, we could not incorporate it in our model.

In a multiple regression model with fixed effects, there is one statistic that the researcher has to check before the R-squared can be fully evaluated. It is the F-test, which is actually more important than the R-squared in this type of model. This is because the F-test will tell us whether or not the model used is the most appropriate model to use. The F-test showed a highly significant result for all of our tests. This means that the choice of fixed effects (i.e. using dummy variables for the companies’ individual effect) for our model increased the suitability of the model for our data. Implicitly, this tells us that the R-squared would in fact have been lower if we had used any other model. The F-tests’ significance told us that we have used the model that would create the highest R-squared possible for our data. We have therefore utilised the most appropriate model for our data.

Based on our discussion and analysis above, we would like to state that our research findings show the true result of our study, and that we are able to answer our research questions. The explanation of the variation in the dependent variables (R-squared) would probably have increased if we had been able to include all the variables that we planned to include in the model. However, as we were unable to retrieve data for those variables we had to perform the tests without them. We therefore have to claim that we have conducted the study to the best of our ability, given the data and resources available. Even though the answers to our research questions will not be the most exciting ones, it still constitutes new knowledge and is a contribution to the field of capital structure.
7. Assessment of the Quality of the Research

In addition to the previous analysis of our results, this chapter analyses and discusses ethical and qualitative considerations of our research. These are important issues to assess in order to enhance the trustworthiness and integrity of it.

7.1 Ethical Considerations

In order to ensure the integrity of our research, it is important to consider possible ethical issues that we might have come across. Even though most of the ethical issues mentioned by methodology books refer to ethical issues within qualitative research, there are ethical issues that one needs to consider when performing quantitative research as well. Research ethics is something that should be regarded from the start of the research, as it is present during the entire research process (Saunders et al., 2011, p. 202). We have from the start of this research and during the entire process always ascertained that our research and actions have been ethically correct, to ensure that we are producing acceptable knowledge. In the following paragraphs we present some examples that confirm this claim.

In order to perform research that is ethically correct it is very important that a researcher remains objective throughout the entire research process (Saunders et al., 2011, p. 194). We have during this entire process made sure to remain objective, making sure that our private opinions and thoughts did not affect neither the process nor the outcome. This way we ensure that the research have been conducted in a proper manner. By remaining objective we ensure that data is collected in an accurate way and that it is interpreted correctly (Saunders et al., 2011, p. 194).

According to Bryman & Bell (2011, p. 128) there are four main areas of ethical principles in business research; harm to participants, lack of informed consent, invasion of privacy and deception. As our research was conducted using publically available data we have not invaded any ones privacy, and since the data was publicly available we did not need consent from the participating firms. We did however need to retrieve some information from Oslo ABM, specifically the names of all the firms that had been listed there. When asking for this data we made sure to fully disclose how we would use the data that we were asking for and why we needed it. They could thus chose whether or not they wanted to provide us with the data. That way if they chose to entrust us with the data we would have received an informed consent to use the information (Saunders et al., 2009, p. 190).

Deception is something that is not present in this thesis. We have not tried to present our research as something other than it is, and thus not tried to deceive anyone (Bryman & Bell, 2011, 137-138). In addition, we have not tried to alter or twist our research either. Instead we have used transparency and made sure to give other authors and researchers credit when their work or researches have been used. Finally, we do not believe that the firms that are included in this research can be harmed by it, as the results of our tests do not affect the firms individually. The only way our research might harm anyone would be if our research findings would significantly change the way firms’ decide to engage
in bond issuing, and therefore hurt the bond market. However, as there are other much stronger market forces in place, it seemed very unlikely and we therefore did not see this as a problem or an ethical issue. For our research, it is more appropriate to consider whether any legal and data management rules have been broken. It would include things such as copyright issues. However, since we have only used publicly available data we have not broken any legal or data management rules.

7.2 Quality Criteria

In addition to the ethical issues it is also important to assess the quality criteria of our research. This is also something that we have continuously been evaluating throughout the entire research process. Quality criteria in business research generally concern validity, replication and reliability (Bryman & Bell, 2011, p. 41). However, as there are different aspects for different kind of research methods, we assess the quality criteria applicable for our research paper on a deeper level in the following sections. The criteria assessed are selected and discussed based on our methodological views on how to construct a research of high quality.

7.2.1 Reliability & Replicability

If a research study is reliable, its results should be dependable and stable. Reliability requires consistency of the measures employed for the concept we want to examine. The study results should be repeated if measured on a different sample from the same population, for example. This means we should be using stable measures in order to get a reliable result (Bryman & Bell, 2011, p.41). Reliability also means the findings should be consistent in a sense that results should be consistent over time, consistent if repeated by a different observer and show transparency in the way conclusions are reached from the basic data (Saunders, 2009, p.156).

When evaluating the reliability of our research, we argue that its stability is reasonably adequate. By thinking about if the stability would be confirmed if the study was re-tested on the same sample but at a later point in time, like the test-retest method suggested by Bryman & Bell (2011, p.157), we are most certain that the results will be the same. This is due to the fact that we were using archival research that provided us with historical numbers that do not change over time. Another way to assess the reliability of our results is to discuss the inter-observer consistency, i.e. if we as researchers collected the data equally (Bryman & Bell, 2011, p.159). As we were collecting data based on standardized and pre-specified criteria, such as how the ratios were to be calculated and numbers identified, we can be certain that our research is reliable in that sense as well. This fact also makes our research reliable, as we can be sure that if someone else would pursue the same data collection, this person would find the same results. However, as previously discussed in the Practical Research Method, our sample was not completely representative of the entire population, which makes us question whether the same results would be repeated on a different sample. Nonetheless, as our results on the relationship were overwhelmingly insignificant, we do believe our research is reliable and would repeat itself conducted on another sample from the same population. Lastly, as we have carefully outlined and discussed how we reached our conclusion of the research findings, we believe that the criteria for transparency is well achieved, and we should therefore be able to conclude that our research is fairly reliable.
It is often said that the criteria of *replicability* is rarely fulfilled within business research, as it concerns the possibility to recreate and replicate the study and do it in the exact same way as the original researcher did (Bryman & Bell, 2011, p.42). However, we believe we have written a very much replicable study, as it has been one of our main focuses. Our practical research method is highly transparent and contains more or less every single small step that we have taken throughout our research. It would be naive of us to fully state our research is one hundred percent replicable, as it historically has been very hard to attain this level. Although, we believe that the main details have been provided for and, most importantly, argued for.

### 7.2.2 Validity

Validity can be evaluated in many different ways, as there are different types of validity. Mainly, validity is concerned with whether the integrity of our conclusions is preserved, that is if our research findings concern what they seem to be about (Saunders, 2009, p.157). It is important to clarify that a research paper cannot be valid if it is not first judged to be reliable. We previously argued that our research should be seen as reliable, we can therefore continue the assessment.

Construct, or measurement, validity concerns the measures of the subject in the research. It is closely related to the reliability of the research as it questions whether the measures used are really measuring what we want to measure (Saunders, 2009, p.157). Measurement validity can furthermore be categorized into different aspects and analysed on several grounds. Face validity is what we have just touched upon, that is, if the measures reflect the concept we want to test (Bryman & Bell, 2011, p. 159). In our case, as we are actually testing whether there is a relationship between bond-to-total debt ratio and performance, we are basically asking if this is a valid relationship. And as we have argued that the insignificance of our tests indicates there is not, the validity of the test can be questioned. However, as this is in itself a result that was plausible, we must disregard this fact. We could discuss the model we used in order to test this relationship and its face validity. The $R^2$ is, as mentioned, a common way to determine if the model is actually explaining the relationship proposed, and therefore also tells us if we are measuring what we would like to measure. As this statistic scored very low on all our tests, we have questioned its validity. It is difficult to determine what the right performance measures for our population would be, and as Li & Simerly (1998, p.170) puts it: "There is equal lack of consistency among researchers on which performance measure to choose." The validity at hand to be questioned is rather called Construct validity (Bryman & Bell, 2011, p.160). It regards whether the theoretical deduction, of which we have done in order to create our hypothesis, was appropriately conducted. It might be that either the theory, our interpretation of it, or the population on which the theories were tested, were wrong in order for us to get higher validity of the tests.

