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The Effect Of Directors´ Network Size On Bank Performance

-A Multilevel Longitudinal Approach

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Abstract

Financial institutions have played a major role in the financial crisis of the recent years. This has yet again renewed the interest for how banks are directed and controlled, also known as the field of Corporate governance. In Corporate governance theory it is well established that the board of directors is an important means for the owners to secure a return on their investment in terms of affecting company strategy and keeping an eye on the management. From this it follows that certain characteristics are crucial as for assembling a well-functioning board of directors. According to Resource dependence theory, the directors all bring with them resources that may prove beneficial in minimizing the external uncertainties facing the company. Therefore and as suggested by Social network theories, directors with connections to the external environment may aid the company in reducing the dependence on the external environment.

The objective of this thesis is to look at European banks during the financial crisis and investigate whether directors´ network size has an effect on bank performance.

The dataset is collected from 118 European banks in the time-period 2005-2011. This includes 10 166 observations from 23 different countries. The gathered data is found to be dependent at three levels (across time, between companies nested within countries and between countries) and therefore a longitudinal multilevel model is applied in the analysis. This methodology allows us to calculate the variance within each grouping separately and thereby controls for the dependence. In applying the Multilevel approach, this thesis models two separate regressions, one using Tobin´s Q as the dependent variable and one using Return on assets. In both models we control for financial, board-specific and director-specific effects that may have an impact on financial performance of the banks.

The results of the analysis suggest that directors´ network size has no significant effect on bank performance, measured as either Return on assets or Tobin´s Q. However, for Return on assets we find evidence that the impact of directors´ network size on bank performance is likely to differ between countries. Put differently, we find that a country´s governance quality negatively moderates the effect of directors´ network size on actual bank performance. This result is in accordance with Institutional theory, which suggests that linkages to the external environment are more important in less developed, bureaucratic countries.

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1. Introduction

1.1 The Financial Crisis

When US housing prices started falling in late 2005/2006, it was the beginning of the most severe recession since the Great Depression in the 1930´s. The declines accelerated in 2007 and by 2008 a great deal of the Wall Street lions had either disappeared or transformed themselves to survive the financial maelstrom (Labaton, 2008).

As a consequence of deregulations and low interest rates in the US mortgage market, financial institutions started taking on excessive risk by offering mortgage loans to almost anyone who asked for it. Believing that housing prices would continue upwards, banks would buy the mortgage loans from the lenders and pack them into complex mortgage-backed securities for sale to investors (Taylor, 2009). Credit-rating agencies underestimated the risks of these securities, perhaps due to lack of competition, poor accountability or most likely due to the complexities involved. Taylor (2009) argues that when housing prices started falling, this led to what is called the queen of spades problem. In the game of hearts the players do not know where the queen of spades is, all they know is that they do not want to get stuck with it. In the same way, the securities were backed on many queens of spades, e.g. bad mortgages that had no chance of being repaid. Adding to this problem was the fact that nobody knew which securities that were bad. Accounting regulations governing banks require that all investments, including the mortgage-backed securities, should be valued at the market value and due to the decline in the value of the underlying mortgages, the securities had to be written down. These write-downs created new problems, as no one knew how to value them accurately at their market prices. As a result of these uncertainties potential investors started to get wary, which in turn, led to further decreases in value and further write-downs.

Due to the write-downs, which for many banking institutions were immense, many started falling out of compliance with banking regulations. At the same time, due to the uncertainties surrounding the securities, liquidity dried up, and the credit of banking institutions vanished. This naturally affected other American businesses and eventually foreign businesses.

The downsides of world financial interconnectedness became evident as the mortgage problems went global. In mid-2007 hedge funds and banks around the world revealed that they had substantial exposure to mortgage-backed securities in their portfolios. Several European banks, among them France´s largest bank BNP Paribas, followed up signaling that they were not able to value the assets held by some of their

hedge funds (CFR, 2012). At about the same time, the European Central Bank injected 95 billion Euros into the interbank market in an attempt to reduce the LIBOR, which had risen significantly due to the liquidity squeeze. In a global attempt to inject liquidity into the credit markets the U.S. Federal reserve, the Banks of Australia, Canada and Japan also injected money into their respective markets.

On September 18th, 2008 Lehmann Brothers, a major global investment bank filed for the largest bankruptcy in U.S. history (CFR, 2012). This event was followed by several government rescues and business transformations of large financial corporations such as AIG, Bear Sterns, Merryl Lynch, JP Morgan Chase and Goldman & Sachs. These actions led to severe governmental spending and thereby increased government debt. In early 2009 Iceland, which had focused its economy heavily on the financial sector, experienced a financial meltdown. Since then, several European economies have struggled due to high levels of debt, most noticeably Ireland, Portugal and Greece.

By 2012 the future of the world economy continues to be uncertain. As governments bailed out companies that were too large to fail and stimulated their economies a new crisis emerged, leaving whole countries in distress and threatening the existence of the capitalistic system and the world as we know it.

1.2 Motivation For The Choice Of Subject

On April 28th, 2004, the five members of the U.S. Securities and Exchange Commission met to consider an urgent plea by the big U.S. Investment banks Their decision was unanimous and the large investment banks got that they wanted; an exemption for their brokerage units from an old regulation that limited the amount of debt they could take on (Labaton, 2008). With this, the authorities basically left the job of monitoring to the banks themselves and the investment banks were unleashed. A few years later in the midst of the financial crisis, Professor James D. Cox, an expert on securities law, admitted:

"We foolishly believed that the firms had a strong culture of self-preservation and responsibility and would have the discipline not to be excessively borrowing"

(Labaton, 2008;2)

These issues highlight the importance of Corporate governance, defined by the Cadbury committee (1992) as the system of which companies are directed and controlled. Kirkpatrick (2009) argues that when put to the test, the Corporate governance routines failed in implementing sound strategies and in safeguarding against excessive risk-taking. This raises important questions about Corporate governance

practices and the board of directors, which is the owners´ best tool for making sure they get a return on their investment.

In this regard and light of the financial crisis, one needs to assess the importance of certain board characteristics and their effect on company performance. Throughout the history, Corporate governance research has mainly focused on these characteristics and linked factors such as board size and portion of independent directors to company performance. These approaches mainly build on Agency theory, in which the board of directors´ prime role is to monitor the management on behalf of the owners. Several theories and results of empirical research, however, suggest that the role of the board of directors is a bit more complicated. In addition to monitoring, the board of directors serves as a means of providing management with resources in terms of strategy formulation, advising and providing valuable connections to the external environment. The ability of the board of directors to perform its duties and thus be a valuable asset to the company is likely to depend on the characteristics of the individual directors.

1.2.1 Problem Statement

During the financial crisis, a mass of external uncertainties faced European banks. Theoretical approaches and empirical investigations suggest that the board of directors may help to reduce these uncertainties by providing knowledge and linkages to the external environment. This thesis will investigate the importance of these linkages through the following research question:

Research Question:

How is Director´s network size related to bank performance during financial crises?

This research question will be answered through investigating the following hypotheses:

Hypothesis 1: *Larger boards of directors affect company performance negatively*

Hypothesis 2: *Company performance is positively affected by directors´ network size*

Hypothesis 3: *The number of independent directors on the board positively affects Company performance*

Hypothesis 4: *Country governance quality negatively moderates the effect of network size on company performance*

1.3 Delimitations

In analyzing the Research Question, there are a variety of considerations that need to be taken into account. This section highlights the decisions taken to delimit the study.

The full dataset counts 19081 observations, consisting of directors in 133 European banks in the time period 1999-2011. For the analysis, the time-period was shortened to include only observations from 2005-2011. There are two reasons for this; first, this thesis aims to investigate European banks during the financial crisis, which started to become evident in year 2007. Adding two years pre-2007 is likely to be sufficient for capturing the effects of pre-financial performance. Second, the data from Thomson One Banker and BoardEx are considered more reliable in recent years; it is thus likely that shortening the time-period of analysis will strengthen the reliability of the results.

In addition to shortening the time-period, observations from UK were deleted from the sample. The reason is that governance practices differ between UK and Continental Europe. UK boards are organized in a one-tier system, meaning that inside and outside directors together form a board of directors. Banks in Continental Europe are organized in a two-tier system, where the directors form two boards, one board of inside directors and one board of outside directors. It is thus likely that these differences would create some bias in the analysis.

There are possibly an infinite amount of factors that influence bank performance. In order to control for these factors, several financial, board-specific and director-specific variables are included in the study. As it is impossible to control for all factors, some limitations have been made necessary.

The choosing of which board- and director-specific variables to include is driven by theory and earlier research. Through this, emphasis is on board size, proportion of outside directors and qualifications and experience of directors. According to Agency theory, it is crucial that both directors and management are remunerated to align their interests with those of the shareholders and should therefore have an effect on company performance. By focusing on the above-mentioned factors, information on remuneration and CEO-characteristics are excluded from the analysis. This is done for two reasons; first the information is not relevant for the Research Question, second the effect of the excluded variables on bank performance is expected to be of limited value. Of greater importance for the predictability of bank performance are the financial factors. Diversification, the size of the company and firm age are important predictors of financial performance and are therefore included in the analysis. This excludes possibly important factors

such as previous performance and debt-ratio. Future research could include these factors to increase the fit and explanatory value of the models.

1.4 Structure

To increase the readability and make the thesis more comprehendible, this part provides an overview of the structure. The thesis consists of 6 chapters, as shown in figure 1.1 below.

Part 1: The first part provides an introduction to the thesis. The focus is on explaining the time-period, which serves as a background for the analysis. Next, focus shifts to the motivation of the thesis, emphasizing the Corporate governance issues and culminates in a presentation of the Research Question and the hypotheses. Lastly, the delimitations and structure of the thesis are outlined.

Part 2: In this chapter the theoretical background of the thesis is presented. Through a discussion of Corporate governance in general and next Agency theory, Social network theories, Resource dependence theory and Institutional theory, four testable hypotheses are derived.

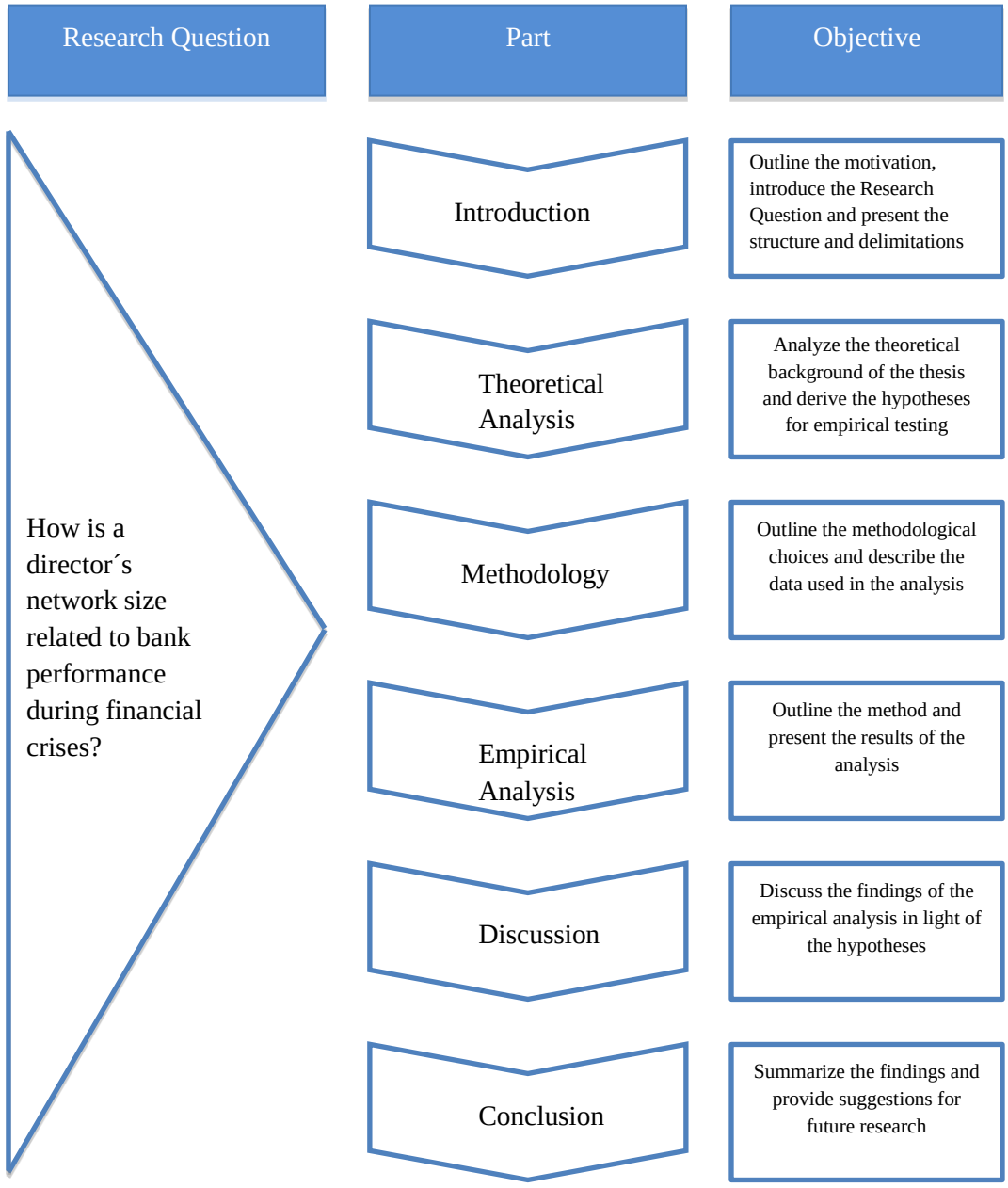
Part 3: The main concern of this part is to describe the method used in answering the Research Question. In doing so, the sample and variables used in the analysis are presented. Next, the applicability and reliability of the study are discussed.

Part 4: The empirical analysis starts with a presentation of the relevant theory of Hierarchical Linear Modeling, the method used for analyzing the Research Question. Next a step-by-step description of the empirical modeling is presented, including the results.

Part 5: The discussion-chapter links the results from part four to the hypotheses derived from part three.

Part 6: This final part concludes the thesis by answering the Research Question and providing suggestions for future research.

Figure 1.1: Thesis Structure



2. Theoretical Analysis

This part provides a discussion of relevant theories in order to investigate the Research Question. The aim is to develop testable hypotheses that will serve as guidelines in the empirical investigation.

The theoretical analysis begins with a brief understanding of Corporate governance and the board of directors. Next, the first hypothesis is derived through a discussion of Agency theory, while the second hypothesis is developed through a discussion of Social network theories. Finally, the third and fourth hypotheses are developed through a discussion of Resource dependence theory and Institutional theory respectively.

2.1 Corporate Governance

"Corporate governance involves a set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined."

(OECD, 2004)

The fall of the Soviet Union in many ways marked the end to communism and a wave of privatization has been felt throughout the world ever since. This development combined with the disclosures of severe management misconduct in large corporations, has increased the interest in, and the importance of how companies should be run.

Even though Corporate governance interest has risen, it has seemed impossible to agree upon a unique and commonly accepted definition. One of the main reasons is probably that the field of Corporate governance interests scholars from a wide range of disciplines. These scholars will all tend to focus on different aspects in their research, i.e. lawyers on the law, management scholars on the board´s duties and so on. Another reason is that due to cultural differences, Corporate governance has different meaning in different countries. According to the Anglo-Saxon model, which mainly consists of the US and Great Britain, the company´s objective is to maximize shareholder value and thus maximize profits. In other countries such as Germany, France and Japan, the company should not only maximize shareholder value, but also take into consideration other stakeholders involved with the company, such as suppliers, employees and customers.