Furthermore, when it comes to quantitative analysis and relationship verification testing, it is important to assess the internal validity of our research. Internal validity concerns the credibility of the study and questions the causality of our results. In a study where longitudinal, cross-sectional research has been employed and the data has been collected at the same time, we can easily question what is the cause and what is the effect being observed (Bryman & Bell, 2011, p. 163). We have, based on theory and our research questions, made assumptions on what should be the independent variables and the dependent variable. We do not aim at explaining the causality of firm performance
or other variables; our purpose was merely to test if the bond-to-total debt ratio affects firm performance. The research question does in itself assume that it would be the ratio that causes/affects the firm’s performance, and not the other way, which could be questioned on an internal validity basis. However, as there seemed to be no relationship at all between those two, worrying about the causality seems pointless.

Moreover, there is the question about generalizability and transferability, also referred to as external validity (Saunders, 2009, p.158). To determine whether the findings of our sample would be generalizable for the whole population, and even further transferable on to other populations, we must have had a representative sample. Therefore, the sampling procedures and the choice of sample in itself is an important step (Bryman & Bell, 2011, p.43). As discussed previously, our sample was not fully representative of the population. This was due to the fact that we needed to be sure our sample included enough firms with outstanding bonds, in order to be able to measure the relationship. Therefore our sample became over-represented by firms with bonds issued. However, disregarding this fact, the overall sample should be considered fairly representative of our population. Our findings, as there was a clear insignificance on the relationship tested, should be generalizable for the Norwegian population. We do not, however, believe our findings should be considered general in the sense that they can be fully transferred on to other populations. As we were hoping our findings could be of interest for Swedish firms and have argued for why it should be applicable for them, we can only hope it will be interesting for them to know, but we do not make any recommendations.
8. Conclusion

In this chapter we conclude our research and present what we have learned. Our research questions are answered and the contributions of our study are stated.

The purpose of this study was to investigate whether a firm’s bond-to-total debt ratio impacts its performance. This is a current topic as the implications of the Basel III accords will probably make it difficult for firms with low creditworthiness to receive bank loans and thus compel them to seek other modes of financing (such as bonds). The purpose was also to contribute with information to practitioners within the field that struggle with capital structure decisions and to the academic field of capital structure and performance. Further, we also wanted to find out whether the findings would differ during times of an economic recession. The results from the tests presented in the empirical chapter above showed that we could not conclude that the bond-to-total debt ratio had an effect on a firm’s performance, as we were unable to reject our null hypotheses. The tests showed that there was no difference in the results during economic downturns. The results from these tests and the discussion above help us answer our research questions, which were:

“Does the bond-to-total debt ratio impact the performance of a firm?”

“Are there any significant differences on this relationship during economic states of recession?”

The answer to our first research question is thus; No, the bond-to-total debt ratio does not impact the performance of a firm. The answer to our second question is; No, there does not appear to be any significant differences on this relationship during economic states of recession.

We have thoroughly discussed the implications of this result in the analysis, and would therefore like to conclude what our contributions are. Our academic contribution is to capital structure and performance theory, as we have shown that there is no significant relationship between the bond-to-total debt ratio and a firm’s performance. The capital structure theories and the determinants of firm performance studies have been complemented with our research findings, as it constitutes new knowledge. Even though this knowledge enhances the understanding of these areas, it cannot be considered as a middle-range theory. Our practical contribution is to the practitioners within the field of finance. We have showed that issuing bonds does not seem to have a significant impact on the performance. It is however important to once again highlight that the hypotheses were tested on the Norwegian market, and one have to be careful when generalising or transferring the results on to other populations.

If we would have gotten significant results, we would have been able to give practical recommendations to firms where we could have advised them to issue bonds if there had been a positive effect, or to avoid bonds if the effect was negative. Due to the insignificant result our practical advice is thus that the firm has to assess each situation individually, and issue bonds if it is the easiest and cheapest source of funds.
9. Limitations & Further Research

In this part we first present a summary of the limitations encountered throughout our research, followed by a section of topics for further research.

9.1 Limitations

The transparency of our research has continuously displayed the problems and difficulties that we have encountered, which compelled us to limit our study. Even though these limitations have been dealt with in the text, we believe it is suitable to sum them up in order to clarify what they have been. The first limitation regards the time period for our sample. Due to the fact that Oslo ABM opened in 2005 and that there were missing financial reports from firms, we had to limit that time period to 2007-2011. Further, we could only include reports that included information about the amount of bonds that firms had outstanding. Because of time and resource constraints we had to limit the collection of data from Oslo Børs, which is why we decided to collect a sample that was the same size as the sample from Oslo ABM. After all the data had been compiled, we detected that one firm had assets that were several times larger than the other firms. We therefore had to limit our study further and exclude it from the sample. Finally, there were some limitations regarding the independent control variables in our regression model. Based on the most commonly used variables and our methodological views we narrowed down our control variables. However, later on we were further limited by missing data on two variables. This forced us to omit one variable (market share) and merge two others (industry and risk). It is reasonable to believe that the outcome of our study could have been different if these limitations had not existed. These limitations and the problems that we have encountered have helped us come up with some possible topics for further research.

9.2 Further Research

Our research investigates whether the bond-to-total debt ratio has an effect in general. However, we believe that this is a relationship that could be investigated in other and more specific ways as well, which might bring out a different result. We now present them as suggestions for further research.

One of the purposes of this research was to fill a knowledge gap that existed within capital structure theory. Mainly whether employing different types of debt, and specifically bonds, had an effect on the firms’ performance. We originated this purpose from the fact that the Swedish high yield bond market recently opened, and thought that this information could be interesting for the firms that were considering whether they should engage in this market or not. We therefore suggest that a similar type of research such as ours could be conducted on the Swedish market in a couple of years in order to test this relationship on that population. Studies can also be performed on other markets and populations in order to verify the results of this study in the future.

Another way to investigate the bond-to-total bond ratio further could be to divide firms into different populations based on their traits. The researcher could for example base the populations on their size and risk, where SMEs and high growth firms could be examples of populations. The researcher could then draw a sample from each
population and investigate the relationship within each sample. It would be interesting to see whether that type of study would generate a different result, and whether the bond-to-total debt ratio actually has an effect on performance within some of these populations. Another alternative could be to divide the firms into populations based on their debt-level and check the same effect. We also believe that it would be interesting to perform the same type of investigation that we have, but only include firms that actually have had bonds sometime during the period.

In this thesis we have only investigated one specific debt instrument and its impact on the performance of a firm. As we have explained in the theoretical chapter, there are several other debt instruments that a firm can use to finance its operations. One suggestion for further research is to investigate whether any of the other debt instruments have an impact on a firm’s performance. Further, investigating whether the composition of a firm’s debt in general has an impact on the performance of a firm is also a topic that can be researched in the future.

Finally, it could also be interesting to investigate whether employing bonds as a type of debt instrument has any effect on other quantitative or qualitative traits of a firm, such as the value of the firm or corporate social responsibility to mention a few examples. We believe that learning about all the possible consequences of a choice is interesting to find out.
References


### Appendix 1

**Summary statistics**

```
xrsum roe roa roce size DA risk BD
Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
roe     overall |  -.004208   .8777137  -8.633171     5.2066 |     N =     425
between |          .4568645  -2.012074   2.150782 |     n =      85
within |                     .7507498 -6.625305  5.572672 |     T =       5
|                                            |
roa      overall | -.0135113   .2600832    -3.0316   .6445381 |     N =     425
between |                      .1726971 -1.061660   .3679115 |     n =      85
within  |                        .1951931 -1.983451  1.035449 |     T =       5
|                                            |
roce     overall | -.1479403   2.408637   -47.8933     2.8982 |     N =     425
between |              1.169695 -10.3286   .6997507 |     n =      85
within  |               2.108614 -37.71264   10.18306 |     T =       5
|                                            |
size     overall |  6306.929   8347.295         20     47249 |     N =     425
between |                    8189.114      109.6    40581 |     n =      85
within  |                       1802.334  -1738.871   18315.33 |     T =       5
|                                            |
DA       overall |   .560933   .2165364    .012867     1.3651 |     N =     425
between |                     .1928893   .0587878   1.163839 |     n =      85
within  |                       .1001635   .2143131    1.17518 |     T =       5
|                                            |
risk     overall |  .8559227   .2691868   .2928599   1.246485 |     N =     425
between |                     .2576426   .3528367   1.121641 |     n =      85
within  |                         .0819027   .5530175   1.026608 |     T =       5
|                                            |
BD       overall |  .1394527   .2691868    .012867     1.3651 |     N =     425
between |                      .1937192   .0013849   1.246485 |     n =      85
within  |                    .1021195 -3811873   .8987392 |     T =       5
```

```
roe  roa  roce  size    D/A  risk  B/D
Min  -8.6332 -3.0316 47.8933  20    0.0129 0.2930 0.0000
Mean -0.0042 -0.0135 -0.1479  6307  0.5609 0.8560 0.1395
Max  5.2066  0.6445  2.8982 47249 1.3651 1.2460 0.9666
Median 0.0636  0.0258 0.0277  3114  0.5988 0.9470 0.0000
Stdev  0.8777  0.2601  2.4086  8347  0.2165 0.2692 0.2182
Q1    -0.0625 -0.0259 -0.0312  833000  0.4349 0.5940 0.0000
Q3    0.1539  0.0680  0.1043  7716000 0.6983 1.0656 0.1776
IQR   0.2163  0.0939  0.1355  6883000 0.2635 0.4716 0.1776
1.5xIQR 0.3245  0.1409  0.2032 103245000 0.3952 0.7073 0.2664
```
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<th>Mild upper</th>
<th>Mild lower</th>
<th>Heavy upper</th>
<th>Heavy lower</th>
</tr>
</thead>
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<tr>
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</table>
Appendix 2

Checking for correlations/multicollinearity

corr DA size BD risk, means
(obs=425)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td>.560933</td>
<td>.2165364</td>
<td>.012867</td>
<td>1.3651</td>
</tr>
<tr>
<td>size</td>
<td>6306.929</td>
<td>8347.295</td>
<td>20</td>
<td>47249</td>
</tr>
<tr>
<td>BD</td>
<td>.1394527</td>
<td>.2181776</td>
<td>0</td>
<td>.966577</td>
</tr>
<tr>
<td>risk</td>
<td>.8559227</td>
<td>.2691868</td>
<td>.2928599</td>
<td>1.246485</td>
</tr>
</tbody>
</table>

DA | size | BD | risk
-------------+------------------------------------
DA | 1.0000
size | 0.1660 1.0000
BD | 0.2349 -0.0267 1.0000
risk | 0.1837 0.0756 0.2914 1.0000

Multicollinearity test:
rvfplot, yline(0)
.vif

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</thead>
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</tr>
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<td>risk</td>
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</tr>
<tr>
<td>DA</td>
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</tr>
<tr>
<td>size</td>
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<td>0.963553</td>
</tr>
</tbody>
</table>

Mean VIF | 1.10
Appendix 3

Distribution of variables
Appendix 4

Homoskedasticity tests:

ROA

ROE
## Appendix 5

### HAUSMAN TESTS

**hausman fixed random** (ROE)

<table>
<thead>
<tr>
<th></th>
<th>(b)</th>
<th>(B)</th>
<th>(b-B)</th>
<th>sqrt(diag(V_b-V_B))</th>
</tr>
</thead>
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<tr>
<td>risk</td>
<td>.64533</td>
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</tr>
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<td>size</td>
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<td>BD</td>
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<td>.3221799</td>
</tr>
</tbody>
</table>

--- Coefficients ---

\[ b = \text{consistent under } Ho \text{ and } Ha; \text{ obtained from } \text{xtreg} \]

\[ B = \text{inconsistent under } Ha, \text{ efficient under } Ho; \text{ obtained from } \text{xtreg} \]

Test: \( Ho: \text{ difference in coefficients not systematic} \)

\[
\chi^2(3) = (b-B)'[(V_b-V_B)^{-1}](b-B) \\
= 7.88 \\
\text{Prob}>\chi^2 = 0.0486
\]

**hausman fixed random** (ROA)

<table>
<thead>
<tr>
<th></th>
<th>(b)</th>
<th>(B)</th>
<th>(b-B)</th>
<th>sqrt(diag(V_b-V_B))</th>
</tr>
</thead>
<tbody>
<tr>
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<td>risk</td>
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</tr>
<tr>
<td>BD</td>
<td>-.1797529</td>
<td>-.1376917</td>
<td>-.0420612</td>
<td>.0635662</td>
</tr>
</tbody>
</table>

--- Coefficients ---

\[ b = \text{consistent under } Ho \text{ and } Ha; \text{ obtained from } \text{xtreg} \]

\[ B = \text{inconsistent under } Ha, \text{ efficient under } Ho; \text{ obtained from } \text{xtreg} \]

Test: \( Ho: \text{ difference in coefficients not systematic} \)

\[
\chi^2(3) = (b-B)'[(V_b-V_B)^{-1}](b-B) \\
= 18.46 \\
\text{Prob}>\chi^2 = 0.0004
\]

**hausman fixed random** (ROCE)

<table>
<thead>
<tr>
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--- Coefficients ---

\[ b = \text{consistent under } Ho \text{ and } Ha; \text{ obtained from } \text{xtreg} \]

\[ B = \text{inconsistent under } Ha, \text{ efficient under } Ho; \text{ obtained from } \text{xtreg} \]
<table>
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---

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

Test: Ho: difference in coefficients not systematic  

\[
\text{chi2}(3) = (b-B)'[(V_{b}-V_{B})^{-1}](b-B) \\
= 17.54 \\
\text{Prob>chi2} = 0.0005
\]
Appendix 6

MULTIPLE REGRESSION (incl. all observations)

. xtreg roe size DA risk BD, fe
Fixed-effects (within) regression Number of obs = 425
Group variable: company Number of groups = 85
R-sq: within = 0.0270 Obs per group: min = 5
between = 0.0011 avg = 5.0
overall = 0.0004 max = 5
F(4,336) = 2.33
corr(u_i, Xb) = -0.6907 Prob > F = 0.0557

-------------+----------------------------------------------------------------
      roe |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     size |   .000049   .0000228     2.15   0.032     4.19e-06    .0000937
      DA |  -.453995   .4036375    -1.12   0.261    -.124797    .3399798
    risk |    .64533   .5019616     1.29   0.199    -.342053    1.633902
     BD |   .583734   .3966184     1.47   0.142    -.196433    1.363902
    _cons |  -.692104   .5347096    -1.29   0.196    -.174391    .3596966
-------------+----------------------------------------------------------------
sigma_u |  .65413507
sigma_e |  .83188488
      rho |  .38207258   (fraction of variance due to u_i)
-------------+----------------------------------------------------------------
F test that all u_i=0:     F(84, 336) =     1.60             Prob > F = 0.0019

. xtreg roe size DA risk BD y07 y08 y09 y10, fe
Fixed-effects (within) regression Number of obs = 425
Group variable: company Number of groups = 85
R-sq: within = 0.0573 Obs per group: min = 5
between = 0.0002 avg = 5.0
overall = 0.0037 max = 5
F(8,332) = 2.52
corr(u_i, Xb) = -0.7068 Prob > F = 0.0113