The most widely accepted definition of Corporate governance seems to be that of the Cadbury commission (1992) which states that Corporate governance is: “The system by which companies are directed and controlled”. This definition is useful because it takes into account both the direction in which the company is led and the controlling of whether the company is led in that direction. Thus it serves well the purpose of this thesis.

2.1.1 The Board Of Directors

Ownership of companies is often allocated among a large amount of shareholders. As part owners of a company, the shareholders should have a say in important company aspects such as direction and strategies. It would be difficult and inefficient, however, to delegate this responsibility to the shareholders, which in some companies may be hundreds of thousands different owners. Therefore, the shareholders appoint a board of directors that will serve the company in their interest.

The duties of a board can be varied in focus and necessity, but it typically includes:

- Reviewing and guiding corporate strategy
- Monitoring the effectiveness of the company´s governance practices
- Selecting, compensating and replacing key executives
- Aligning key executives and board remunerations with the longer term interests of the company and its shareholders
- Ensuring a formal and transparent board nomination and election process
- Monitoring and managing potential conflicts of interests of management, board members and shareholders
- Ensuring the integrity of the corporation´s accounting and financial reporting systems
- Overseeing the process of disclosure and communication

(OECD, 2004)

The research on Corporate governance has focused widely on the role of the board of directors. The next part will discuss some of the theories that aim to explain the role, tasks and composition of boards, beginning with Agency theory.

2.2 Agency Theory

"Agency costs include the costs of structuring, monitoring, and bonding a set of contracts among agents with conflicting interests" (Fama & Jensen, 1983, p.5).

Fundamental for the concept of agency problems, is the separation of ownership and control. This separation occurs when an entrepreneur or manager lacks the capital needed to run the company. Thus he needs to obtain capital from an outside financier. The financier provides the capital, but the agency problem occurs in the difficulties he has in assuring that the capital is not wasted or expropriated by the management.

To get around the agency problem, the manager and financier sign a contract. This contract must specify what the manager should do with the funds and how the returns should be divided between him and the financier (Jensen & Meckling, 1976). The contract would ideally be complete and state what the manager should do with the capital in every situation that possibly could occur. There are obvious problems in this regard, however, as no one can ever predict all future states of the world. Thus the financier needs to hand management the right to control, in the literature known as residual control rights, in the states not foreseen by the contract. If the owner were to retain all residual control rights, he would be the one deciding in every unexpected event. However, the owner´s lack of information and qualifications, which made him hire the management in the first place, makes this option infeasible. For these reasons, management will end up with a considerable amount of residual control and therefore has the privilege to allocate the funds as he wishes.

There may be limits on the management´s residual control rights, however, which should not be open for too much interpretation if they are to be enforced by outside courts. Also, if the funding requires a larger set of financiers, these investors might be too small and too poorly informed to exercise the control rights they actually have (Shleifer & Vishny, 1996). This is in the literature known as the free-rider problem, as these investors enjoy the benefits of the company without actually taking part in the decision-making.

2.2.1 Types Of Agency Problems

The agency problem is not limited to the relationship between management and owners. In fact "almost any contractual relationship, in which one party (the agent) promises performance to another (the principal), is potentially subject to an agency problem (Armour et.al, 2009).

A second type of agency problem is the one that might arise between majority and minority shareholders. The agent in this case is the majority shareholder, who has the majority or the controlling interest of the

firm. The principal is the minority or non-controlling shareholders. Here, the difficulties lie in assuring that the majority shareholders do not expropriate the minority shareholders (Armour et.al, 2009). Expropriation may occur as a consequence of different objectives between the different types of shareholders. I.e. a risk-loving majority shareholder may put pressure on management to increase the riskiness of the company investment policies. Due to the free-rider problem the smaller shareholders will not gather information about the business and will thus be involved in a more risky business than he has taste for. The majority shareholder may also use his power, more or less to reduce the smaller shareholders' wealth. Examples of this is self-dealing, creative self-destruction and tunneling. In all of these examples, the majority shareholder obtains benefits from his advantage position, reducing smaller shareholders´ wealth.

"The third agency problem involves the conflict between the firm itself- including, particularly, its owners- and the other parties with whom the firm contracts, such as creditors, employees and customers." (Armour et. al, 2009). In order to pursue their personal goals, the company could expropriate the stakeholders and reduce their wealth. I.e. employees could be expropriated by a shutdown of a company factory in a location where the workers are unlikely to find other jobs.

2.2.2 Management Discretion

The agency problem results in management obtaining a significant portion of discretion or control rights. Enjoying this independence, management will have the opportunity to expropriate the investor´s funds. Several methods of expropriating are discovered in the literature, such as transfer pricing and selling off assets.

Crossland and Hambrick (2011) argue that two factors affect management discretion. First, management needs to be aware of the different actions they can undertake without the stakeholders intervening. Second, discretion only exists to the degree that stakeholders lack the power or possible sanctions to object. Further, it is argued that discretion will vary across individuals, organizations and environments. Some individuals have an ability to envision more opportunities, while some organizations hand management more freedom. Certain societies provide more choice and variety than other and factors such as unregulated industries and differentiable product categories increase relative discretion.

In most developed countries, courts try to control management expropriation. As self-dealing, transfer pricing and selling off assets all are quite conspicuous, managers more often allocate themselves perquisites, such as company airplanes, cars and vacation homes. How damaging for the company these

expropriations may be, there are more costly self-indulgences management might undertake. One of these is the classical case of empire building. Running a larger company is associated with increased power and a higher pay (Jensen, 1986).

"Finally and perhaps most important, managers can expropriate shareholders by entrenching themselves and staying on the job even if they are no longer competent or qualified"(Shleifer & Vishny, 1996, p.10). This could be extremely harmful for the company and costly for the shareholders.

Management opportunism and expropriation lead to financiers being less willing to put the needed capital up front. A large part of Corporate governance literature, therefore, concentrates on the possible constraints that can be applied to reduce management misconduct and thus increase financiers' willingness to invest up front.

2.2.3 Incentive Contracts

Managers have more company expertise than shareholders. This combined with incomplete contracts will leave managers with a significant portion of residual control rights, which can be exploited to induce self-interested behavior. To deal with this the manager should be granted a long-term incentive contract that aligns his interests with those of the investors. The contract should be signed ex ante, and according to Jensen and Meckling (1976) it should consist of an optimal mix of manager and outside ownership. This optimal mix (in the absence of taxes) is obtained when the marginal utility derived from an additional unit of expenditure is equal to the marginal utility derived from an additional unit of wealth. By inducing such a contract, the manager will act in the owners´ interest without the incentive to blackmail. The contract will obviously be more expensive the more residual control the manager enjoys. A difficult aspect of this contract is to choose the performance measure to align with the manager´s compensation. The measure needs to be correlated with the manager´s quality of actions, without being prone to manipulation. Shleifer and Vishny (1996, p.12) argue that the performance measure, in addition, must be verifiable in court, although in some cases: "the credibility of an implicit threat or promise from the investors to take action based on an observable, but not verifiable, signal may suffice".

"Cash compensation should be structured to provide big rewards for outstanding performance and meaningful penalties for poor performance" (Jensen & Murphy, 1990, p.8). Incentive contracts are common in practice and can take many forms, such as through share ownership and stock options. Berle and Means (1932) argue that management ownership in large firms generally is too small and that this makes them less interested in profit maximization. Several studies have empirically researched similar

questions to that of Berle and Means (1932) have found: “a positive relationship between pay and performance, and thus rejecting the extreme hypothesis of complete separation of ownership and control” (Shleifer & Vishny, 1996, p.13). Amongst these are Jensen and Murphy (1990) who conclude that compensation arrangements are inefficient, as the executive pay does not correspond too well with the fluctuations of shareholder wealth.

A problem that might arise in forming an incentive-based contract is the fact that the managers often negotiate with a weak board of directors, rather than with large investors. This leaves room for self-dealing as the management is better informed on when stock prices are likely to rise or which accounting numbers that is prone to manipulation.

2.2.4 The Board

According to Agency theory, the main objective of the board of directors is to monitor the management. To reduce the agency problems, the board keeps management separate and control parts of the decision-making processes (Bathala & Rao, 1995). The aspect of managing decisions involves implementing and initiating corporate strategies while the aspects of control involves the monitoring of management. Bathala and Rao (1995) argue that board composition becomes crucial in this matter, as independence of the board will rely on the outside directors.

In fact, composition of the board and specifically factors such as board size and number of outside directors has been linked positively with boards´ ability to monitor management (Bathala & Rao, 1995). In addition to their ability to monitor management, outside directors bring with them a significant portion of experience and knowledge to the board and do not suffer from the same biasedness and groupthink as inside-board members might suffer from.

Regarding the composure of boards of directors, there are some distinctions between countries. In Anglo-Saxon countries, a one-tier board system is typically applied, whereas economies in Continental Europe such as Germany typically have a two-tier system. The difference is that in a one-tier system, executive and supervisory directors all form one board of directors, whilst in a two-tier system the different groups of directors form separate boards. In the literature, there is near consensus that one-tier boards will consist of greater proportions of outside directors (Dalton et.al, 1998). There are, however, also some criticisms of this view. Outside directors, typically serve on several boards and may thus have inferior knowledge of the specific company than do inside directors. In addition, outside directors may not have the relations necessary to obtain the relevant company-specific information, as insiders may have.

Jensen (1993) argues that the size of a board is negatively related to company performance. The reasoning is that a smaller board is more effective and as number of directors exceeds 7 or 8, the board will be less effective and easier for the CEO to control. Several studies (Yermack, 1996; Eisenberg et al, 1998) confirm these arguments by finding a negative relation between board size and company performance, e.g. return on assets and Tobin´s Q. In line with Jensen (1993), we expect that board size will negatively affect the board´s ability to monitor and thus negatively affect company performance. This leads to the first hypothesis:

Hypothesis 1: *Larger boards of directors affect company performance negatively*

2.3 Social Networks

By viewing companies as: ”a set of social groupings with relatively stable patterns of interactions over time” (Tichy et.al, 1979, p.507), Social network theories provide a method of conceptualizing the interactions occurring within and between organizations. The concepts of Social network theories are derived from several broad schools of thought, mainly sociology, anthropology and mathematics.

Social structure often involves highly complicated networks of ties, spanning across both levels and time. It is thus not always obvious to the naked eye and needs a thorough examination to be understood. Social network theories, however, provide tools for linking the micro and macro levels of networks. The micro level is concerned with each and every individual, tracing their Social networks by starting with the one agent and snowballing as new acquaintances show up. These investigations might also start with dyads or triads, which are small groups consisting of two and three individuals respectively. On the macro level, the outcome of interactions is usually analyzed through exploration of interactions, such as economic or social, over a large population.

Human interaction follows certain patterns, the perceptions of relations, however, can differ between agents in the same network. The reason for these differences in individual cognitive maps is still not well understood. (Kilduff & Tsai, 2003), however, suggest that factors such as individual position in the organization, differential opportunities to learn the Social network and susceptibility to biased perceptions might influence the differences between agents. What is certain, though, is that individuals, who can better perceive social interactions, will gain advantages in contact with others.

This discussion of network theories will start by first introducing the board of directors as a Social network. Next, the discussion will go in depth into the foundations of Social network theories by discussing the concepts on which it is built, first on the general level, then on the network level and finally on the individual level. The discussion will end up in an assessment of the importance of directors´ internal and external ties.

2.3.1 The Board As A Social Network

“Decisions by boards of directors can have critical impact on the success or failure of a firm” (Harris & Helfat, 2007, p.228). Viewing the board of directors as a Social network will provide a basis for understanding the processes in which decisions are made. This relatively small group consists of people who all bring with them different skills and social connections. Some of the directors may have a stronger relationship than others and some may only have a relationship through another member of the board.

According to Geletkanycs and Boyd (2011) networks of interpersonal relationships guide much of organizational economic activity, where the board of directors plays an instrumental role.

Harris and Helfat (2007) emphasize three sociopolitical factors that affect board decisions: directors' expectations and attributions, directors´ allegiances and values, and the power distribution. The expectations and attributions of directors refer to directors´ beliefs about the challenges facing the board. The second factor refers to the goals of the directors and their allegiances to others, such as members of the board, the CEO, shareholders or stakeholders. The final factor refers to the relative power distribution of the board members, meaning their influence on board decisions. According to Harris and Helfat (2007), these factors occur in the following way; first the expectations and attributes of each director are shaped within-board-social capital and the information he or she has received through internal social ties. Additionally, director allegiances may also be shaped by social network information. Second, expectations and allegiances help shaping the desired outcome of the director. Finally, the directors will use their social capital to influence the decision-making according to their shaped expectations and allegiances.

Directors´ internal social capital plays a vital role affecting the expectations and allegiances, as well as their ability to influence the outcome of board decisions.

2.3.2 General Concepts

2.3.2.1 Embeddedness

"There´s far greater loyalty to ones craft, than to ones company. A company is just a vehicle that allows you to work"(Saxenian, 1990, p.97). This statement emphasizes that the bonds to the company are not as strong as the one to colleagues in the same industry and reflects the fact that interactions indeed occur between companies.

The argument of embeddedness states that work-related transactions overlap with socially related transactions (Granovetter M. , 1985). Thus, interactions within and between companies will not necessarily follow what is expected from a strictly economic perspective. Some company representatives might thus prefer to do business with companies to which they have friendly or familiar ties. In connection to this, a board is more likely to appoint a manager to whom the existing board of directors already has a connection with. Powell et al. (1996) forwards the idea that some companies may suffer from a liability of unconnectedness. In claiming this, Powell suggests that company representatives fail to make strong bonds with individuals inside or outside the organization. Some companies may even go as

far as to punish agents who try to connect with those of other organizations, especially competitors. These fortress-like companies are usually found in high-tech industries, where it is crucial for the business that their ideas do not come out in public. Embeddedness is visible in all parts of an organization. When recruiting, a candidate with ties to the company is more likely to be hired and persons or companies with familiar or friendly ties are more likely to be favored timely information and interesting projects.

2.3.2.2 Social Capital

Social capital is by Kilduff and Tsai (2003, p.26) defined on the individual level as:" the potential resources inherent in an actor´s set of social ties". The concept of social capital differs from money and human capital in that the actor alone cannot control it. For social capital to have any value, two agents have to engage in cooperation with one another. At a higher level, social capital can be described as the collectivity´s benefits from maintenance of positive relations between different groups, units or levels (Kilduff & Tsai, 2003). Thus actors might use their personal social capital to the benefit of their organization in terms of stronger ties within the organization itself or to outside stakeholders.

"Structural holes" is a term for gaps in connectivity within social groups such as a company. An agent can act as a liaison between these two unconnected groups and thereby control the flow of information between them. By doing so, the agent will bridge the gap and increase his or her social capital and status. In some social organizations there is a high degree of density in groups, meaning that agents within groups are familiar with each other, but much less with agents in other groups. In such occasions, liaisons that bridge the gap between these cliques would facilitate crucial collaboration, which obviously is beneficial for a company consisting of different groupings.

2.3.2.3 Centrality

An agent that fills the gap between two unconnected groups is said to have high betweenness centrality in the social network. The concept of centrality is concerned with the degree the social network is concentrated around a few important agents. The agent has high betweenness centrality because he is the central connection between the two groups. There are several ways for an agent to be central. Indegree centrality is concerned with an individual being popular and thus receiving many friendship requests. Closeness centrality, on the other hand, is achieved by an agent who has close ties to a large number of people in the organization.

2.3.3 Network Level Concepts

2.3.3.1 Density

The concept of density deals with the number of connections there are between agents within a group, compared to the maximum possible connections. Thus a group characterized by high density, is a group where a high proportion of possible ties is exploited. Research on density has come up with some counterintuitive results (Kilduff & Tsai, 2003) as higher density among companies is associated with lower effectiveness while agents embedded in a dense network, under some circumstances, may be less constrained than agents embedded in a dense network.