-------------+----------------------------------------------------------------
      roe |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     size |  -.280655   .4044511    -0.69   0.488    -.976264    .4150532
      DA |  -.453995   .4036375    -1.12   0.261    -.124797    .3399798
    risk |   .679563   .4981048     1.36   0.173    -.300276    1.659403
     BD |   .437171   .4002228     1.09   0.275    -.350121    1.224464
       y07 |   .267989   .1292538     2.07   0.039    -.013711    .5496127
       y08 |   .004584   .1264522     0.04   0.971    -.244168    .2533323
       y09 |   .325228   .1269473     2.56   0.011     .075505     .5749499
       y10 |   .126466   .1267843     1.00   0.319    -.122936    .3758673

. xtreg roe size DA risk BD y0809, fe
Fixed-effects (within) regression                   Number of obs  =     425
Group variable: company                           Number of groups =     85
R-sq: within  = 0.0276                             Obs per group: min =     5
               between = 0.0012                        avg =     5.0
               overall = 0.0004                       max =     5
F(5,335) = 1.90
corr(u_i, Xb) = -0.6912                          Prob > F = 0.0931

|      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval] |
|---------------------------------------------------------------|
|  roe |                  size |  .0000488 |  .0000228 |  2.14  0.033 |  4.02e-06  .0000937 |
|      DA |         -.4638603 |  .4046702 |  -1.15  0.253 | -1.259875  .3321547 |
|      risk |       .6536253 |  .5028679 |   1.30  0.195 | -.3355513  1.642802 |
|      BD |         .597581  |  .3982051 |   1.50  0.134 | -.1857165  1.380879 |
|        y0809 |      .0384215 |  .0829058 |   0.46  0.643 | -.1246601  .201503 |
|      _cons |     -.7102258 |  .5367618 |  -1.32  0.187 | -.1766074  .3456225 |

---------------------------------------------------------------------
|sigma_u |     .6550966 |
sigma_e |     .8328586 |
rho |     .38221379 (fraction of variance due to u_i)
---------------------------------------------------------------------
F test that all u_i=0:  F(84, 332) = 1.62  Prob > F = 0.0015

. xtreg roa size DA risk BD, fe
Fixed-effects (within) regression                   Number of obs  =     425
Group variable: company                           Number of groups =     85
R-sq: within  = 0.1724                             Obs per group: min =     5
               between = 0.0702                        avg =     5.0
               overall = 0.0820                       max =     5
F(4,336) = 17.49
corr(u_i, Xb) = -0.5829                          Prob > F = 0.0000

|      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval] |
|---------------------------------------------------------------|
|  roa |                  size |  .000016  |  5.46e-06 |  2.92  0.004 |  5.22e-06  .0000267 |
|      DA |         -1.7204619 |  .967887 |  -1.74  0.085 | -.91085  -.5300737 |
|      risk |       .2287525 |  .120366 |   1.90  0.058 | -.0080133  .4655183 |
|      BD |         -.1797529 |  .0951056 |  -1.89  0.060 | -.3668303  .0073245 |

---------------------------------------------------------------------
|sigma_u |     .6550966 |
sigma_e |     .8328586 |
rho |     .38221379 (fraction of variance due to u_i)
---------------------------------------------------------------------
F test that all u_i=0:  F(84, 335) = 1.60  Prob > F = 0.0020
\_cons | .119276  .1282186  0.93  0.353  -.1329363  .3714884  \\
-----------------------------------------------
sigma_u | .21618655  
sigma_e | .19947864  
rho | .54013074  (fraction of variance due to u_i)  

F test that all u_i=0:  F(84, 336) = 3.76  Prob > F = 0.0000  

. xtreg roa size DA risk BD y07 y08 y09 y10, fe
Fixed-effects (within) regression  Number of obs = 425  
Group variable: company  Number of groups = 85  
R-sq:  within = 0.2075  
between = 0.0724  
overall = 0.0934  
F(8,332) = 10.87  
corr(u_i, Xb) = -0.5966  Prob > F = 0.0000  

|     | Coef.  Std. Err.  t  P>|t|  [95% Conf. Interval]  
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| size | .0000176  5.41e-06  3.26  0.001  6.99e-06  .0000283  
| DA  | -.6856794  .0964164  -7.11  0.000  -.8753435  -.4960154  
| risk | .2242851  .1187423  1.89  0.060  -.0092971  .4578673  
| BD  | -.2335441  .0954084  -2.45  0.015  -.4212254  -.0458629  
| y07 | .1109252  .0308124  3.60  0.000  .0503131  .1715373  
| y08 | .0590306  .0301447  1.96  0.051  -.0002682  .1183293  
| y09 | .0799979  .0302627  2.64  0.009  .020467  .1395287  
| y10 | .0409155  .0302239  1.35  0.177  -.0185389  .10037  
| _cons | .0423176  .1289399  0.33  0.743  -.2113246  .2959597  
-----------------------------------------------
sigma_u | .22091147  
sigma_e | .19637258  
rho | .55860354  (fraction of variance due to u_i)  

F test that all u_i=0:  F(84, 332) = 3.86  Prob > F = 0.0000  

. xtreg roa size DA risk BD y0809, fe
Fixed-effects (within) regression  Number of obs = 425  
Group variable: company  Number of groups = 85  
R-sq:  within = 0.1750  
between = 0.0693  
overall = 0.0823  
F(5,335) = 14.21  
corr(u_i, Xb) = -0.5828  Prob > F = 0.0000  

|     | Coef.  Std. Err.  t  P>|t|  [95% Conf. Interval]  
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</table>
| size | .0000159  5.46e-06  2.91  0.004  5.15e-06  .0000266  

90
| Variable | Coef. | Std. Err. | t    | P>|t|  | [95% Conf. Interval] |
|----------|-------|-----------|------|------|---------------------|
| DA       | -7.257347 | 0.0969128 | -7.49 | 0.000 | [-9.163691, -5.351003] |
| risk     | 0.2331863 | 0.1204298 | 1.94  | 0.054 | [-0.0037076, 0.4700802] |
| BD       | -1.723521 | 0.0953645 | -1.81 | 0.072 | [-3.599408, 0.0152367] |
| y0809    | 0.0205359 | 0.0198548 | 1.03  | 0.302 | [-0.0185199, 0.0595916] |
| _cons    | 1.095899  | 0.1285469 | 0.85  | 0.395 | [-0.143271, 0.3624507] |

sigma_u | 0.21643883 |
sigma_e | 0.19945793 |
rho | 0.54076164 (fraction of variance due to u_i) 

F test that all u_i=0:  F(84, 335) = 3.76  Prob > F = 0.0000
DA |  -5.817304   1.113643    -5.22   0.000     -8.00799   -3.626618  
risk |   .7407992   1.371515     0.54   0.589    -1.957157    3.438755  
BD |  -1.979607   1.102001    -1.80   0.073    -4.147391    .1881774  
y07 |  0.0133814   .3558938     0.04   0.970    -.6867097    .7134725  
y08 |   .0879784   .3481821     0.25   0.801    -.5969428    .7728996  
y09 |  -.5967566   .3495452    -1.71   0.089    -1.284359     .090846  
y10 |  -.2004117   .3490965    -0.57   0.566    -.8871317    .4863082  
    _cons |  2.895271   1.489301     1.94   0.053    -.0343849    5.824927  

------------------  
sigma_u |  1.6091387  
sigma_e |  2.2681722  
rho |  .33480085  (fraction of variance due to u_i)  

F test that all u_i=0:     F(84, 332) =     1.50             Prob > F = 0.0069  

.xtreg roce size DA risk BD y0809, fe  
Fixed-effects (within) regression               Number of obs      =       425  
Group variable: company                         Number of groups   =        85  
R-sq:  within  = 0.0823                         Obs per group: min =         5  
        between = 0.0146                                        avg =       5.0  
        overall = 0.0275                                        max =         5  
                         F(5,335)           =      6.01  
corr(u_i, Xb)  = -0.5993                        Prob > F           =    0.0000  

---------------------------------------------  
roce |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]  
---------------------------------------------  
     size |   7.14e-06   .0000622     0.11   0.909    -.0001152    .0001295  
    DA |  -5.588815   1.104176    -5.06   0.000    -7.760807    -3.416823  
    risk |   .8772296   1.372116     0.64   0.523    -.82182     3.576279  
    BD |  -1.974778   1.086535    -1.82   0.070    -.41207     1.625133  
y0809 |  -.1939808   .2262153    -0.86   0.392    -.6389623    .2510008  
    _cons |  2.544128   1.464599     1.74   0.083    -.3368411    5.425097  

---------------------------------------------  
sigma_u |  1.5684603  
sigma_e |  2.2725233  
rho |  .32265595  (fraction of variance due to u_i)  

---------------------------------------------  
F test that all u_i=0:     F(84, 335) =     1.48             Prob > F = 0.0087  

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Appendix 7

MULTIPLE REGRESSION (excl. mild outliers)

```
.xtreg roe size DA risk BD if roe >=-0.387 & roe <=0.4784 & DA >=0.0397 & DA <= 1.0935, fe

Fixed-effects (within) regression
Number of obs = 365
Group variable: company
Number of groups = 84
R-sq: within = 0.0714
between = 0.0001
overall = 0.0034
F(4,277) = 5.32
corr(u_i, Xb) = -0.5407

------------------------------------------------------------------------------
roe |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
size |   5.75e-06   3.67e-06     1.57   0.118    -1.47e-06     .000013
DA |  -.3828988   .0907915    -4.22   0.000    -.5616277   -.2041699
risk |  -.0805445   .0780693    -1.03   0.303     -.234229    .0731399
BD |   .0397187   .0800968     0.50   0.620     -.117957    .1973945
    _cons |   .2920864   .0885776     3.30   0.001     .1177155    .4664572
------------------------------------------------------------------------------
F test that all u_i=0:     F(83, 277) = 5.40             Prob > F = 0.0000

.xtreg roe size DA risk BD y07 y08 y09 y10 if roe >=-0.387 & roe <=0.4784 & DA > 0.0397 & DA <=1.0935, fe

Fixed-effects (within) regression
Number of obs = 365
Group variable: company
Number of groups = 84
R-sq: within = 0.1325
between = 0.0001
overall = 0.0161
F(8,273) = 5.21
corr(u_i, Xb) = -0.5256

------------------------------------------------------------------------------
roe |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
size |   7.69e-06   3.61e-06     2.13   0.034     5.84e-07    .000148
DA |  -.3608685   .0899862    -4.01   0.000    -.5380236   -.1837135
risk |  -.067736   .0761262     -0.89   0.374     -.2176424    .0820951
BD |  -.0010521   .0789486    -0.01   0.989     -.156478    .1543738
y07 |   .069766   .0202462     3.45   0.001     .0299074    .1096246
y08 |   .0127265   .0208396     0.61   0.542     -.0283004    .0537533
------------------------------------------------------------------------------
F test that all u_i=0:     F(83, 277) = 5.21             Prob > F = 0.0000
```

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\begin{verbatim}
. xtreg roe size DA risk BD y0809 if roe >=-0.387 & roe <=0.4784 & DA >=0.0397 & DA <=1.0935, fe
 Fixed-effects (within) regression               Number of obs      =       365
 Group variable: company                         Number of groups   =        84
 R-sq:  within  = 0.0723                         Obs per group: min =         1
 between = 0.0000                                        avg =       4.3
 overall = 0.0038                                        max =         5
 F(5,276)           =      4.30
 corr(u_i, Xb)  = -0.5363                        Prob > F           =    0.0009
------------------------------------------------------------------------------
   roe |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   size |   5.67e-06   3.67e-06     1.54   0.124    -1.57e-06    .0000129
   DA |  -.3801164   .0910667    -4.17   0.000    -.5593901   -.2008428
   risk |  -.0814596   .0781915    -1.04   0.298    -.2353872     .072468
   BD |   .0354678   .0806139     0.44   0.660    -.1232284    .1941639
 y0809 |  -.0071163    .013622    -0.52   0.602    -.0339324    .0196998
 _cons |   .2952395   .0888993     3.32   0.001     .1202328    .4702463
------------------------------------------------------------------------------
 F test that all u_i=0:     F(83, 276) =     3.37             Prob > F = 0.0000

. xtreg roa size DA risk BD y0809 if roa >=-0.1668 & roa <=0.2089 & DA >=0.0397 & DA <=1.0935, fe
 Fixed-effects (within) regression               Number of obs      =       371
 Group variable: company                         Number of groups   =        85
 R-sq:  within  = 0.0731                         Obs per group: min =         1
 between = 0.0055                                        avg =       4.4
 overall = 0.0038                                        max =         5
 F(4,282)           =      5.56
 corr(u_i, Xb)  = -0.3708                        Prob > F           =    0.0003
------------------------------------------------------------------------------
   roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   size |  .3358149    .170625     2.02   0.044     .0034141    .6682157
   DA |   .2572383    .090736     2.84   0.005     .0790319    .4354447
   risk |  -.3369316    .208396    -1.62   0.106    -.7499008    .1756375
   BD |   .0979971    .086940     1.14   0.256    -.0731792    .2691735
 y0809 |  -.0497156    .055122    -0.89   0.373    -.1642024    .0657713
 _cons |   .2632912    .087045     3.02   0.003     .1021933    .4243892
------------------------------------------------------------------------------
 F test that all u_i=0:     F(83, 276) =     3.37             Prob > F = 0.0000
\end{verbatim}
xtreg roa size DA risk BD y07 y08 y09 y10 if roa >=-0.1668 & roa <=0.2089 & DA >=0.0397 & DA <=1.0935, fe

Fixed-effects (within) regression               Number of obs      =       371
Group variable: company                         Number of groups   =        85
R-sq:  within  = 0.1053                         Obs per group: min =         1
between = 0.0050                                        avg =       4.4
overall = 0.0556                                        max =         5
F(8,278)           =      4.09
corr(u_i, Xb)  = -0.3119                        Prob > F           =    0.0001

-------------+----------------------------------------------------------------
roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
size |  -8.60e-08   1.58e-06    -0.05   0.957    -3.19e-06    3.02e-06
DA |  -.1559114   .0358235    -4.35   0.000    -.2264312   -.0853916
risk |  -.0364024   .0326197    -1.12   0.265    -.1006154    .0278105
BD |   .0099754   .0319742     0.31   0.755    -.0529669    .0729177
y07 |   .0251137   .0086251     2.91   0.004     .0081349    .0420925
y08 |   .0034975   .0085668     0.41   0.683    -.0133665    .0203615
y09 |   .0081305   .0083739     0.97   0.332    -.0083539    .0246148
y10 |   .0070822   .0083883     0.84   0.399    -.0094304    .0235948
_cons |   .1361857   .0383178     3.55   0.000     .0607558    .2116157
-------------+----------------------------------------------------------------

sigma_u |  .06283966
sigma_e |  .04994297
rho |  .61287404   (fraction of variance due to u_i)

F test that all u_i=0:     F(84, 278) =     4.48             Prob > F = 0.0000

. xtreg roa size DA risk BD y0809 if roa >=-0.1668 & roa <=0.2089 & DA >=0.0397 & DA <=1.0935, fe

Fixed-effects (within) regression               Number of obs      =       371
Group variable: company                         Number of groups   =        85
R-sq:  within  = 0.0755                         Obs per group: min =         1
between = 0.0058                                        avg =       4.4
overall = 0.0393                                        max =         5
F(8,278)           =      4.09
corr(u_i, Xb)  = -0.3119                        Prob > F           =    0.0001