2.3.3.2 Reachability

The concept of reachability refers to the degree an agent´s messages reach out to a number of agents. A high reachability network is more efficient in the sense that the agent can advance information to more people. I.e. an agent will send information to his network and these individuals will pass on the information to their network and so on.

2.3.3.3 Balance

The structure of networks can to some extent be assessed by measures of balance, which again is comprised by reciprocity and transitivity. Reciprocity is related to the mutual bonding between agents. I.e. if one agent likes another, the liking will be mutual. Transitivity involves the mutual bonding between several people. If one agent likes two others, then both of these will like the first agent and each other. This will be valid also for larger groups and a high level of transitivity will lead to a less cliquish organization.

2.3.4 Tie Level Concepts

The tie level concepts are concepts crucial for understanding the individual ties between two agents.

2.3.4.1 Strength Of Interpersonal Ties

Kilduff and Tsai (2003, p.32) define the strength of interpersonal ties as: “a combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie”. Research on the matter suggests that weak ties may provide important information flow. However, more complex flow of information is linked with stronger-tie relationships (Kilduff & Tsai, 2003).

2.3.4.2 Reciprocity

Reciprocity is already mentioned as an important factor of the whole network, it is however, also a crucial characteristic of each tie between individuals. A relation can be either reciprocated or non-reciprocated, creating a symmetric or asymmetric network respectively.

2.3.4.3 Multiplexity

Multiplexity refers to relations that serve multiple interests. I.e. two agents, who both work together and are involved in a mutual activity outside work, have two common social circles in which they interact. These multiple relations might lead to a stronger relation between the two agents, but can also create problems, as they are more difficult to break out of.

2.3.5 The Strength Of Weak Ties

Social network theories provide an understanding of how people interact and should thus improve the understanding of board decision processes. The internal and external ties brought to the board by each member will help to increase his or her social capital and thus also upper his or her status among the board members. Research has found that directors with strong external ties may have greater influence on board decisions (Jackson, 2002), as well as higher status and access to information and resources in the outside environment (Harris & Helfat, 2007). Belliveau et.al (1996) found that board members use their external social capital to affect board decisions. E.g. when setting the CEO pay, directors use their outside contacts to get an understanding of the level of CEO pay at competing firms. The internal social capital will obviously also affect a director´s standing with the other member of the board. As previously mentioned, all directors are assumed to be connected within the social network, one way or another. For some reasons, though, these connections will differ, creating stronger linkages between some members than others. This will also be the case for a given director´s external connections, e.g. some of the ties will be stronger than others.

The strength of an interpersonal tie is defined as: "a combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie"(Granovetter (1973, p.1361). The stronger the tie in a dyad or triad, the individuals involved will tend to be more alike in various ways. As people usually move in more than one network circle these similarities will increase the likelihood that a person strongly connected to one member of a strongly connected dyad also will be a good match with the other member. E.g. if A and B are strongly connected in a dyad and C has a strong relation with A, a possible friendship between B and C is likely. (Granovetter, 1973).

Granovetter (1973) argues that people that are weakly connected are more likely to move in different networks and thus information spread through weak ties is likely to traverse greater social distance than through strong ones. Thus through weak ties, an agent is more likely to get access to information different from what he would receive.

2.3.6 Network Size

A director´s social capital is likely to influence the distribution of power between the directors on board and thus affect his or her impact on the decisions that are made. Closely linked to social capital are director´s internal and external ties and it is argued that both of these have impact on social capital and thus board decisions.

The question is whether or not the improved social capital from internal and external ties can be linked to firm performance. A director with a great portion of social capital will clearly have a strong impact on board decisions. This decision bias, however, is not certain to improve firm performance. A director might have personal motives to influence decisions taken by the board. E.g. an inside director might want to become CEO and use his power to undermine the incumbent CEO. Accordingly, a CEO who also is chairman on the board will most likely have a great deal of power which can be expropriated in pursue of personal goals. The benefits of external ties will possibly outweigh the attainable expropriations, although one should always be careful and minimize the probability of expropriations. External ties are likely to provide useful resources for a board of directors. Both strong and weak ties, as argued by Granovetter (1973), are likely to equip directors with important insight on the outside environment, e.g. in CEO succession planning, establishing strategies, management supervision and so on. This leads to the second hypothesis regarding the board of directors.

Hypothesis 2: *Company performance is positively affected by directors´ network size*

2.4 Resource Dependence Theory

Resource dependence theory concerns the ability of the board to bring resources to the firm. These resources might be anything that could be thought of as resources to the firm (Wernerfelt, 1984)

Companies survive to the extent that they are effective and according to Pfeffer and Salancik (1978) the key to this survival is their ability to acquire and maintain resources. This would not be a big issue if companies were in control of all the factors needed for operating. This is not the case though, as no company is self-contained. Similar to Social network terminology, companies are embedded in an environment full of external actors, with which they must interact and transact to obtain the necessary resources. This environment is in constant change, as companies exit and enter. These changes results in resources becoming more or less scarce and companies face the challenge of adapting to these changes in order to survive.

2.4.1 Interdependence

In Resource dependence terms, companies are interdependent, meaning that one agent does not control all conditions for the achievement of an action or for obtaining the outcome desired for the action (Pfeffer & Salancik, 1978). As globalization makes the world smaller in terms of speed of information, companies get more strongly interconnected. A rise in the oil price in the Middle East will lead to an almost immediate increase in fuel price in Iceland. This increases the external uncertainties facing a company as changes can come from anywhere without notice and produce unanticpated consequenses. According to Pfeffer and Salancik (1978) a system would be more stable if it was loosely connected. E.g. disturbances would have more time to be localized and dealt with earlier. Furthermore, it would be easier to adapt to the changes in a loosely connected system as interconnections lead to stronger constraining links.

For bringing stability and certainty to their environments, organizations employ a variety of strategies. These might be actions such as organizational restructuring or stabilizing exchange relationships in order to alter the connectedness to the system. However, as Pfeffer and Salancik (1978) note, the actions taken to manage interdependencies may, in the long run, increase the interdependencies requiring further actions to manage the new environment.

For a company facing external uncertainties it is vital to correctly perceive the groups to which it is dependent. Problems arise when these groups are misperceived or their relative importance is misinterpreted. These types of problems are most likely to occur in new businesses or in companies entering new markets or activities. Another kind of problem occurs when the company recognizes a group

as important, but misreads their demands. This leads the company into unwanted actions and situations, which could be devastating for their relationship.

2.4.2 Conflicting Interests

Organizations themselves are interlockings of participants with varying interests and often also incompatible preferences and goals. This leads to challenges in whose interests that are going to prevail in determining organizational actions. Pfeffer and Salancik (1978) argue that power is too frequently overlooked and that effectiveness and performance only can be evaluated by asking whose interests that are being served. The concept of power organizes around critical and scarce resources and control of an organization will depend on the extent of these resources one furnishes. In fact, some agents will provide resources without being tightly bound to the organization. These will, to the extent they control critical resources, be able to influence organizational decisions. These actors might be stakeholders such as competitors, suppliers or financiers.

Conflicting preferences and goals of agents make managing an organization difficult, as one cannot comply with some of these demands without non-complying with others. Due to this, organizations require some discretion to adjust to contingencies as they develop. By restricting the information flow about their activities, companies attempt to avoid influence and contraints by the interested parties. However, as much as companies wish to avoid being controlled, they also seek stability and certainty in their own resource exchanges (Pfeffer & Salancik, 1978). The organization thus faces a dilemma where on the one hand, dicretion is required to be able to modify actions and to respond to future uncertainties. While on the other hand, the requirements for certainty and stability necessarily means that interorganizational relationships must be developed and maintained.

2.4.3 Coordination Of Mutual Interdepence

In a way to reduce the uncertainties of the external environment, companies attempt to coordinate their mutual interdependence. According toPfeffer and Salancik (1978) the most direct method for controlling dependence is to control the source of the dependence. The most obvious way to control for a source of dependence is through a merger or an acquisition. However, this is not applicable in all situations as M&A`s require resources and some times may be proscribed. Instead, companies coordinate in many ways such as cooption, trade associations, cartels, joint ventures and boards of directors (Pfeffer & Salancik, 1978). These strategies are more frequently used than M&A´s and are especially useful when only occasional coordination is needed. For example, for a company that only needs occasional access to the capital markets it is not necessary to own or control a financial institution.

The critical task for the organizations seeking greater autonomy is how to reduce the other´s discretion. That is, how to align the interests of the relationship with their own. By coordinating through interfirm linkages, significant discretion is left with the external company if it descides to withdraw from the coordination interaction. Ownersip, however, solves this problem directly. Pfeffer and Salancik (1978) argue that there are four primary benefits from managing environmental dependence. First, a linkage to another company provides information about the activities of that firm and second, it provides a channel for communicating information. The third benefit is the provision of possible commitments of support from important elements in the environment. While the fourth benefit is that the coordination could have a certain value of legitimacy.

In accordance with Social network theories, linkages help to reduce the uncertainties and stabilize the organization´s exchanges with it´s environment. As social relationships strengthen such that friendship and acquaintance networks will overlap, the predictability and stability of these will increase.

2.4.4 The Board Of Directors

Pfeffer and Salancik (1978) argue that of all the interorganizational coordinations a company may use to reduce external uncertainties, cooptation is the easiest and most flexible to implement. It is flexible because any organization can create advisory or directing boards and appoint outsiders to them. Due to discretion, an organization can choose to appoint agents that will provide resources to help reduce the uncertainties of the external environment. Due to mutuality in the environment, the agents are likely to accept if the relation would offer advantages to them as well as their organizations.

To explain the appointments of outsiders to a board of directors, Pfeffer and Salancik (1978) argue that there are three points of view. The first identifies the possibilities of appointing directors with managerial skills. In this way the board will provide the company with advice and managerial expertise. The second perspective concerns the governing function of the board and their ability to monitor the management. An outside director will, in this view, provide independence to the board and is thus better fit to prevent opportunism and self-dealing in the company. The third perspective emphasizes that the possibilites of gaining support is of crucial importance in appointing directors. Pfeffer and Salancik (1978, p.173) state that:”when an organization appoints an individual to a board, it expects the individual will come to support the organization, will concern himself with its problems, will favorably present it to others, and will try to aid it”.

The board of director as a means of coordinating interorganizational links provides typically provides the benefits as Pfeffer and Salancik suggested for managing environmental dependence:

1: Advice and counsel

2: Legitimacy

3: Channels for communicating and information between external organizations and the firm

4: Preferential access to commitments or support from important elements outside the firm

(Pfeffer & Salancik 1978)

"One of the basic tenets of Resource dependence theory is that the need for linkages to the environment such as those facilitated by the board is a function of the levels and types of dependence facing the firm" (Hillman, 2005, p.466). Therefore, the resources needed by a specific firm depends on the environment that the company operates in. I.e. a firm operating in an uncertain environment would benefit from forming a large board consisting of well-connected directors. Thus board composure is not random, but rational responses to the conditions of the external environment (Pfeffer, 1972).

Empirical research on Resource dependence has shown that there is a relationship between board capital and firm performance (Hillman & Dalziel, 2003). Specifically, board capital has been positively linked with each of the four provisions suggested by Pfeffer & Salancik (1978) and thus qualifies for a deeper understanding in the context of the board of directors.

2.4.4.1 Advice And Counsel

This provision is associated with the board´s ability to give advice and counsel the management. In order to fulfill this obligation, the board should consist of directors either with a strong background from the company or with experience and ties to external environment facing the company. Empirical research finds that boards often are composed of "lawyers, financial representatives, top management of other firms, public affairs or marketing specialists, former government officials and community leaders, and other directors bring with them expertise, experience and skills facilitate advice and counsel" (Hillman & Dalziel, 2003). Both inside and outside directors have important capital that facilitates advice and counsel. Insiders because they know the company, have access to information and participate in the decision processes (Baysinger & Hoskisson, 1990). Outsiders, on the other hand, have information on the

external environment, and if chosen correctly, should facilitate advice and counsel on the external problems facing the company.

2.4.4.2 Legitimacy

"Prestige of directors (board capital) can enhance the credibility and performance of the firm they serve" (Hillman & Dalziel, p.387). Pfeffer and Salancik (1978) note that having a prestigious board signalizes to the outside world the company´s value and worth. Several Resource dependence scholars emphasize the linkage between board legitimacy and performance (Hillman & Dalziel, 2003). This linkage is thought to be strongest early in a company´s life cycle. Certo et.al (2001) underpin these allegations, finding that firms with more prestigious boards are less underpriced at initial public offerings.

2.4.4.3 Channels For Communicating And Information Between External Organizations And The Firm

"Board capital provides the firm with timely and valuable information and serves to reduce the transaction costs of dealing with uncertainties in the environment, thereby enhancing performance" (Hillman & Dalziel, p.387). For this reason, an important feature of board capital is to appoint directors that have ties to government or competitors. Several studies (Burt,1980: Palmer, 1983) have found that interlocking, meaning directors holding several directorates amongst firms, is an important factor in sharing information, minimize costs and promote innovation. Interlocking directorates also helps as an aid to reveal the operations and agendas of competitors.

2.4.4.4 Preferential Access To Commitments Or Support From Important Elements Outside The Firm

This last provision emphasizes that board capital is a means of obtaining closer bonds to customers, suppliers, lenders and other important stakeholders. Several studies have also found a positive link between the presence of financial representatives on board and the subsequent acquiring of financial capital (Hillman & Dalziel, 2003). By choosing directors wisely, a company can create commitment and involvement from the most important stakeholders and thus better the company´s performance.

2.4.5 A Combination

Up until now the discussion has focused on Agency theory, Social network theories and Resource dependence theory separately. Theories of Social networks and Resource dependence are closely linked and share many of the same foundations and characteristics. These and Agency theory provide two opposing views on the role of the board of directors. Agency theory states that the main role of the board

is to monitor management, while Social network and Resource dependence theory primarily view the board as means of providing resources.

In a survey by Korn/Ferry (1999), however, directors were asked how they spent their time on the board. As it turned out: ”The directors reported performing a variety of activities for both monitoring and providing resources” (Hillman & Dalziel, 2003, p. 388). This indicates that the directors´ role on the board is not limited to one, but is a combination of the two perspectives. As both theories appear important, combining the two would reflect the real world more accurately.

2.4.5.1 Board Capital

Board capital has been positively linked to the provision of resources and firm performance (Hillman & Dalziel, 2003), meaning that an improvement in the board capital should lead to an increase in the company performance. In this literature, however, the role of the board capital in monitoring has not been explicitly discussed (Hillman & Dalziel, 2003). The traditional Agency theory´s focus on incentives as crucial for monitoring overlooks the board´s real ability to monitor. E.g. a board consisting of directors with a lot of within company or within industry experience will obviously be better at monitoring than a board consisting of directors that have no experience from the company or its competitors.

“Agency theorists have often employed measures of a board´s independence without considering the heterogeneity of monitoring ability” (Hillman & Dalziel, p.389) A board consisting of independent CEO´s of large companies is likely to be more efficient at monitoring than a board consisting of independent local business owners. Hillman and Dalziel (2003) argue that this is due to the differences in experience, skills and expertise. As directors differ in their abilities to monitor, boards will also differ. In their seminal work, Jensen and Meckling (1976) argued that a specialization would develop within boards so that the directors with greater skills to monitor would handle these activities. This leads to the third hypothesis regarding the board of directors.

Hypothesis 3: *The number of independent directors on the board positively affects Company performance*

2.5 Institutional Theory

"Institutional frameworks define the ends and shape the means by which interests are determined and pursued" (Scott, 1987, p.508)

Institutional theory provides no universally agreed definition of institutions. Scott (1995, p.33), however, describes them as: "social structures that have gained a high degree of resilience". In other words, institutions are those mechanisms that outlive individuals and thus bring with them continuity and stability to social life. Transmittance of institutions may occur through symbolic and relational systems, routines and artifacts. Thus, the structure and meaning of institutions vary across different levels of jurisdiction, from the world system to local interpersonal relationships (Scott, 1995).