-------------+----------------------------------------------------------------
roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
size |  -8.60e-08   1.58e-06    -0.05   0.957    -3.19e-06    3.02e-06
DA |  -.1559114   .0358235    -4.35   0.000    -.2264312   -.0853916
risk |  -.0364024   .0326197    -1.12   0.265    -.1006154    .0278105
BD |   .0099754   .0319742     0.31   0.755    -.0529669    .0729177
y07 |   .0251137   .0086251     2.91   0.004     .0081349    .0420925
y08 |   .0034975   .0085668     0.41   0.683    -.0133665    .0203615
y09 |   .0081305   .0083739     0.97   0.332    -.0083539    .0246148
y10 |   .0070822   .0083883     0.84   0.399    -.0094304    .0235948
_cons |   .1361857   .0383178     3.55   0.000     .0607558    .2116157
-------------+----------------------------------------------------------------

sigma_u |  .06283966
sigma_e |  .04994297
rho |  .61287404   (fraction of variance due to u_i)

F test that all u_i=0:     F(84, 278) =     4.48             Prob > F = 0.0000
\[ F(5, 281) = 4.59 \]
\[ \text{corr}(u_i, Xb) = -0.3643 \]
\[ \text{Prob} > F = 0.0005 \]

| roa | Coef. | Std. Err. | t  | P>|t| | [95% Conf. Interval] |
|-----|-------|-----------|----|-----|---------------------|
| size | -9.38e-07 | 1.57e-06 | -0.60 | 0.550 | -4.02e-06 - 2.15e-06 |
| DA  | -1.527789 | 0.035722 | -4.28 | 0.000 | -2.230956 - 0.0824621 |
| risk | -0.038896 | 0.03294 | -1.18 | 0.239 | -0.1037301 - 0.0259509 |
| BD  | 0.0256651 | 0.03193 | 0.80 | 0.422 | -0.0371340 - 0.0884651 |
| y0809 | -0.0047765 | 0.0055046 | -0.87 | 0.386 | -0.015612 - 0.0060591 |
| _cons | 0.1511014 | 0.0380801 | 3.97 | 0.000 | 0.0761429 - 0.2260598 |

\[ \text{sigma}_u = 0.06302446 \]
\[ \text{sigma}_e = 0.05049502 \]
\[ \rho = 0.60904422 \] (fraction of variance due to \( u_i \))

\[ F(84, 281) = 4.31 \]
\[ \text{Prob} > F = 0.0000 \]

\[ \text{xtreg roce size DA risk BD if roce >=-0.2344 & roce <=0.3075 & DA >=0.0397 & DA <=1.0935, fe} \]
\[ \text{Fixed-effects (within) regression} \]
\[ \text{Number of obs} = 379 \]
\[ \text{Group variable: company} \]
\[ \text{Number of groups} = 85 \]
\[ \text{R-sq: within} = 0.0398 \]
\[ \text{Obs per group: min = 1} \]
\[ \text{between} = 0.0271 \]
\[ \text{avg = 4.5} \]
\[ \text{overall} = 0.0003 \]
\[ \text{max = 5} \]
\[ F(4, 290) = 3.01 \]
\[ \text{corr}(u_i, Xb) = -0.3697 \]
\[ \text{Prob} > F = 0.0186 \]

\[ \text{xtreg roce size DA risk BD if roce >=-0.2344 & roce <=0.3075 & DA >=0.0397 & DA <=1.0935, fe} \]
\[ \text{Fixed-effects (within) regression} \]
\[ \text{Number of obs} = 379 \]
\[ \text{Group variable: company} \]
\[ \text{Number of groups} = 85 \]
\[ \text{R-sq: within} = 0.0638 \]
\[ \text{Obs per group: min = 1} \]

\[ \text{xtreg roce size DA risk BD y07 y08 y09 y10 if roce >=-0.2344 & roce <=0.3075 & DA >=0.0397 & DA <=1.0935, fe} \]
\[ \text{Fixed-effects (within) regression} \]
\[ \text{Number of obs} = 379 \]
\[ \text{Group variable: company} \]
\[ \text{Number of groups} = 85 \]
\[ \text{R-sq: within} = 0.0638 \]
\[ \text{Obs per group: min = 1} \]
The output of the regression analysis is as follows:

### Model Coefficients

| Variable | Coef. | Std. Err. | t | P>|t| | 95% Conf. Interval |
|----------|-------|-----------|---|-----|-------------------|
| size | 9.93e-07 | 1.96e-06 | 0.51 | 0.612 | -2.86e-06 to 4.84e-06 |
| DA | -0.1437329 | 0.0461279 | -3.12 | 0.002 | -0.2345262 to -0.0529396 |
| risk | -0.0447356 | 0.0411168 | -1.09 | 0.278 | -0.1256654 to 0.0361943 |
| BD | -0.0061422 | 0.0344224 | -0.18 | 0.859 | -0.0738956 to 0.0616111 |
| y07 | 0.01395 | 0.0109432 | 1.27 | 0.203 | -0.0075894 to 0.0354894 |
| y08 | -0.0038998 | 0.0106967 | -0.36 | 0.716 | -0.0249541 to 0.0171545 |
| y09 | -0.0136279 | 0.0106873 | -1.28 | 0.203 | -0.0346635 to 0.0074078 |
| y10 | 0.0042347 | 0.0107961 | 0.39 | 0.695 | -0.0170153 to 0.0254846 |
| _cons | 0.1553624 | 0.0465373 | 3.34 | 0.001 | 0.0637633 to 0.2469615 |

### Model Summary

- **F(8, 286) = 2.44**
- corr(u_i, Xb) = -0.3391
- Prob > F = 0.0146

-----

### Model Coefficients

| Variable | Coef. | Std. Err. | t | P>|t| | 95% Conf. Interval |
|----------|-------|-----------|---|-----|-------------------|
| size | 7.83e-07 | 1.93e-06 | 0.41 | 0.685 | -3.02e-06 to 4.58e-06 |
| DA | -0.1395317 | 0.0455731 | -3.06 | 0.002 | -0.229229 to -0.0498345 |
| risk | -0.0445619 | 0.0405731 | -1.09 | 0.279 | -0.1253712 to 0.0362473 |
| BD | 0.0016306 | 0.0337314 | 0.05 | 0.961 | -0.0647597 to 0.0680209 |
| y0809 | -0.0149451 | 0.0068597 | -2.18 | 0.030 | -0.0284465 to -0.0014437 |
| _cons | 0.1594803 | 0.0455522 | 3.50 | 0.001 | 0.0698241 to 0.2491365 |

### Model Summary

- **F(5, 289) = 3.39**
- corr(u_i, Xb) = -0.3421
- Prob > F = 0.0054

-----

### F Test

- F test that all u_i=0: F(84, 286) = 6.62
- Prob > F = 0.0000

### Additional Model

- . xtreg roce size DA risk BD if roce >=-0.2344 & roce <=0.3075 & DA >=0.03 & DA <=1.0935, fe
- Fixed-effects (within) regression
  - Number of obs = 379
  - Number of groups = 85
  - R-sq: within = 0.0554; avg = 4.5
  - overall = 0.0002; max = 5
  - corr(u_i, Xb) = -0.3391
  - Prob > F = 0.0146

### Model Coefficients

| Variable | Coef. | Std. Err. | t | P>|t| | 95% Conf. Interval |
|----------|-------|-----------|---|-----|-------------------|
| size | 9.93e-07 | 1.96e-06 | 0.51 | 0.612 | -2.86e-06 to 4.84e-06 |
| DA | -0.1437329 | 0.0461279 | -3.12 | 0.002 | -0.2345262 to -0.0529396 |
| risk | -0.0447356 | 0.0411168 | -1.09 | 0.278 | -0.1256654 to 0.0361943 |
| BD | -0.0061422 | 0.0344224 | -0.18 | 0.859 | -0.0738956 to 0.0616111 |
| y07 | 0.01395 | 0.0109432 | 1.27 | 0.203 | -0.0075894 to 0.0354894 |
| y08 | -0.0038998 | 0.0106967 | -0.36 | 0.716 | -0.0249541 to 0.0171545 |
| y09 | -0.0136279 | 0.0106873 | -1.28 | 0.203 | -0.0346635 to 0.0074078 |
| y10 | 0.0042347 | 0.0107961 | 0.39 | 0.695 | -0.0170153 to 0.0254846 |
| _cons | 0.1553624 | 0.0465373 | 3.34 | 0.001 | 0.0637633 to 0.2469615 |