Institutional theory comprises a rejection of rational-agent models and instead focuses on behavior as a consequence of cognitive and cultural explanations. Specifically, the interest lies in supra-individual units of analysis which cannot be accounted for as direct consequences of individuals´ attributes or motives (Powell & DiMaggio, 1991). These supra-individual units of analysis involve the processes by which structures, rules and norms become established and how they turn to become authoritative guidelines for social behavior.

2.5.1 Approaches To Institutionalism

Scott (1987) states that although there are underlying similarities in the approaches to Institutionalism, there is little agreement on the specifics. Scott recognizes four different approaches to Institutionalism: as a process of instilling value, a process of creating reality, class of elements and finally as distinct societal spheres.

2.5.1.1 Instilling Value

By viewing organizational structure as an adaptive vehicle, Philip Selznik (1957) pioneered this first approach to Institutionalism. The adaptive vehicle is shaped in reaction to the characteristics and commitments of participants as well as to influences and constraints from the external environment (Scott, 1987). This process is what is referred to as institutionalization, which adds a value beyond that of the technical requirements themselves. In terms of organizations, Selznick (1957) distinguishes between the technically devised mechanical instruments and their natural dimension. This natural dimension, which suggests that organizations are products of interaction and adaption, become receptacles of group idealism and are therefore less expendable than the technical dimension.

Time is an important aspect in viewing Institutionalism as a process of instilling value and Selznick (1957) emphasizes that institutionalization is a process, which promotes stability and persistence of the structure over time. In similar manner, North (1991) views organizational structures as historical evolvements caused by people to create order and reduce uncertainties. In a game theoretic manner, North (1991) claims that wealth-maximizing individuals would find cooperation more appealing when the game is repeated, when they possess complete information about the other players and when there are small numbers of players. On the other hand, cooperation is more difficult when the game is not repeated, information is lacking and the numbers of players is large. As economies developed from the simple case of local exchange to long-distance trading, more and more players entered the game. Thus, contracts had to be made between the involved parties agency problems became evident. Enforcement of these contracts, however, posed difficult in alien parts of the world. In response to the increased uncertainties, North (1991) argues that institutions, organizations and instruments evolved and made possible transacting and engaging in long-distance trade.

2.5.1.2 Creating Reality

This version of Institutional theory builds on philosophical underpinnings established by German idealists and phenomenologists (Scott, 1987). In contrast to the view of Selznick, institutionalization is seen as a process of creating reality. It is based on the concept of a shared social reality, which is a human construction. Initially, human beings confront few limits or constraints in the form of instinctual patterns. Berger and Luckmann (1967) argue that constraints develop in the form of social order, which is an ongoing human production and exists only as a product of human activity. As individuals act, interpret their actions and finally share their interpretation with other, social order is created. In this way, people try to classify their behavior into categories, so that others are enabled to respond in a similar way. According to Berger and Luckmann (1967, p.54): "institutionalization occurs whenever there is a reciprocal typification of habitualized actions by types of actors". Further there is an understanding that reciprocal typifications cannot be created instantaneously, but are built up through a shared history. In this way, certain actions are associated with certain actors.

Berger and Luckmann (1967) acknowledge that society is a human product and man is a social product. This brings forward the paradox that man is able to create a world he experiences as something other than a human product. Several influential scholars have advanced this view, among them Meyer and Rowan (1977) and Zucker (1977). According to Scott (1987) these extensions all have in common a view that institutionalization is a social process and that through this process individuals come to accept a shared

definition of social reality. In this, a set of rules evolves, and is taken for granted and accepted as the way things are or the way things should be done. Zucker (1983) assert that institutionalization is rooted in conformity of these aspects of everyday life that are taken for granted.

2.5.1.3 A Set Of Elements

From the focus on institutionalization as a process, emphasis now shifts to a belief that a distinctive class of elements can account for the existence and/or the elaboration of organizational structure (Scott, 1987). Meyer and Rowan (1977) argue that complexity of relational networks and exchange processes, as well as shared belief systems, constitute organizational forms.

The shift in emphasis stresses the role played by cultural elements and its sources. Scott and Meyer (1983, p.140) make a distinction between institutional and technical elements, where technical elements are defined as ”within which a product or service is exchanged in a market such that organizations are rewarded for effective and efficient control of the work process”. Institutional elements are then defined as “characterized by the elaboration of rules and requirements to which individual organizations must conform if they are to receive support and legitimacy” (Scott & Meyer 1983, p.149).

Meyer and Rowan (1977) argue that organizations conform to a set of institutionalized beliefs because they are rewarded for doing so through increase of legitimacy, resources and survival capabilities, not because the beliefs constitute reality or are taken for granted. Further, the emphasis shifts from the view of one unique environment to a view of multiple institutional environments. Modern societies have become more rationalized and folkway, traditions and customs have given way to laws, rules and regulations, while elders´ councils and other forms of traditional authority are replaced by nation-state, the professions and systems of law (Scott, 1987).

2.5.1.4 Distinct Societal Spheres

“Social institutions refer to relatively enduring systems of social beliefs and socially organized practices associated with varying functional arenas within societal systems” (Scott, 1987, p.499). In this way, institutions bring with them stability and social continuity. Furthermore, Hertzler (1961) emphasized the importance of predictability and efficiency and thus the central role of regulation, establishment and enforcement of the organization of institutional patterns.

2.5.2 Institutional Complexes

Friedland and Alford (1987) proposed that among institutionial complexes, there is not necessarily harmony. Neither is there necessarily a consensus among individuals within a given complex, regarding

which beliefs are appropriate for what types of activities. These differences lead to large variations in social relations and beliefs within and across institutions. In fact most important struggles between groups, organizations and classes regard the relation between institutions and by which logic activities should be regulated (Friedland & Alford, 1987). This raises the questions of how, why and where these differences occur. Scott (1987) identifies several different accounts of structural influence.

First, structure of organizations may be imposed. For this to be feasible, a structural agent needs to be sufficiently powerful so that subordinate units will accept and adapt to the imposition. One may distinguish, however, between impositions made by authority and by coercive power. Scott (1987) argues that the former will be met with less resistance and thus will occur more rapidly. Closely linked to structural imposition is the authorization of structure. In this, the subordinate unit voluntarily seeks out the attention and approval of the authorizing agent.

Organizations that lack power or authority may be in a position where they can provide inducements for the subordinate units to conform to their wishes. In doing so, the subordinate units will conform due to the incentives and benefits provided. Another widely studied influence process is one through acquisition. By deliberately choosing structural models, Scott (1987) argues that acquired structural changes will be less superficial and agents will thus be more committed to them.

Imprinting of organizational structure is one where the organizational form is decided at the time of founding and retained into the future. Some institutional theorists (Scott, 1987) argue that this is consistent with the central argument that organizations acquire a certain structure because it is taken for granted, not due to rational choice.

Not every outcome is the result of a conscious decision process and not everything works out quite as planned. Some organizational structures may therefore develop and change over time as a response to the outside environment. Lastly, Scott (1987) proposes a view that conformity is achieved not as a result of organizational but of institutional processes. By sharing the same institutional environment and culture, individuals will accept the extent of formal policies and to which areas these apply.

2.5.3 Network Size

The faces of Institutional theory are many. There is however, an understanding that the structure and meaning vary across institutions. DiMaggio and Powell (1983) identify professions and nation-states as the primary modern shapers of institutional forms. While the former generally will prefer weaker and more decentralized structures, the latter will tend to create bureaucratic arrangements that facilitate

centralized discretion at the top of the structure. These bureaucratic structures will obviously differ from country to country depending on different aspects of the institutional structure.

There is reason to believe that the institutional differences between countries will affect company performance by shaping the external environment. In a nation-state with for example strong bureaucratic structure, a company will benefit from acquiring knowledge of these arrangements. A possible means for dealing with these kinds of uncertainties is for a company to attach themselves with people that have specific knowledge of the relevant processes. In this respect, the board of directors is of focal importance. Attaining politicians or other individuals with strong connections to the board, will aid the company to both pick up structural changes before they occur and important knowledge of the bureaucratic processes.

In terms of Institutionalism, some countries are more developed than others. The more developed countries are associated with factors such as political stability, better control of corruption and stronger individual human rights. In these countries it is likely that the institutional structures are less complex and that courts and rules better protect the inhabitants. From this it follows that the less developed countries are associated with more complex structures and inferior quality of courts and rules. Therefore, there is reason to believe that the quality of the institutional environment will dictate the importance of external connections for a company, in terms of profit maximization. This leads to the fourth and final hypothesis:

Hypothesis 4: *Country quality negatively moderates the effect of network size on company performance*

3. Methodology

According to Clough and Nutbrown (2002), the purpose of the methodology is to explain the particularity of the methods of a given study. The first part of the methodological chapter therefore describes briefly the line of reasoning when examining the Research Question. Second, the data used in the analysis described and lastly the applicability and reliability of the study is discussed.

3.1 Methodological Preface

This thesis will, in examining the research question, build on a deductive approach. The four testable hypotheses are derived through a discussion of the relevant theories. These hypotheses will then be tested using a quantitative approach, namely Hierarchical Linear Modeling.

The data for the analysis is recognized as clustered within 3 groups, which motivates the application of a Hierarchical Linear Model. Through this application, the hypotheses are tested, which eventually lead up to an answer to the Research Question.

3.1 The Sample

The data used in the analysis is gathered from several sources. The board and director characteristics are all gathered from BoardEx, which is a database specialized in information on boards and directors. The financial data is gathered from Thomson One Banker, while the information on country governance is obtained from the World Bank.

The final sample consists of 10 166 observations in the time period 2005-2011. This includes directors from 118 European banks in 23 different countries.

3.2 The Variables

Tobin´s Q is widely accepted as a measure of company profitability, specifically it is the ratio of the market value of assets to the replacement costs of assets. It can, however, be approximated as the market value of assets to the book value of assets. The latter approximation is applied in this study, due to the difficulties involved in obtaining and calculating the replacement costs of assets (Maury & Pajuste, 2005).

Tobin´s Q can be interpreted as the value the market puts on a company as a fraction of the book value of a company. In this way, a higher Tobin´s Q suggests that the market expects the company to increase in value due to different factors. In terms of this study, these factors could include board characteristics,

such as director´s network size or number of outside independent directors. If the market expects these company characteristics to increase future performance, the Tobin´s Q will be higher.

Return on assets (ROA) is the other measure of performance applied in this study. In contrast to Tobin´s Q it is a measure of actual company performance, calculated as the return relative to its total assets. To better be able to compare banks operating in different countries, returns are calculated before interests and taxes (EBIT), as these may change between countries (Staikouras et.al, 2007).

ROA gives an idea of how efficient a company is in utilizing its assets to generate return. This efficiency is obviously driven by numerous factors such as management abilities and strategic choices. As it is the board´s duty to appoint the manager and to actively take part in major company decisions, one would expect certain board characteristics to have an influence on company efficiency and thus have a significant impact on ROA.

3.2.1 Level-1 Variables

The time-period analyzed in this study is highly volatile for the banking industry in Continental Europe. According to Capital market theory, one would expect the banks to diversify their portfolio to reduce the risks of their investments (Markowitz, 1952). This difference in diversification would then, theoretically, affect both the Tobin´s Q and ROA.

To measure this diversification, two measures of diversification are considered; the Herfindahl and the Palepu index.

The Herfindahl index is calculated as the sum of a company´s squared income from each segment, in which they operate. In this study we have normalized the Herfindahl index to consist of values between 0 and 1 to ease the calculations (Jacquemin & Berry, 1979).

The Palepu index is a similar measure of diversification, calculated as the sum of income from each segment times the natural logarithm of 1 divided by the income from the segment (Palepu, 1985)

In addition to the diversification-measures we add the linear variable Time, which is constructed as a measure of time, taking the value of 0 in the first year 2005 and 6 in the final year 2011. In Multilevel modeling, this is a crucial factor in analyzing longitudinal data.

3.2.2 Level-2 Variables

In line with hypothesis number 2, the variable network size is expected to have a positive effect on company performance. There are, however, other firm-specific variables that might explain the variation of Tobin´s Q and ROA among banks nested within countries. According to Resource dependence theory, a board´s inhibited experience and knowledge should positively affect company performance. Thus, several variables are included in the analysis to control for these effects. The variables Time on board, Time in role, Time in company and Number of quoted boards are included to capture the effect of director experience. The number of Qualifications and number of Independent NED on board are included to control for directors´ abilities. The variable named Number of qualifications takes into account a director´s education (undergrad and above), while Independent NED is the number of non-executive independent directors on board, calculated as a proportion of total directors on the board.

The number of directors on the board of directors has been extensively discussed in Corporate governance research. The variable named Board size is included in the analysis as a measure of the number of directors on a board.

In addition to control for the board-specific variables, financial measures that may explain company performance, need to be taken into account. Measures of diversification have already been included at the level-1 of the analysis. At level-2 the financial variables named Foreign assets per total assets and Enterprise value are introduced. The ratio Foreign assets per total assets is calculated to capture the effect of operating in more than one country. By operating in foreign countries a larger market is served, which possibly has an impact on company profitability. Similarly to the level-1 variables it can also serve as a means of diversifying risks. Foreign operations, however, is likely to be more stable and part of a longer-term strategy and is thus included as a level-2 variable. Enterprise value,as well as the variable named Employees, are included to capture the size-effect of companies. A larger firm, measured in value or number of employees, is likely to be more stable in times of distress. The company performance could also be a result of economies of scale, which should be taken into account in the modeling.

The final level-2 variable Firm age is similar to the previous two, aiming to capture the effect of long-term survival. An older firm is likely to have a more loyal customer base and therefore their income will be more stable in times of distress, which possibly could explain some of the company performance.

3.2.3 Level-3 Variables

The benefits, alternatively the disadvantages of operating in one country versus another, may be crucial for company performance. At level-3 of the analysis, factors that may control for the differences of operating in different countries are included.

Stability is of crucial importance for a country´s ability to facilitate company performance. The variable named Political stability is considered to capture the perceptions of the likelihood that a company will be overthrown or that the government will be destabilized. Of equal importance is the fact that the population has confidence in and abides the rules of the society. Therefore, the variable named Rule of law is included to control for this effect.

It is vital in a democracy that the citizens are able to participate in selecting their government. The variable named Voice & accountability is considered to measure the basic human rights of expression and association. Closely linked with Voice & accountability is the governments ability to run the country and the people´s belief in the system of society. The variable Regulatory quality is a measure of a government´s ability to formulate and implement sound policies and regulations.

The variable named Government effectiveness is included to capture the quality of public and civil services, as well as the quality of policy formulation and implementation. In addition, the variable named Control of corruption is taken into account to control for the extent to which public power is exercised for private gain.

The level-3 variables are likely to be interlinked, in fact pre-modeling investigations found significant multicollinearities among them. The reason is that countries with a high score on one measure are likely to have a high score of another. E.g. the quality of public and civil services, as measured by government effectiveness, is determined by amongst other factors the control of corruption. To avoid the multicollinearity problems, an index was made simply by summing the variables at each observation. This is possible because all variables are normalized to values between -2.5 and 2.5. The resulting variable, Country index, thus reflects a country´s score on the six level-3 variables combined, where a higher score is associated with stronger country governance.

3.3 Applicability And Reliability

Validation can be understood as whether the research gives answer to what it is supposed to (Andersen, 1990). This thesis can be claimed to provide insightful information about the effect of directors´ network size on bank performance. The validity should therefore be adequate and the thesis may contribute to the existing literature and could perhaps serve as inspiration for future research on Corporate governance.

The reliability of the study is related to the degree that an equivalent study would end up with similar findings. In this respect, there are some aspects that may affect the generalization of the findings and therefore should be recognized. The large sample of the analysis gives reason to believe that the results are generalizable to a larger population, such as different time-periods, industries and continents/countries. However, some important factors limit the generalization potential. First, banks are different from other companies in several aspects related to Corporate governance. Levine (2004) argues that banks are more opaque than nonfinancial firms. Due to these information asymmetries, loan quality is not readily observable and can be hidden for long periods. Banks are also argued to better be able to hide their problems, by extending loans to clients that cannot service previous debt. In doing this, banks can easier alter their risk-composition than nonfinancial companies.

Second, banks are heavily regulated (Levine, 2004). Due to the opacity and importance of banks in the economy, even governments that intervene little in other sectors tend to impose restrictions on banks. This combined with regulations imposed by agencies such as IMF, the World Bank and UN, distinguishes banks from other industries, limiting the potential for generalizing the results.

The time-period used in the analysis is characterized by instability and decreasing bank performance. In fact, the time-period analyzed is seen to be the worst financial crisis since the Great Depression in the 1930´s. The nature of bank performance in this period is likely to be different from those of other time-periods. It is therefore possible that the findings of this study only are generalizable to banks facing large uncertainties.

The last generalization issue concerns other countries and continents than the one(s) analyzed. The Corporate governance mechanisms found in Europe, in some respects differ from those found in e.g. U.S. and United Kingdom. There is reason to believe that these differences could have an impact on the generalization of the findings.

In conclusion, the findings of this thesis are reliable in the sense that they should persist in similar future research. The method used for the analysis emphasizes the nature of the variables and the fact that they

are nested at three levels, over time, within companies nested within countries and finally between countries. The reliability, however, may be weakened due to missing financial data. While the quality of the financial data found through Thomson One Banker greatly increases with time, it is also substantially better for larger companies and more developed countries. This inevitably led to some missing data points for the financial data and may or may not affect the findings. The main weakness of the thesis is, in fact, the unavailability of certain financial data and missing data-points.

4. Empirical Analysis

4.1 Hierarchical Linear Modeling

"In the social sciences, data structures are often hierarchical in the following sense: We have variables describing individuals, but the individuals also are grouped into larger units, each unit consisting of a number of individuals" (Raudenbush & Bryk, 2002).

Multilevel modeling, also known as Hierarchical linear modeling, takes into account these groupings by incorporating a series of simultaneous within-group regressions that iterate between estimation of fixed and random effects until a model converges. In doing so, the multilevel model partitions total variance into within- and between group components and thereby controls for dependence. (Holcomb et. al 2009). The leading example of multilevel modeling, according to Raudenbush and Bryk (2002) is taken from the school system. Students are grouped in classes and classes are grouped within schools that again are grouped within districts.

Hierarchical linear models (HLM) spring out from the simple ANOVA, and have, with advances in computer technology, experienced increasing popularity in recent years. Even though this method of modeling is a step forward from the ANOVA, it does not offer the solution to all the data analyses problems of the social sciences (Raudenbush & Bryk, 2002).

4.1.1 Before Modeling

Before one can start fitting a multilevel model, there are several factors that need to be taken into account. First, the relevance of applying a multilevel analysis needs to be explored. This choice of analysis method should be based on the structure of the data collected for the research. A multilevel approach is relevant when the data shows a hierarchical structure. "Methodologically, when conditions at multiple levels affect organizational outcomes or when conditions change over time, sample observations likely contain some dependence" (Holcomb et.al, 2009, p.349). Dependence meaning that knowledge of one observation proves meaningful for the interpretation of another variable. Nesting occurs when lower units are nested or are dependent on a higher-level group. For example, students (lower-level) are nested within classes (higher-level). Suppose that students´ background is related to academic achievement. The magnitude of this effect would probably depend on certain teacher characteristics such as teaching methods or teacher´s expectations. In this case the effect of students´ background on academic achievement is likely to differ between classes depending on characteristics of the teachers. In the same way, directors will share some common characteristics within a board. Suppose that a director´s network size would have a positive

effect on a firm´s financial performance and that the magnitude of this effect could depend on certain company characteristics such as firm age or firm size. It is thus likely that the effect of network size on firm performance will differ between companies.

Second, if a multilevel analysis proves to be relevant, one needs to determine which variables belong in the model and at what level these belong. Both of these choices are important and should be guided by existing theory.

Third, one should test the theoretically important variables and see whether these empirically belong in the model. The choice of whether or not to enter a theoretically relevant variable into the model should be based on a goodness-of-fit measure.

4.1.2 Three-Level Model

In a three-level HLM, three linear models are estimated simultaneously; one modeling the relations within the lower level, the second modeling how these relations vary on the higher level and a third that models these relations variation on the upper level. Typically, in hierarchical linear models it is assumed that the error terms normally distributed with a mean of zero and some variance σ^2 (Raudenbush & Bryk, 2002;17). These assumptions apply at each level of the analysis. In addition, misspecifications at one level can affect or bias the estimations on another level.

The models for analyzing multilevel data have been developed out of methods for analyzing experiments with random effects (Albright & Marinova, 2010). Thus it is important to differentiate between random and fixed effects when analyzing multiple-level data. A fixed effect is one where the same, fixed levels would be included in replications of the study, meaning that the researcher only is interested in the exact categories of the factor that appear in that particular research (Albright & Marinova, 2010). In other studies, however, the factors may not be fixed or perfectly replicable to other experiments. That is, the data represent a random sample from a larger population. E.g. the effect of board size on firm performance may not be of particular theoretical interest in the examination, but one could control for the possibility that a board-size effect is present beyond the fixed effect being investigated. In Multilevel analysis, the model can therefore be described as either a fixed, random or mixed effects model depending on the motivation of the study. A fixed effects model is one containing solely fixed effects. Thus the researcher is only interested in those levels included in the study. On the other hand, a random effects model is one containing only random effects and thus the researcher wishes to generalize the results of the study to a larger population. A random effects model is a hybrid of the two former and contains both fixed

and random effects and can be used when the researcher is interested in keeping some factors fixed while generalizing others.

4.1.2.1 The Unconditional Model

The simplest three-level model is one that is fully unconditional, meaning that there are no predictor variables at any level. "Such a model represents how the variation in an outcome measure is allocated across the three different levels" (Raudenbush & Bryk, 2002, p.228). At the first level of analysis, e.g. variation in companies over time, the dependent variable *Y* is modeled as a function of an intercept plus a random error

$$\text{Level 1: } Y_{ijk} = \pi_{0jk} + e_{ijk} \tag{4.1}$$

Here, π_{0jk} can be understood as the mean of *Y* for observation *i* of venture *j* in country *k*, while e_{ijk} is the error term or the deviation of *Y*, for observation *i* in company *j* in country *k*. At the second level, e.g. variation in companies nested within countries, the outcome π_{0jk} is varying randomly around each country´s mean performance:

$$\text{Level 2: } \pi_{0jk} = \beta_{00k} + r_{0jk} \tag{4.2}$$

β_{00k} can be understood as the mean *Y* for country *k* in time period *i*. The second term r_{0jk} is a random level-2 effect, showing the deviation of Y from the country-mean for company *j* in country *k*. The third level, e.g. between countries, completes the three-level model, by using the intercept β_{00k} of the level-2 equation as the dependent variable. The outcome Y is here varying around some level-1 mean

$$\text{Level 3: } \beta_{00k} = \gamma_{000} + u_{00k} \tag{4.3}$$

Here, γ_{000} is the population mean of Y, while u_{00k} is a random country effect, the deviation of Y for country *k* over time.

From the assumption of independence between levels it follows that the variance of the outcome Y_{ijk} is given by

$$Var(Y_{ijk}) = Var(u_{00k} + r_{0jk} + e_{ijk})$$

$$= Var(u_{00k}) + Var(r_{0jk}) + Var(e_{ijk}) \tag{4.4}$$

In this notion the residual term $Var(e_{ijk})$ denotes the variability on the third level, $Var(r_{0jk})$represents the variability on the second level and $Var(u_{00k})$ represents the variability on the first level. By defining $\sigma^2 = Var(e_{ijk})$, $\tau_\pi = Var(r_{0jk})$ and $\tau_\beta = Var(u_{00k})$, Raudenbush and Bryk (2002) assert that the variability allocations across the levels can be written as

Level 1: $\sigma^2/(\sigma^2 + \tau_\pi + \tau_\beta)$ (4.5)

Level 2: $\tau_\pi/(\sigma^2 + \tau_\pi + \tau_\beta)$ (4.6)

Level 3: $\tau_\beta/(\sigma^2 + \tau_\pi + \tau_\beta)$ (4.7)

A statistical test, such as a Chi-square test, may be applied to determine whether or not the variances at each evel are statistically significant.

For a longitudinal study, the unconditional model can be extended to incorporate the variations over time. According to Raudenbush and Bryk (2002) there is one important difference one needs to consider when doing a longitudinal multilevel approach. Typically level-1 variables have no structure in multilevel models, but time, which is a level 1 variable, has a chronological ordering. Thus researchers need to consider both how to treat time as a predictor to test different growth structures and they must pay close attention to the error-covariance matrix. Specifically the variation over time can be accounted for by adding the covariate and slope coefficent of the time measure to equations 4.1, 4.2 and 4.3 (Holcomb et.al, 2009).

4.1.2.2 Conditional Models

The Unconditional model allows us to estimate the proportion of variability occurring at each level in the analysis. By introducing independent variables at each level, these will presumably explain or account for part of the variability at each level (Raudenbush & Bryk, 2002).

4.1.2.2.1 The General Level-1

Within each company over time, financial performance is modeled as a function of time-level predictors plus a random time-level error

$$Y_{ijk} = \pi_{0jk} + \pi_{1jk}a_{1ijk} + \pi_{2jk}a_{2ijk} + \cdots + \pi_{Pjk}a_{Pijk} + e_{ijk} \quad (4.8)$$

Where

Y_{ijk} is the outcome of observation i of company j in country k

π_{0jk} is the intercept of company j in country k

a_{pijk} are p=1,…,P company characteristics that predict Y over time

π_{pjk} are the corresponding level-1 coefficients that indicate the direction and strength of association between each time-dependent characteristic, a_p, and the outcome of each company jk

e_{ijk} is a level-1 random effect that represents the deviation of a company ijk´s performance from its predicted performance based on the level-1 model. These residuals are assumed normally distributed with a mean of zero and variance σ^2

4.1.2.2.2 The General Level-2

"Each of the regression coefficients in the general level-1 model can be seen as either fixed, non-randomly varying, or random" (Raudenbush & Bryk, 2002, p.232).Due to these possibilities, the general level-2 model, e.g. variations across companies, can be written as

$$\pi_{pjk} = \beta_{p0k} + \sum_{q=1}^{Qp} \beta_{pqk} X_{qjk} + r_{pjk} \quad (4.9)$$

Where

β_{p0k} is the intercept for country k in modeling the level-2 effect π_{pjk}

X_{qjk} is a company characteristic used as a predictor of the level-2 effect π_{pjk}

β_{pqk} is the corresponding coefficient that represents the direction and strength of association between company characteristic X_{qjk} and π_{pjk}

r_{pjk} is a level-2 random effect that represents the deviation of company jk´s level-1 coefficient, π_{pjk}, from its predicted value based on the level-2 model. These residuals are assumed normally distributed with a mean of zero and variance σ^2

In the formulation of the level-2 model, there are P+1 equations, one for each of the level-1 coefficients.

When level-1 models are estimated separately, there are four different patterns than can emerge as illustrated by figure 4.1

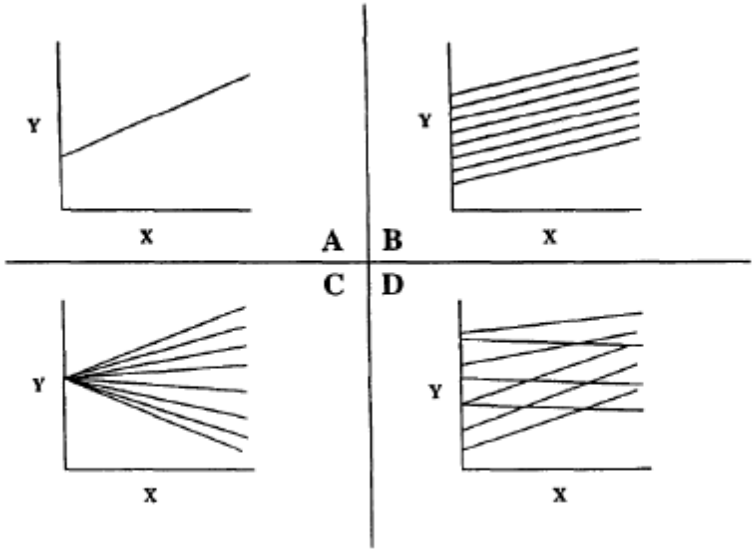


Figure 4.1: *Patterns for intercepts and slopes* (Hoffmann, 1997, p.727)

Pattern A shows the situation where each of the companies has an identical regression line, meaning that both the intercept and slope are equal across the companies. Pattern B represents the case where the intercept varies across companies, but the slopes are still equal in all companies. In pattern C it is the intercept that is identical across companies and the slopes that vary, while D allows for variation in both the intercept and slope across companies (Hofmann, 1997). The patterns B,C and D illustrate that there are systematic differences across companies. This raises the question of whether or not these variations are caused by level-2 variables. The level-2 model analyzes this question by using the intercept and slopes from the level-1 model as dependent variables.

4.1.2.2.3 The General Level-3

$$\beta_{pqk} = \gamma_{pq0} + \sum_{s=1}^{Spq} \gamma_{pqs} W_{sk} + u_{pqk} \quad (4.10)$$

Where

γ_{pq0} is the intercept term in the level-3 model for β_{pqk}

W_{sk} is a company characteristic used as a predictor for the level-3 effect, β_{pqk}

γ_{pqs} is the corresponding level-3 coefficient that represents the direction and strength of association between country characteristic W_{sk} and β_{pqk}

u_{pqk} is a level-3 random effect that represents the deviation of country k´s coefficient, β_{pqk}, from its predicted value based on the level-3 model. These residuals are assumed multivariate normally distributed, a mean of zero, variance σ^2 and covariance among all pairs of elements

For each country in the model there are $\sum_{p=0}^{P} (Q_p + 1)$ equations.

As the case in level-2, the level-3 model uses the intercept and slopes of the lower level as dependent variables to assess whether

There is a range of alternative formulations for the equations involved from the unconditional model to the level-3 conditional model. Generally, the researcher must decide on the following three questions as suggested by Raudenbush and Bryk (2002, p.235):

- Introduce predictors at each level (i.e. specify a structural model at each level)
- Specify whether structural effects in each model are considered fixed, non-randomly varying, or random at that level
- Specify alternative models for the variance-covariance components

4.1.3 Additional Issues

4.1.3.1 Model Estimation

The theory of Hierarchical linear models provides several different ways to estimate the models. These can be generalized to fall under one of the three main competing estimation models: Maximum likelihood, Restricted maximum likelihood and Bayesian approaches. The Maximum likelihood estimates the parameters of the data so that it produces the distribution that gives the highest probability. This method has some desirable properties in that the estimates are consistent, asymptotically unbiased and efficient. In large samples these parameters will also be normally distributed and a range of statistical tests is readily available (Raudenbush & Bryk, 2002). In small samples, however, Maximum likelihood has some shortcomings and could result in an approximation that is not practically useful. In Multilevel models, the sample size at the highest level can often be quite small making statistical inferences untrustworthy. Restricted maximum likelihood differs from the Maximum likelihood in that instead of estimating the highest probability distribution of all the information, it maximizes the likelihood based on a transformed set of data. In this way it corrects for the degrees of freedom lost due to the fixed effect estimation while estimating the variance components.