### Model Summary

- **F(5, 289) = 3.39**
- corr(u_i, Xb) = -0.3421
- Prob > F = 0.0054

-----

### F Test

- F test that all u_i=0: F(84, 289) = 6.62
- Prob > F = 0.0000
**MULTIPLE REGRESSION (excl. heavy outliers)**

```
. xtreg roe size DA risk BD if roe >=-0.7115 & roe <=0.8029, fe
Fixed-effects (within) regression Number of obs = 390
Group variable: company Number of groups = 85
R-sq: within = 0.0810 Obs per group: min = 1
between = 0.0075 avg = 4.6
overall = 0.0088 max = 5
F(4,301) = 6.63
corr(u_i, Xb) = -0.5148 Prob > F = 0.0000

| Coef.  | Std. Err. | t     | P>|t|   | 95% Conf. Interval |
|--------|-----------|-------|-------|------------------|------------------|
| size   |    6.28e-06 | 4.53e-06 | 1.39  | 0.167 | -2.64e-06, 0.0000152 |
| DA     |  -0.5133712  | 0.1054227 | -4.87 | 0.000 | -0.72083, -0.3059124 |
| risk   |  -0.06484  | 0.0975885 | -0.66 | 0.507 | -0.2568821, 0.1272021 |
| BD     |   0.0275303  | 0.1018989 |  0.27 | 0.787 | -0.1729941, 0.2280547 |
| _cons  |   0.3419916  | 0.1085015 |  3.15 | 0.002 | 0.128474, 0.5555093 |
| sigma_u |        0.17547614 |
| sigma_e |        0.15785067 |
| rho    |         0.55273  | (fraction of variance due to u_i) |

F test that all u_i=0: F(84, 301) = 3.73 Prob > F = 0.0000

. xtreg roe size DA risk BD y08 y09 y10 y07 if roe >=-0.7115 & roe <=0.8029, fe
Fixed-effects (within) regression Number of obs = 390
Group variable: company Number of groups = 85
R-sq: within = 0.1332 Obs per group: min = 1
between = 0.0132 avg = 4.6
overall = 0.0246 max = 5
F(8,297) = 5.70
corr(u_i, Xb) = -0.4847 Prob > F = 0.0000

| Coef.  | Std. Err. | t    | P>|t|   | 95% Conf. Interval |
|--------|-----------|------|-------|------------------|------------------|
| size   |   8.50e-06  | 4.47e-06 | 1.90  | 0.058 | -2.96e-07, 0.0000173 |
| DA     |  -0.4660581  | 0.1048753 | -4.44 | 0.000 | -0.6724509, -0.2596653 |
| risk   |  0.0275303  | 0.1018989 |  0.27 | 0.787 | -0.1729941, 0.2280547 |
| BD     |   0.001145  | 0.0257493 |  0.04 | 0.965 | -0.0495292, 0.0518192 |
| y08    |   0.0443049  | 0.0252265 |  1.76 | 0.080 | -0.0053404, 0.0939502 |
| y09    |   0.017407   | 0.0249945 |  0.70 | 0.487 | -0.0317818, 0.0665958 |
| y10    |   0.090553   | 0.021447 |  3.60 | 0.000 | 0.0410686, 0.1400373 |
| _cons  |   0.2756856  | 0.1091026 |  2.53 | 0.012 | 0.0609735, 0.4903977 |
```

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sigma_u |  .17390157  
sigma_e |  .15433217  
rho |  .55940913  (fraction of variance due to u_i)  

F test that all u_i=0:  F(84, 297) = 3.88  Prob > F = 0.0000

.xtreg roe size DA risk BD y0809 if roe >=-0.7115 & roe <=0.8029, fe
Fixed-effects (within) regression  Number of obs = 390
Group variable: company  Number of groups = 85
R-sq:  within = 0.0827  Obs per group: min = 1
  between = 0.0071  avg = 4.6
  overall = 0.0092  max = 5
F(5,300) = 5.41  Prob > F = 0.0001

corr(u_i, Xb) = -0.5128

|     | Coef. | Std. Err. |      t    |     P>|t|     [95% Conf. Interval] |
|-----|-------|-----------|-----------|--------|-----------------------------|
| roe | 6.17e-06 | 4.54e-06 | 1.36 | 0.175 | -2.76e-06 - 0.000151       |
| size | -5087418 | 1056763 | -4.81 | 0.000 | -7167024 - 3007812         |
| DA  | -0.0684848 | 0.977776 | -0.70 | 0.484 | -2.609017 0.1239321        |
| risk | 0.195082 | 0.1025242 | 0.19 | 0.849 | -0.1822495 0.2212658       |
| y0809 | -0.0126559 | 0.167676 | -0.75 | 0.451 | -0.2609017 0.203411        |
| BD  | 0.0195082 | 0.1025242 | 0.19 | 0.849 | -0.1822495 0.2212658       |
| _cons | 0.349357 | 0.1090168 | 3.20 | 0.001 | 0.1348225 0.5638915        |

sigma_u |  .1754936  
sigma_e |  .15796362  
rho |  .55242553  (fraction of variance due to u_i)  

F test that all u_i=0:  F(84, 300) = 3.73  Prob > F = 0.0000

.xtreg roa size DA risk BD if roa >=-0.3077 & roa <=0.3498, fe
Fixed-effects (within) regression  Number of obs = 397
Group variable: company  Number of groups = 85
R-sq:  within = 0.0527  Obs per group: min = 2
  between = 0.0285  avg = 4.7
  overall = 0.0475  max = 5
F(4,308) = 4.29  Prob > F = 0.0022

corr(u_i, Xb) = -0.3049

|     | Coef. | Std. Err. |      t    |     P>|t|     [95% Conf. Interval] |
|-----|-------|-----------|-----------|--------|-----------------------------|
| roa | 2.17e-06 | 2.07e-06 | 1.05 | 0.294 | -1.90e-06 6.25e-06         |
| size | -1818272 | 4534999 | -4.01 | 0.000 | -421062 -0.925924          |
| DA  | -0.0017487 | 0.448523 | -0.04 | 0.969 | -0.090045 0.086507        |
| risk | -0.0204744 | 0.0405699 | -0.50 | 0.614 | -0.1003035 0.0593548      |
| BD  | 0.1151197 | 0.0501406 | 2.30 | 0.022 | 0.0164581 0.2137812       |

sigma_u |  .15796362  
rho |  .55242553  (fraction of variance due to u_i)  

F test that all u_i=0:  F(4,308) = 4.29  Prob > F = 0.0022
\[
\begin{align*}
\text{sigma}_u & \mid .07230185 \\
\text{sigma}_e & \mid .07309806 \\
\rho & \mid .49452417 \quad \text{(fraction of variance due to u}_i) \\
\end{align*}
\]

F test that all u_i=0:
\[F(84, 308) = 3.26 \quad \text{Prob} > F = 0.0000\]

```
.xtreg roa size DA risk BD y07 y08 y09 y10 if roa >=-0.3077 & roa <=0.3498, fe
Fixed-effects (within) regression               Number of obs      =       397
Group variable: company                         Number of groups   =        85
R-sq:  within  = 0.1125                         Obs per group: min =         2
between = 0.0323                                        avg =       4.7
overall = 0.0694                                        max =         5
F(8,304)           =      4.82
\]

\[
\begin{align*}
\text{corr}(u_i, Xb) & = -0.3207 \quad \text{Prob} > F = 0.0000 \\
\end{align*}
\]

```
------------------------------------------------------------------
\text{roa} \mid \text{Coef.} \quad \text{Std. Err.} \quad t \quad P>|t| \quad [95\% \text{ Conf. Interval}] \\
------------------------------------------------------------------
\text{size} \mid 3.27e-06 \quad 2.03e-06 \quad 1.61 \quad 0.109 \quad -7.32e-07 \quad 7.27e-06 \\
\text{DA} \mid -.1591896 \quad .0449314 \quad -3.54 \quad 0.000 \quad -.2476056 \quad -.0707736 \\
\text{risk} \mid -.0032644 \quad .0437849 \quad -0.07 \quad 0.941 \quad -.0894242 \quad .0828953 \\
\text{BD} \mid -.0499588 \quad .0403059 \quad -1.24 \quad 0.216 \quad -.1292727 \quad .0293552 \\
\text{y07} \mid .0372204 \quad .0116722 \quad 3.19 \quad 0.002 \quad .0142518 \quad .060189 \\
\text{y08} \mid -.0084055 \quad .0116612 \quad -0.72 \quad 0.472 \quad -.0313525 \quad .0145414 \\
\text{y09} \mid .0139916 \quad .011602 \quad 1.21 \quad 0.229 \quad -.0088389 \quad .0368221 \\
\text{y10} \mid -.0040025 \quad .0116069 \quad -0.34 \quad 0.730 \quad -.0268425 \quad .0188376 \\
\text{_cons} \mid .0923997 \quad .0499933 \quad 1.85 \quad 0.066 \quad -.0059769 \quad .1907764 \\
------------------------------------------------------------------
```

```
sigma_u \mid .0728459 \\
sigma_e \mid .07122017 \\
\rho \mid .51128317 \quad \text{(fraction of variance due to u}_i) \\

F test that all u_i=0:
\[F(84, 304) = 3.44 \quad \text{Prob} > F = 0.0000\]

```
.xtreg roa size DA risk BD y0809 if roa >=-0.3077 & roa <=0.3498, fe
Fixed-effects (within) regression               Number of obs      =       397
Group variable: company                         Number of groups   =        85
R-sq:  within  = 0.0565                         Obs per group: min =         2
between = 0.0289                                        avg =       4.7
overall = 0.0500                                        max =         5
F(5,307)           =      3.68
\]

\[
\begin{align*}
\text{corr}(u_i, Xb) & = -0.2957 \quad \text{Prob} > F = 0.0030 \\
\end{align*}
\]

```
------------------------------------------------------------------
\text{roa} \mid \text{Coef.} \quad \text{Std. Err.} \quad t \quad P>|t| \quad [95\% \text{ Conf. Interval}] \\
------------------------------------------------------------------
\text{size} \mid 2.13e-06 \quad 2.07e-06 \quad 1.03 \quad 0.303 \quad -1.94e-06 \quad 6.20e-06 \\
\text{DA} \mid -.17663 \quad .0455775 \quad -3.88 \quad 0.000 \quad -.2663138 \quad -.0869463 \\
\text{risk} \mid -.0044114 \quad .0449012 \quad -0.10 \quad 0.922 \quad -.0927644 \quad .0839416 \\
------------------------------------------------------------------
```
BD | -.0251827  .040779  -0.62  0.537  -.1054245  .055059
y0809 | -.0084287  .0076334  -1.10  0.270  -.0234491  .0065917
_cons |  .1188406  .050236  2.37  0.019  .0199902  .2176909

-----------+----------------------------------------------------------------
sigma_u |  .07216137
sigma_e |  .07307206
rho |  .49372967 (fraction of variance due to u_i)
-----------+----------------------------------------------------------------
F test that all u_i=0:  F(84, 307) =  3.26  Prob > F = 0.0000

.xtreg roce size DA risk BD if roce >=-0.4376 & roce <=0.5107, fe
Fixed-effects (within) regression  Number of obs    =     395
Group variable: company  Number of groups   =      85
R-sq:  within  = 0.0477
       between = 0.0000
       overall = 0.0078
       F(4,306)    =  3.83
corr(u_i, Xb) =  -0.3120

-------------+----------------------------------------------------------------
            Coef.  Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
roce |  .1210595   .0514948     2.35   0.019     .0197307    .2223883
size |  3.96e-06   2.05e-06     1.93   0.054    -6.80e-08    8.00e-06
DA |  -.1662961   .0494496    -3.36   0.001    -.2636005   -.0689918
risk |  -.0176372   .0458682    -0.38   0.701    -.1078942    .0726198
BD |  -.0066091   .0382135    -0.17   0.863    -.0818035    .0685853
_cons |          .10839617
sigma_u |          .10839617
sigma_e |          .07436761
rho |          .67995051 (fraction of variance due to u_i)
-------------+----------------------------------------------------------------
F test that all u_i=0:  F(84, 306) =  7.36  Prob > F = 0.0000

.xtreg roce size DA risk BD y07 y08 y09 y10 if roce >=-0.4376 & roce <=0.5107, fe
Fixed-effects (within) regression  Number of obs    =     395
Group variable: company  Number of groups   =      85
R-sq:  within  = 0.0764
       between = 0.0006
       overall = 0.0171
       F(8,302)    =  3.12
corr(u_i, Xb) =  -0.2975

-------------+----------------------------------------------------------------
            Coef.  Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
roce |  .1210595   .0514948     2.35   0.019     .0197307    .2223883
size |  4.28e-06   2.05e-06     2.09   0.037     2.50e-07    8.30e-06
DA |  -.1591425   .0498562    -3.19   0.002     -.257252   -.061033
risk |  -.0204177   .0455183    -0.45   0.654    -.1099909    .0691555  
 BD |  -.0269841   .0386968    -0.70   0.486    -.1031337    .0491654  
 y07 |   .0257624   .0121071     2.13   0.034     .0019374    .0495874  
 y08 |   .0027107   .0121071     0.23   0.821    -.0208555    .0262769  
 y09 |   -.008923   .0119611    -0.75   0.456    -.0324606    .0146145  
 y10 |   -.000605   .0118571    -0.05   0.959    -.0239381    .0227281  
 _cons |    .116207    .052259     2.22   0.027     .0133692    .2190448  

-------------+----------------------------------------------------------------
 sigma_u |  .10840121  
 sigma_e |  .07372101  
 rho |  .68375939   (fraction of variance due to u_i)

------------------------------------------------------------------------------
F test that all u_i=0:     F(84, 302) =     7.46             Prob > F = 0.0000

. xtreg roce size DA risk BD y0809 if roce >=-0.4376 & roce <=0.5107, fe
Fixed-effects (within) regression               Number of obs      =       395
Group variable: company                         Number of groups   =        85
R-sq:  within  = 0.0542                         Obs per group: min =         1
       between = 0.0001                                        avg =       4.6
       overall = 0.0097                                        max =         5
       F(5,305)           =      3.50  
 corr(u_i, Xb)  = -0.3040                        Prob > F           =    0.0043
------------------------------------------------------------------------------
roce  |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 size |   3.97e-06   2.05e-06     1.94   0.053    -5.65e-08    7.99e-06  
 DA |  -.1610584   .0494911    -3.25   0.001    -.2584456   -.0636713  
 risk |  -.0202756   .0458208    -0.44   0.658    -.1104405    .0698893  
 BD |  -.0114882   .0382914    -0.30   0.764    -.0868368    .0638605  
 y0809 |   -.011318   .0077832    -1.45   0.147    -.0266336    .0039975  
 _cons |   .1255474   .0514939     2.44   0.015     .0242192    .2268757  
-------------+----------------------------------------------------------------
 sigma_u |  .10829156  
 sigma_e |  .07423254  
 rho |  .68375939   (fraction of variance due to u_i)

------------------------------------------------------------------------------
F test that all u_i=0:     F(84, 305) =     7.38             Prob > F = 0.0000

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