With advances in computer technology, the Bayesian approach has increased in popularity. According to Raudenbush and Bryk (2002) the Bayesian approach provides a sensible alternative to the methods of maximized likelihood, the reason being that the standard errors will tend to be more realistic. The Bayesian approach differs from the classical approach in that probability is no longer viewed as a relative frequency over many repeated samples. Instead it quantifies an investigator´s uncertainty about something unknown. The most interesting unknowns are the parameters of the distribution generating the data and these distributions describe the investigator´s uncertainty about the parameter values (Raudenbush & Bryk, 2002, p.400).

The statistical packages available differ in how they estimate the multilevel models. The SAS Proc Mixed procedure used in this thesis has adopted a generalization of the standard linear model used in the Generalized Linear Model, which permits the data to exhibit correlation and non-constant variability. This approach also provides flexibility to the means of data, as well as the variances and covariances.

In general, Hierarchical Linear Modeling in SAS Proc Mixed relies on some assumptions that are critical for the model estimation:

- The data are normally distributed (Gaussian)
- The means (expected values) of the data are linear in terms of a certain set of parameters
- The variances and covariances of the data are in terms of a different set of parameters, and they exhibit a structure matching one of those available in Proc Mixed

(SAS Institute, 2008, p.3886)

In addition, unreliable estimates occur in the case of multicollinearity among the independent variables. In case of multicollinearity, the predictive power or reliability of the model itself is not reduced, but the estimates of individual variables may be misleading.

4.1.3.3 Statistical Tests

There is a range of statistical tests that can be applied to multilevel modeling and the statistical packages available incorporate most of these. Emphasis will, in this section, be put on those tests relevant for the Research Question of the thesis. Raudenbush & Bryk (2002) assert that hypothesis testing in two- and three-level models are interchangeable. The two-level tests presented will thus be valid also for the three-level model.

To test whether a fixed effect parameter significantly differs from zero, one can perform a Student´s t-test. The t-test is a hypothesis test and usually takes the form

$$H_0: \gamma_{qs} = 0$$

$$H_1: \gamma_{qs} \neq 0 \qquad (4.11)$$

Which implies that the effect of a predictor on a particular parameter is null. The test of this hypothesis takes the form

$$t = \hat{\gamma}_{qs} / (\hat{V}_{\hat{\gamma}_{qs}})^{1/2} \qquad (4.12)$$

Here, the $\hat{\gamma}_{qs}$ is the maximum likelihood estimate of γ_{qs} and $\hat{V}_{\hat{\gamma}_{qs}}$ is the estimated sampling variance of γ_{qs}. The Student´s t-test follows a t-distribution with degrees of freedom equal to $J - S_q - 1$, where J is the number of groups and S_q equals the number of level-specific predictors (Raudenbush & Bryk, 2002, p.57). The Student´s t-test can also be used for testing random effects. This is directly analogous to the

procedure in testing fixed effects. However, one has a choice of whether to use the empirical Bayes or the OLS estimates(Raudenbush & Bryk, 2002, p.61).

In multilevel modeling one needs to pay close attention to the variance and covariance components and deciding whether the coefficients should be specified as fixed, random or non-randomly varying. For this purpose, a test of the existance of random variation may be applied. The null and the alternative hypothesis is written as

$$H_0: \tau_{qq} = 0$$

$$H_1: \tau_{qq} \neq 0 \qquad (4.13)$$

Where $\tau_{qq} = Var(\beta_{qj})$. In case of hypothesis rejection, one can thus conclude that there is random variation in β_q. The test can be equated as

$$\sum_j (\hat{\beta}_{qj} - \hat{\gamma}_{q0} - \sum_{s=1}^{S_q} \hat{\gamma}_{qs} W_{sj})^2 / \hat{V}_{qqj} \qquad (4.14)$$

Where $\hat{\beta}_{qj}$ is the estimate of β_{qj} and $\hat{\gamma}_{q0}$ is the estimate of γ_{qi}, while $\hat{V}_{qqj}$ is the estimated sampling variance of $\hat{\beta}_{qj}$. This statistic will be distributed approximately X^2 with degrees of freedom equal to $J - S_q - 1$ (Raudenbush & Bryk, 2002, p.61)

4.1.3.3 Centering

It is important that the variables, in any quantitative research, have a precise meaning making the interpretation and relation to the research question understandable. In the case of HLM, the difficulties arise in that the intercept and slopes in level 1 become outcome variables at level 2. According to Raudenbush and Bryk (2002), centering of the variables could be applied to ease the interpretation and the relation to the theoretical motive of the research. E.g. in some cases it does not make sense for the intercept to have a value of zero, thus the researcher may want to transform the variable to make it more meaningful. Raudenbush and Bryk (2002) argue that these transformations are most critical for the level-1 variables. The variables located at upper levels are less likely to pose problems with numerical instability, except when cross-product terms are introduced. However, centering may be convenient at level-2 and level-3 for interpretation purposes.

Specialized choices for the location of level-1 predictors may be sensible. I.e. in some cases the population could be known and the researcher would want to define the intercept as the expected average

outcome of the population. Here, the level-1 predictor would be set as the original value of the variable minus the population mean. In a longitudinal analysis, the researcher may want to define the level-1 predictors such that the intercept represents the outcome at a point in time that is of particular theoretical interest. According to Raudenbush and Bryk (2002) this is also applicable, as long as the data encompasses the time point.

In multiple-level models, grand-mean and group-mean centering are the two options most frequently applied. When centering around the grand-mean, the population mean is subtracted from each variable value. Whilst in group-mean centering, the mean of the group is subtracted from each variable value.

In addition to the already mentioned methods, it could be useful to center dummy-variables. For example assume that we have a dummy variable that takes the value of 1 if the subject A in company X is male and 0 if not. In this case the intercept will be calculated as the expected outcome for a female worker in company X. When centering a dummy around it´s grand mean in this case, the grand mean will equal the mean of males in the sample and thus the intercept will reflect the men's´ mean. However, even if introducing a multiple of dummies into a model makes sense theoretically, one should be careful as the interpretation of the estimates could get confusing.

4.1.3.4 Goodness Of Fit Measures

To assess the goodness of fit of a multilevel model several statistics may be applied. The most popular statistical packages all provide outputs of several goodness-of-fit measures. This is also the case for SAS PROC MIXED, which by default produce measures of Log likelihood, Akaike´s Information Criterion (AIC) and Bayesian Information Criterion (BIC). Both the AIC and BIC are based on the -2 Log likelihood (-2LL), which defined as -2 times the likelihood of the function. The likelihood in statistical terms can be understood as the probability that the model gives accurate estimates for the parameters.

Closely related to the concept of likelihood, AIC and BIC is the Criteria of deviance information (DIC). This method is used to compare the fit of different models. To apply this measure, the deviance (DIC) of the model is calculated as two times the negative Maximum log likelihood. The smaller the deviance, the better the fit.

$$DIC = -2 * Log(L) \quad (4.15)$$

This is obviously equal to the -2LL statistic SAS Proc Mixed provides by default. This measure can be used in comparing two nested models. This is done by simply subtracting the deviance of the latter from the deviance of the former model in question

$$D_0 - D_1 \quad (4.16)$$

What makes this measure helpful is that it follows an approximate Chi-square distribution with degrees of freedom equal to the change in number of variables (O´Connell & McCoach, 2008). Also here, the model with the better fit is the one with the smallest D. Thus a researcher would like to have a largest possible deviance between the two models.

AIC and BIC may also be applied for the same purposes. Both these measures penalize harder for additional variables than the -2LL.

$$AIC = -2 * Log(L) + 2(p + k + 1 \quad (4.17)$$

$$BIC = -2 * Log(L) + [\log(n)\,(p + k + 1)] \quad (4.18)$$

(Fernandez, 2007)

In the equations, *p* is the number of fixed effect terms, *k* is the number of random effect terms and *n* is the total sample size for the random effects model. The deviance concept can be applied also for the AIC and BIC and will follow the same procedure as described for the -2LL.

4.1.3.5 Moderation

According to Baron and Kenny (1986) a moderator is a variable that affect the direction and/or the strength of the relation between an independent and dependent variable. A moderating variable can take the form of a qualitative variable such as gender or race, or it can take the form of a quantitative variable such as performance or country quality. Figure 4.2 illustrates a moderating effect, where the relationship of the predictor and the outcome variable is dependent on the moderator

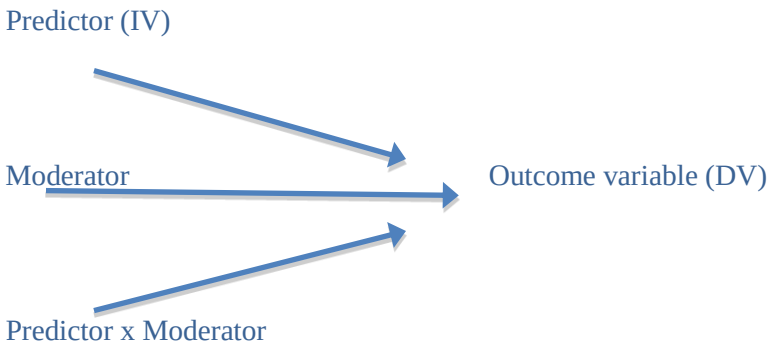


Figure 4.2: *Moderator model* (Baron & Kenny, 1986)

In multilevel modeling, as well as in regular ANOVA, a moderated relationship may be modeled as an interaction effect, as illustrated in figure 4.2. The interaction effect, which is calculated as the predictor times the moderator, will then be a product of the moderated relationship. When this relationship involves a qualitative variable, e.g. gender, interpretation is relatively straightforward.

Consider the following simple example:

$$Y = b_0 + b_1X + b_2Z + b_3XZ + e \tag{4.19}$$

Here, Y represents wage, X is gender, taking the value of zero for Male and zero for female, while Z represents education. In this simple regression the intercept will be calculated as the average effect of female education on wage. The output of the interaction term will thus represent the effect of education on wage for the male population, because in the product-term all female observations will sum to 0.

In a relation where both the predictor and the moderator are quantitative variables, interpretation can be a bit more difficult. For this reason, Aiken and West (1991) suggest that it could be useful to make an interaction plot, where one plots the relationship between the independent and dependent variable using some fixed values of the moderator.

Using SAS Proc Mixed for multilevel modeling, moderating relationships are explored after the final modeling of the different levels. The reason is that the interaction term may affect the estimates of the other variables in the model and one should therefore be careful about making any conclusions based on these estimates. In fact, only the estimates of the interaction term should be used in the analysis.

4.2 Results

4.2.2 Pre-Modeling Analysis

The output of the analysis is only as good as the data that is used. It is therefore vital to the quality of the results that the data is analyzed on beforehand.

The issue of centering or not centering is not of importance for the results of the modeling. It is, however, a way to make the results easier to interpret. As the variables center around zero and the variation among the observation is close to zero, SAS Proc Mixed may run into some problems regarding the estimation. Due to this, the fixed variables in the modeling will not be centered. The random effects, however, will be centered around its grand mean to ease the interpretation.

Hierarchical Linear Modeling is built on the assumption that the variables are normally distributed. Therefore, all the variables were graphically checked for normality. From this, Network size was the one variable that was highly non-normal. By taking the log, the variable was transformed and all variables are after this close to normally distributed.

Collinearities among the predictors were also checked. There were not found any collinearities on level-1 or level-2. On level-3, however, there were found collinearities among the six country variables, as shown in table 4.1. A rule of thumb is that a VIF-value over 10 and a tolerance-value below 0.1 are signs of collinearity (see appendix C for multicollinearity-specifics). From the results of table 4.1 there are therefore obvious reasons for concern.

Results Of Collinearity Check Governance Quality			
Variable	DF	Tolerance	VIF
Voice & Accountability	1	0.05601	17.85508
Political Stability	1	0.27769	3.60114
Government Effectiveness	1	0.04084	24.48449
Regulatory Quality	1	0.03681	27.16361
Rule Of Law	1	0.02029	49.27642
Control Of Corruption	1	0.03554	28.13470

Table 4.1: *Results of collinearity check on governance quality*

To avoid the problems caused by collinearity, an index called Country index was therefore made by adding all six variables together at each data-point.

4.2.3 Tobin`s Q Results

Tobin´s Q and Return on assets are the two measures of performance most commonly applied in Corporate governance literature. Thus, in line with previous research, this thesis builds two separate multilevel models, one using Tobin´s Q as the dependent variable and another using Return on assets as the dependent variable.

As there are two different models, the results will be presented in two separate parts, first the modeling with Tobin´s Q as the dependent variable and second with ROA as the dependent variable. This is to done to avoid confusion and make the results easier to interpret.

4.2.3.1 Unconditional Model

Unconditional model Tobin´s Q				
Fixed effect		Coefficient	SE	t-value
Average Tobin´s Q (γ_{000})		0.4513	0.02611	17.28
Random effect	Variance component	SE	Z-value	Pr>Z
Level-1 (e_{ijk})	0.005237	0.000074	70.87	<. 0001
Level-2 (r_{0jk})	0.02559	0.003801	6.73	<. 0001
Level- 3 (u_{00k})	0.008843	0.005131	1.72	0.0424
Variance decomposition	% by level			
Level 1 (Within banks over time)	13.20%			
Level 2 (Among banks within countries)	64.51%			
Level 3 (Among countries)	22.29%			
Model fit statistics				
Δ -2LL	-			

Table 4.2: *Results of Tobin´s Q Unconditional model*

The unconditional model allows us to measure the variations of the performance measures over the three different levels and aids as a benchmark throughout the modeling.

Table 4.2 reports the output of the unconditional model. The fixed effect indicates Tobin´s Q`s intercept outcome, γ_{000} in the level-3 equation. It can thus be interpreted as the population mean of Tobin´s Q.

The most important contribution of the unconditional model, are the variance estimates. At all three levels of analysis, variance is shown statistically significant (p<. 05). This indicates that there is significant variation that remains unexplained and encourages further exploration. By decomposing the variance estimates, we can calculate the fraction of total variation occurring at each level. In this way, we find that a large part of Tobin´s Q variation occurs between companies nested within countries (64.51%). The remaining variation is distributed among companies over time (13.20%) and between countries (22.29%).

4.2.3.2 Determining The Models

Before one can start building the level-1 model, one needs to determine which theoretically relevant variables that empirically belong in the model. In this procedure the unconditional model will aid as a benchmark when all variables are regressed individually on Tobin´s Q. As the change in -2LL follows an approximate Chi-distribution, the models can be compared to the unconditional model. For a theoretically relevant variable to belong in the empirical model, the negative change in -2LL from the unconditional model needs to be significant on a 5% level. The deviance statistic, simply -2LL of the unconditional model minus -2LL of the alternative model, is applied to calculate the difference between the models. The change in degrees of freedom equals 1 in each regression as each variable is tested individually.

Interpreting the results of table 4.3, it is evident that the three levels of analysis will be constructed the following way:

Level-1: Time

Level-2: Network size, Time in role, Time on board, Time in company, Quoted boards, Board size, Independent NED on board and Enterprise value

Level-3: Country index

The variable Independent NED on board, even though not significantly improving the model, will be included in the analysis as it is of particular interest in the analysis.

Results Of Simple Regressions On Tobin´s Q				
Variable	-2LL	Δ -2LL	Δ D.f.	X^2-significance
Unconditional Model	-23 826.2	-	-	-
Time	-24 301.5	475.3	1	<. 0001
Network size	-23 647.2	-	1	-
Time in role	-23 836.1	9.9	1	0.00165
Time on board	-23 833.7	7.5	1	0.00617
Time in company	-23 831.2	5	1	0.025347
Quoted boards	-23 830.9	4.7	1	0.030163
Qualifications	-23 830	3.8	1	0.051253
Board size	-23 861.5	35.1	1	<. 0001
Independent NED On board	-23 826.2	0	1	-
Employees	-23 094.8	-	1	-
Firm age	-23 567.3	-	1	-
HHI	-23 827.3	-	1	-
Palepu index	-22 317.1	-	1	-
Enterprise value	-24 055.4	229.2	1	<. 0001
Country index	-24 566.9	740.7	1	<. 0001

Table 4.3: *Results of Simple regressions on Tobin´s Q*

4.2.3.3 Level 1-Model

Level 1-model Tobin´s Q				
Fixed effect		Coefficient	SE	t-value
Tobin´s Q, (γ_{000})		0.4780	0.02586	18.48
Time, (γ_{100})		-0.00847	0.000384	-22.06
Random effect	Variance component	SE	Z-value	Pr>Z
Within-banks variation over time (e_{ijk})	0.004995	0.000070	70.87	<. 0001
Variation across banks within countries (r_{0jk})	0.02573	0.003821	6.73	<. 0001
Variation across countries (u_{00k})	0.008506	0.005024	1.69	0.0452
Model fit statistics				
Δ -2LL	475.3			
Explained variance of Time	4.62%			

Table 4.4: *Results of Tobin´s Q Level-1 model*

The level-1 variable Time proved to increase the model fit, while the diversification variables, Palepu index and Herfindahl index proved insignificant. The level-1 model therefore consists of the variable Time on Tobin´s Q.

From table 4.4, one can see that the level-1 model is an improvement to the unconditional model. The -2LL has decreased with 475.3, which is significant at a level less than 1%.

As the level-1 model only includes time on Tobin´s Q, it is also known as a linear change model. In this modeling it can be tested whether the variation in Tobin´s Q is due to the slopes of the individual companies. This is calculated by comparing the time period variance of the level-1 model compared to the unconditional model. The results suggest that differences in the slopes of companies account for about 4.62% of the variation over time.

The Time-variable is coded such that 0 is the first year of analysis, 2005, 1 is 2006 and so on. Thus, the intercept can be interpreted as the initial Tobin´s Q in the first year of analysis. Thus, from the results of the level-1 model it can be interpreted that the mean Tobin´s Q on average will decrease by -0.00847 as time changes with one unit.

4.2.3.4 Level-2 Model

Level 2-model Tobin´s Q				
Fixed effect		Coefficient	SE	t-value
Tobin´s Q (γ_{000})		0.4455	0.02790	15.97
Time (γ_{100})		-0.01222	0.000391	-31.25
Network size		0.001943	0.001099	1.77
Time in role		-0.00021	0.000252	-0.82
Time in company		-0.00002	0.000143	-0.14
Time on board		-0.00005	0.000241	-0.23
Quoted boards		0.000063	0.000314	0.20
Board size		0.001629	0.000353	4.61
Independent NED		-0.02987	0.009458	-3.16
Enterprise value		2.785E-7	0	Infty
Random effect	Variance component	SE	Z-value	Pr>Z
Within-banks variation over time (e_{ijk})	0.004484	0.000064	70.13	<. 0001
Variation across banks within countries (r_{0jk})	0.02666	0.003933	6.78	<. 0001
Variation across countries (u_{00k})	0.009259	0.005207	1.78	0.0377
Model fit statistics				
Δ -2LL	1018.4			

Table.4.5: *Results of Tobin´s Q Level-2 Model*

Table 4.5 reports the result of the Tobin´s Q level-2 model. It shows that the -2LL has decreased with 1018.4 from the level-1 model, which is significant (p<. 000). This suggests that the level-2 model is a significant improvement to that of level-1.

The estimates of the fixed effects show that time still has a significantly negative (p<. 000) impact on Tobin´s Q. The level-2 variables Time in role, time in company, Time on board, Quoted boards and Enterprise value are not statistically significant from zero. The results, however, suggest that Network size (p=0.077) and Board size (p<. 000) have a positive relation with Tobin´s Q. Independent NED (p=0.0016), on the other hand, is suggested to have a significant negative influence on Tobin´s Q.

The random effect output shows that show that there still is significant variation within companies (p=<. 000), between companies (<. 000) and between countries (p=0.0377).

A VIF-test was used on the level-2 model and found no evidence of multicollinearity among the independent variables. The output is therefore left for the references, see appendix C.

4.2.3.5 Level-3 Model

In the pre-modeling process, there were found collinearities among the level-3 predictors. For this reason the country-index was created by summing the six level-3 variables at each observation. The country-index is thus a measure of country governance quality and adding it creates the results reported in table 4.6.

The level-3 results, proves a significant improvement to the level-2 model, reducing -2LL by 184.2 (p<. 000). In the same regard, the level-3 variable country index is suggested to be a positive predictor of Tobin´s Q (p<. 000). The level-2 variables of specific interest, Independent NED (p=0.0002) and board size (p<. 000) are still statistically significant predictors of Tobin´s Q. The significance of Network size has slightly declined and is only significant on 10.89% level.

The random effect output shows that there still is significant unexplained variation within companies over time (p <. 000), between companies nested within countries (p <. 000) and between countries (p=0.0316). For this reason it is possible that a random effect might belong in the model.

To account for the possibility that the impact of Network size may vary among countries moderated by country quality, a random interaction effect between Network size and Country index was added to the model. When allowed to vary randomly across countries, the level-2 slope of Network size is significant (p=.0136), while the interaction effect proves insignificant (p=. 1629).

As was the case of level-2, the VIF-test found no evidence of multicollinearity among the independent variables at level-3. See appendix C for the output.

Level 3-model Tobin´s Q				
Fixed effect		Coefficient	SE	t-value
Tobin´s Q (γ_{000})		0.4082	0.02825	14.45
Time (γ_{100})		-0.00795	0.000498	-15.95
Network size		0.001745	0.001089	1.60
Time in role		-0.00010	0.000250	-0.41
Time in company		-0.00001	0.000142	-0.09
Time on board		-0.00008	0.000239	-0.35
Quoted boards		0.000089	0.000311	0.29
Board size		0.001784	0.000350	5.10
Independent NED		-0.03522	0.009380	-3.76
Enterprise value		2.511E-7	0	Infty
Country index		0.004487	0.000329	13.64
Network size*Country index		0.000338	0.000242	1.40
Random effect	Variance component	SE	Z-value	Pr>Z
Within-banks variation over time (e_{ijk})	0.004402	0.000063	70.13	<. 0001
Variation across banks within countries (r_{0jk})	0.02609	0.003834	6.80	<. 0001
Variation across countries (u_{00k})	0.009674	0.005209	1.86	0.0316
Slope Network size	0.000083	0.000038	2.21	0.0136
Model fit statistics				
Δ -2LL	184.2			

Table 4.6: *Results of Tobin´s Q Level-3 Model*

4.2.4 Return On Assets Results

Results for ROA unconditional model				
Fixed effect		Coefficient	SE	t-value
Average initial ROA, (γ_{000})		1.6644	0.1477	11.27
Random effect	Variance component	SE	Z value	Pr>Z
Within-bank variation over time (e_{ijk})	0.5937	0.008659	68.56	<. 0001
Variation across banks within countries (r_{0jk})	1.998	0.1806	6.64	<. 0001
Variation across countries (u_{00k})	0.1874	0.1522	1.23	0.1090
Variance decomposition by level	% by level			
Level 1 (Within banks over time)	29.97%			
Level 2 (Among banks within countries)	60.57%			
Level 3 (Among countries)	9.46%			
Model fit statistics				
Δ -2LL	-			

Table 4.7: *Results of ROA Unconditional Model*

Table 4.7 reports the output of the unconditional model for ROA. The fixed effect indicates ROA´s intercept outcome, γ_{000} in the level-3 equation. It can thus be interpreted as the population mean of ROA.

As was the case in modeling Tobin´s Q, there is significant variation at all three levels of the analysis of ROA. The variation within and between companies are both significant on a level less than 1% p<. 0001), while the variation between countries only is significant on a 10.9% level (p=. 1090)

This indicates that there is significant variation that remains unexplained and encourages further exploration. By decomposing the variance estimates, it is found that a large part of ROA variation occurs

between companies nested within countries (60.57%), while variation within companies account for 29.97% of total variation. The remaining portion of total variance, 9.46%, occurs at the third level, between countries.

4.2.4.1 Determining The Models

To determine which theoretically relevant variables that belong in the empirical model, each variable is regressed individually on ROA.

The deviance statistic, simply -2LL of the unconditional model minus -2LL of the alternative model, is applied to calculate the difference between the models. The change in degrees of freedom equals 1 in each regression as each variable is tested individually.

Interpreting the results of table 4.8, it is evident that the modeling of ROA will be constructed in the following way:

Level-1: Time and Palepu index

Level-2: Network size, Time in role, Time on board, Time in company, Quoted boards, Qualifications, Employees, Firm age, Board size, Independent NED on board and Enterprise value

Level-3: Country index

The variables Independent NED on board and Board size, even though not significantly improving the model, will be included in the analysis as they are of particular interest in the analysis.

Results Of Simple Regressions On ROA				
Variable	-2LL	Δ -2LL	Δ D.f.	X^2-significance
Unconditional Model	22 625.6	-	-	-
Time	22 535.3	90.3	1	<. 0001
Network size	22 494.8	130.8	1	<. 0001
Time in role	22 266.3	359.3	1	<. 0001
Time on board	22 268.9	356.3	1	<. 0001
Time in company	22 269.7	355.9	1	<. 0001
Quoted boards	22 269. 8	355.8	1	<. 0001
Qualifications	22 268.1	357.5	1	<. 0001
Board size	22 625.6	-	1	-
Independent NED On board	22 623.8	1.8	1	0.1797
Employees	20 311	2314.6	1	<. 0001
Firm age	22 383.1	242.5	1	<. 0001
HHI	22 625.6	-	1	-
Palepu index	19 980.5	2645.1	1	<. 0001
Enterprise value	22 509.9	115.7	1	<. 0001
Country index	22 198.2	427.4	1	<. 0001

Table 4.8: *Results of simple regressions on ROA*

4.2.4.2 Level-1 Model

Level 1-model ROA				
Fixed effect		Coefficient	SE	t-value
ROA, (γ_{000})		1.7570	0.1861	9.44
Time, (γ_{100})		-0.05011	0.004047	-12.38
Palepu index		-0.01809	0.1456	-0.12
Random effect	Variance component	SE	Z-value	Pr>Z
Within-banks variation over time (e_{ijk})	0.5042	0.007566	66.64	<. 0001
Variation across banks within countries (r_{0jk})	0.5890	0.09404	6.26	<. 0001
Variation across countries (u_{00k})	0.3097	0.1521	2.04	0.0209
Model fit statistics				
Δ -2LL	2797.1			
Explained variance of level-1	15.01%			

Table 4.9: *Resultd of ROA Level-1 Model*

From the results shown in table 4.9, one can see that the level-1 model is an improvement to the unconditional model. The -2LL has decreased with 2797.1, which is significant on level of < .0001.

The level-1 model of ROA is comprised by two variables. First, the intercept indicates the average ROA when Time equals zero. Further, the Time variable is significantly negative (p<. 0001), suggesting that a one unit increase in Time is associated with a decrease of -0.05011 in ROA. The measure of the Palepu index is non-significant and not different from zero.

The variance estimates indicate that there still is significant unexplained variation within companies (p<. 0001), between companies (p<. 0001) and between countries (p=0.02099). The within-companies variance has decreased from 0.5937 to 0.5042, meaning that the level-1 variables account for 15.01% of the ROA variation within companies.

4.2.4.3 Level-2 Model

Level 2-model ROA				
Fixed effect		Coefficient	SE	t-value
ROA (γ_{000})		2.1047	0.2383	8.83
Time (γ_{100})		-0.07365	0.004477	-16.45
Palepu index		-0.09862	0.1563	-0.63
Network size		-0.00925	0.01316	-0.70
Time in role		-0.00399	0.002825	-1.41
Time on board		0.000487	0.002690	0.18
Time in company		0.000182	0.001610	0.11
Number of quoted boards		0.001127	0.003559	0.32
Number of qualifications		0.01212	0.007612	1.59
Independent NED		0.2738	0.1046	2.62
Board size		-0.01182	0.004119	-2.87
Employees		-5.02E-6	2.068E-6	-2.43
Firm age		-0.00130	0.001174	-1.11
Enterprise value		1.924E-6	0	Infty
Random effect	Variance component	SE	Z-value	Pr>Z
Within-banks variation over time (e_{ijk})	0.4963	0.007549	65.74	<. 0001
Variation across banks within countries (r_{0jk})	0.6553	0.1061	6.18	<. 0001
Variation across countries (u_{00k})	0.3702	0.1815	2.04	0.0207
Model fit statistics				
Δ -2LL	644.2			

Table 4.10: *Results of ROA Level-2 Model*

Table 4.10 reports the result of the ROA level-2 model. It shows that the -2LL has decreased with 644.2 from the level-1 model, which is significant on a level less than 1%. This suggests that the level-2 model is a significant improvement to that of level 1.

Time is still a significant negative influence on ROA (p<. 0001), while the Palepu index (p=0.5289) is not significantly different from zero. The level-2 variables Network size (p=0.4821), Time in role (p=0.1575), Time on board (p=0.8564), Time in company (p=0.9102), Number of quoted boards (p=0.7514), Qualifications (p=0.1114) and Firm age (p=0.2676) are not statistically significant on a 5%-level. Number of employees and Enterprise value are statistically significant on a 1%-level. These estimates, however, are close to zero, suggesting that they do not explain much of the variation in the dependent variable. Board size is shown to have a significant (p<. 000) negative effect on ROA, while the estimates of Independent NED (p=0.0088) suggests a positive relationship wih ROA.

The random effect output shows there still is significant variation unexplained within companies (p=<. 000), between companies (p<. 000) and between countries (p=0.0207).

A VIF-test was used on the level-2 model and found no evidence of multicollinearity among the independent variables. The output is therefore left for the references, see appendix C.

4.2.4.4 Level-3 Model

The level-3 results, proves a significant improvement to the level-2 model, reducing -2LL by 263.3 (p<. 000).

The level-3 variable Country index is shown to have a significant (p<. 0001) positive impact on ROA

The random effect output shows that there still is significant unexplained variation within companies over time (p <. 000), between companies nested within countries (p <. 000) and between countries (p=0.0316)

To account for the possibility that the impact of Network size may vary among countries moderated by country quality, a random interaction effect between Network size and Country index was added to the model. The results, as reported in the random effect output, showed a significant negative effect, suggesting that the impact of network size on ROA varies among countries moderated by the country quality.

As was the case of level-2, the VIF-test found no evidence of multicollinearity among the independent variables at level-3. See appendix C for the output.

Level 3-model ROA				
Fixed effect		Coefficient	SE	t-value
ROA (γ_{000})		1.6109	0.2542	6.34
Time (γ_{100})		-0.01989	0.005623	-3.54
Palepu index		-0.09413	0.1553	-0.61
Network size		-0.01084	0.01298	-0.84
Time in role		-0.00253	0.002788	-0.91
Time on board		0.000045	0.002653	0.02
Time in company		0.000254	0.001588	0.16
Number of quoted boards		0.001429	0.003510	0.41
Number of qualifications		0.01146	0.007509	1.53
Independent NED		0.1690	0.1035	1.63
Board size		-0.00809	0.004073	-1.99
Employees		-3.98E-6	2.064E-6	-1.93
Firm age		-0.00127	0.001163	-1.09
Enterprise value		1.587E-6	0	Infty
Country index		0.05466	0.003527	15.50
Network size*Country index		-0.00539	0.002286	-2.36
Random effect	Variance component	SE	Z-value	Pr>Z
Within-banks variation over time (e_{ijk})	0.4828	0.007343	65.74	<. 0001
Variation across banks within countries (r_{0jk})	0.6349	0.1025	6.19	<. 0001
Variation across countries (u_{00k})	0.5217	0.2261	2.31	0.0105
Slope Network size	0.000332	0.001161	0.29	0.3873
Model fit statistics				
Δ -2LL	263.3			

Table 4.11: *Results of ROA Level-3 Model*

5. Discussion

This part will discuss the findings from the previous section. The discussion will be based on the hypotheses that were derived in the theoretical section.

5.1 Hypothesis 1

Agency theory, e.g. Jensen (1993), argues that a larger board will be less efficient in monitoring management and therefore as the size of the board increases, it will affect company performance negatively.

This study finds that board size is a significant predictor of Tobin´s Q ($p < .0001$). The effect, however, is positive, meaning that an increase in board size positively affects Tobin´s Q. The results thus suggest that we reject the hypothesis that board size has a negative impact on company performance.

As a predictor of ROA, board size also proves significant ($p=0.0472$). This effect, however, is negative and we fail to reject the hypothesis that board size has a negative effect on company performance.

The results of the study prove contradictory. ROA, which is a measure of actual company performance, shows results in line of the predictions of Agency theory. Quite interestingly, Tobin´s Q, which takes into account the market value of a company, proves a positive effect. This suggests that a larger board negatively affects actual company performance, but for some reason a larger board has a positive signaling effect in terms of market valuation.

The negative trend of the time-period analyzed may provide some answers to the contradictory results. Even though board size has a negative impact on actual company performance, the market might look favorably at a company with a larger board. This is in accordance with Resource dependence theory. As external uncertainties increase, a company will benefit from attaching themselves with directors that have knowledge and experience relevant to the uncertainties the companies are facing. The results suggest that a larger board might be associated with these characteristics, which might aid to reduce the potential losses in times of distress event though we find no evidence of a connection to actual company performance.

5.2 Hypothesis 2

According to Social network theories, the directors' connections to the external environment are expected to have a positive impact on company performance. This study finds no significant relationship between network size and Tobin´s Q (p=0.1089) or between network size and ROA (p=0.4036). The results imply that we reject the hypothesis that network size has a positive effect on company performance.

In light of the results and without completely dismissing the importance of linkages to the external environment, one might argue that what matters is the quality and relevance of the linkages. In other words, it will not improve company performance having directors on board who have a large network size if these linkages provide no resources for the company. A large network size itself may not have an effect on company performance if the resources provided are not relevant for the company in question.

It might also be the case that the importance of network size will vary by some external factors such as country, time or uncertainty.

5.3 Hypothesis 3

Resource dependence theory suggests that independent outside directors bring with them crucial experience and knowledge about the external environment. A higher proportion of independent directors on board should therefore be associated with a higher company performance.

The results suggest that opposite to what was expected, a higher proportion of independent outside directors has a significant (p=0.0002) negative effect on Tobin´s Q. The effect on ROA, however, was not found significant on a 5%-level (p=0.1026).

We fail to reject that the effect of Independent NED on ROA is zero, however, this is not the case for Tobin´s Q. To be able to give an explanation for this result, we again need to think about the trend of the analyzed time-period. Inside directors are often former CEO´s or other individuals with firm-specific knowledge and operational experience. Thus, inside directors provide a valuable resource for management in company´s daily operations. The results suggest that the market values these qualities more than those associated with independent directors in times of uncertainty, even though the we find no actual impact on company performance.

5.4 Hypothesis 4

Institutional theory predicts that the impact of network size on company performance will vary between countries. Specifically, the governance quality of the nation-state negatively moderates the impact of network size on company performance.

Based on the results, we find that the slope of network size significantly varies across countries (p=0.0136). However, even if the network size varies across countries, we find no significant relationship between the interaction term and Tobin´s Q. Therefore, we fail to reject that the relationship is equal to zero and we reject the hypothesis of country quality as a moderator of network size on Tobin´s Q (p=0.1629).

For ROA, we find that the slope of network size does not vary across countries (p=0.3873). The interaction effect however is found significantly negative (p=0.0183). We therefore reject the hypothesis that the relationship is equal to zero and fail to reject the hypothesis that country quality negatively moderates the effect of network size on ROA.

The results indicate that regardless of country governance quality, network size has no impact on Tobin´s Q. Thus, the financial markets recognize no added benefits from a large network size. This coincides with the results in regard to hypothesis 2, and the argument that a large network size itself has no value if the connections are not relevant to the external uncertainties facing the company. The fact that we find country quality to negatively moderate the impact of network size on ROA, however, suggests that even if the market fails to recognize it, network size has an impact on actual company performance in countries of poor governance quality.

Countries of poor institutional quality, where network size has the most impact on company performance, are more likely to lack efficiency in capital markets. Network size is not a readily observable characteristic and is therefore more likely to be overlooked. This could be part of the explanation why network size is insignificant on Tobin´s Q, even when moderated by country quality.

6. Conclusion And Suggestions For Future Research

This thesis investigates whether directors´ network size has an impact on bank performance. Through a thorough review of relevant theories, four hypotheses are derived. As the data gathered for the analysis is found to be nested on three different levels, the hypotheses are tested through Hierarchical Linear Modeling. The advantage of this approach is that it allows us to measure the variation at each level of the analysis.

The results of the Hierarchical Linear Modeling suggest that directors´ network size has no significant effect on neither return on assets nor Tobin´s Q. However, a relationship is found when introducing the moderating effect country quality. These results suggest that for Return on assets, directors´ network size is negatively moderated by country quality. This means that:

Directors´ network size is more important for bank performance in countries of low governance quality

In addition to the main findings, this thesis provides information on board size and outside independent directors. The effect of board size on bank performance was expected to be negative, e.g. a smaller board is associated with higher performance. The results, as expected, suggest that board size negatively affect actual company performance (ROA). However, a positive effect is found in the modeling with Tobin´s Q as the dependent variable. This suggests that there are some differences in the way the market values the size of the board and actual performance. This paper argues that this is, in part, due to the time-period analyzed and the negative outlooks for the European banking industry. Even though a larger board has a negative impact on the performance, the market puts a certain value to a larger board in the sense that it provides the company with vital resources.

A higher proportion of independent outside directors on a board was hypothesized to have a positive impact on bank performance. The results suggest that the proportion of outside independent directors has no significant effect on actual company performance (ROA). Moreover, contrary to the expectations the results suggest that the proportion of outside independent directors has a negative impact on Tobin´s Q. This thesis argues that the time-period analyzed again is vital in understanding the results. Even though the proportion of outside independent directors has no effect on actual company performance the market sees a value in having a larger amount of inside dependent directors. These directors are likely to possess great knowledge about the company and within-company experience that may prove vital in times of distress.

Research on Corporate governance has historically focused mainly on Agency theory. This thesis highlights the role of the board of directors as vital in providing the company with resources to reduce outside uncertainties. Future research should continue to recognize the importance of director-specific characteristics and their impact on the boards´ ability to both monitor and provide resources. An interesting continuation to the findings of this thesis would be to increase the time-period to include the more positive results and outlooks of the 1990. Equally interesting would be to expand the analysis to include the U.S. and United Kingdom.

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8. Appendices

Appendix A

SAS Output

Tobin`s Q Level-1

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008506	0.005024	1.69	0.0452
UN(1,1)	ISIN(CountryID)	0.02573	0.003821	6.73	<.0001
Residual		0.004995	0.000070	70.87	<.0001

Fit Statistics

-2 Log Likelihood	-24301.5
AIC (smaller is better)	-24291.5
AICC (smaller is better)	-24291.5
BIC (smaller is better)	-24285.8

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	17205.84	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4780	0.02586	22	18.48	<.0001
TIME	-0.00847	0.000384	1E4	-22.06	<.0001

Tobin`s Q Level-2

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.009259	0.005207	1.78	0.0377
UN(1,1)	ISIN(CountryID)	0.02666	0.003933	6.78	<.0001
Residual		0.004484	0.000064	70.13	<.0001

Fit Statistics

-2 Log Likelihood	-24844.6
AIC (smaller is better)	-24818.6
AICC (smaller is better)	-24818.5
BIC (smaller is better)	-24803.8

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	17642.78	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4455	0.02790	22	15.97	<.0001
TIME	-0.01222	0.000391	9923	-31.25	<.0001
ln_network_size	0.001943	0.001099	9923	1.77	0.0770
Time_in_Role	-0.00021	0.000252	9923	-0.82	0.4141
Time_in_Company	-0.00002	0.000143	9923	-0.14	0.8901
Time_on_Board	-0.00005	0.000241	9923	-0.23	0.8201
Number_Quoted_boards	0.000063	0.000314	9923	0.20	0.8420
Board_size	0.001629	0.000353	9923	4.61	<.0001
Fraction_of_NED	-0.02987	0.009458	9923	-3.16	0.0016
Enterprise_Value	2.785E-7	0	9923	Infty	<.0001

Tobin`s Q Level-3

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.009674	0.005209	1.86	0.0316
UN(1,1)	ISIN(CountryID)	0.02609	0.003834	6.80	<.0001
Residual		0.004402	0.000063	70.13	<.0001

Fit Statistics

-2 Log Likelihood	-25028.8
AIC (smaller is better)	-25000.8
AICC (smaller is better)	-25000.8
BIC (smaller is better)	-24984.9

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	17801.98	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4082	0.02825	22	14.45	<.0001
TIME	-0.00795	0.000498	9922	-15.95	<.0001
ln_network_size	0.001745	0.001089	9922	1.60	0.1089
Time_in_Role	-0.00010	0.000250	9922	-0.41	0.6790
Time_in_Company	-0.00001	0.000142	9922	-0.09	0.9243
Time_on_Board	-0.00008	0.000239	9922	-0.35	0.7231
Number_Quoted_boards	0.000089	0.000311	9922	0.29	0.7741
Board_size	0.001784	0.000350	9922	5.10	<.0001
Fraction_of_NED	-0.03522	0.009380	9922	-3.76	0.0002
Enterprise_Value	2.511E-7	0	9922	Infty	<.0001
Country_index	0.004487	0.000329	9922	13.64	<.0001

Tobin`s Q Interaction-Model

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
Intercept	CountryID	0.009690	0.005213	1.86	0.0315
Mean_ln_network	CountryID	0.000083	0.000038	2.21	0.0136
UN(1,1)	ISIN(CountryID)	0.02602	0.003825	6.80	<.0001
Residual		0.004376	0.000062	70.05	<.0001

Fit Statistics

-2 Log Likelihood	-25054.3
AIC (smaller is better)	-25022.3
AICC (smaller is better)	-25022.3
BIC (smaller is better)	-25004.1

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4083	0.03005	22	13.58	<.0001
TIME	-0.00799	0.000498	9921	-16.05	<.0001
ln_network_size	0.001725	0.002382	9921	0.72	0.4690
Time_in_Role	-0.00006	0.000250	9921	-0.22	0.8254
Time_in_Company	1.661E-6	0.000142	9921	0.01	0.9907
Time_on_Board	-0.00010	0.000239	9921	-0.41	0.6802
Number_Quoted_boards	0.000194	0.000322	9921	0.60	0.5464
Board_size	0.001840	0.000350	9921	5.26	<.0001
Fraction_of_NED	-0.03657	0.009366	9921	-3.90	<.0001
Enterprise_Value	2.485E-7	0	9921	Infty	<.0001
Country_index	0.004441	0.000328	9921	13.52	<.0001
Mean_coun*Mean_ln_ne	0.000338	0.000242	9921	1.40	0.1629

ROA Level-1

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.3097	0.1521	2.04	0.0209
UN(1,1)	ISIN(CountryID)	0.5890	0.09404	6.26	<.0001
Residual		0.5042	0.007566	66.64	<.0001

Fit Statistics

-2 Log Likelihood	19828.5
AIC (smaller is better)	19840.5
AICC (smaller is better)	19840.5
BIC (smaller is better)	19846.7

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	6576.46	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.7570	0.1861	20	9.44	<.0001
TIME	-0.05011	0.004047	8961	-12.38	<.0001
Palepu_index	-0.01809	0.1456	8961	-0.12	0.9011

ROA Level-2

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.3702	0.1815	2.04	0.0207
UN(1,1)	ISIN(CountryID)	0.6553	0.1061	6.18	<.0001
Residual		0.4963	0.007549	65.74	<.0001

Fit Statistics

-2 Log Likelihood	19184.3
AIC (smaller is better)	19218.3
AICC (smaller is better)	19218.4
BIC (smaller is better)	19236.1

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	5947.58	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	2.1047	0.2383	20	8.83	<.0001
TIME	-0.07365	0.004477	8712	-16.45	<.0001
Palepu_index	-0.09862	0.1563	8712	-0.63	0.5281
ln_network_size	-0.00925	0.01316	8712	-0.70	0.4821
Time_in_Role	-0.00399	0.002825	8712	-1.41	0.1575
Time_on_Board	0.000487	0.002690	8712	0.18	0.8564
Time_in_Company	0.000182	0.001610	8712	0.11	0.9102
Number_Quoted_boards	0.001127	0.003559	8712	0.32	0.7514
Qualifications	0.01212	0.007612	8712	1.59	0.1114
Fraction_of_NED	0.2738	0.1046	8712	2.62	0.0088
Board_size	-0.01182	0.004119	8712	-2.87	0.0041
Employees	-5.02E-6	2.068E-6	8712	-2.43	0.0153
Firm_age	-0.00130	0.001174	8712	-1.11	0.2676
Enterprise_Value	1.924E-6	0	8712	Infty	<.0001

ROA Level-3

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.5217	0.2261	2.31	0.0105
UN(1,1)	ISIN(CountryID)	0.6349	0.1025	6.19	<.0001
Residual		0.4828	0.007343	65.74	<.0001

Fit Statistics

-2 Log Likelihood	18948.0
AIC (smaller is better)	18984.0
AICC (smaller is better)	18984.1
BIC (smaller is better)	19002.8

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	6153.21	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6109	0.2542	20	6.34	<.0001
TIME	-0.01989	0.005623	8711	-3.54	0.0004
Palepu_index	-0.09413	0.1553	8711	-0.61	0.5444
ln_network_size	-0.01084	0.01298	8711	-0.84	0.4036
Time_in_Role	-0.00253	0.002788	8711	-0.91	0.3636
Time_on_Board	0.000045	0.002653	8711	0.02	0.9865
Time_in_Company	0.000254	0.001588	8711	0.16	0.8729
Number_Quoted_boards	0.001429	0.003510	8711	0.41	0.6839
Qualifications	0.01146	0.007509	8711	1.53	0.1268
Fraction_of_NED	0.1690	0.1035	8711	1.63	0.1026
Board_size	-0.00809	0.004073	8711	-1.99	0.0472
Employees	-3.98E-6	2.064E-6	8711	-1.93	0.0536
Firm_age	-0.00127	0.001163	8711	-1.09	0.2749
Enterprise_Value	1.587E-6	0	8711	Infty	<.0001
Country_index	0.05466	0.003527	8711	15.50	<.0001

ROA Interaction-Model

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
Intercept	CountryID	0.5393	0.2328	2.32	0.0103
Mean_ln_network	CountryID	0.000332	0.001161	0.29	0.3873
UN(1,1)	ISIN(CountryID)	0.6490	0.1046	6.21	<.0001
Residual		0.4824	0.007356	65.58	<.0001

Fit Statistics

-2 Log Likelihood	18946.8
AIC (smaller is better)	18984.8
AICC (smaller is better)	18984.9
BIC (smaller is better)	19004.6

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.5036	0.2524	20	5.96	<.0001
TIME	-0.01902	0.005605	8711	-3.39	0.0007
Palepu_index	-0.09935	0.1570	8711	-0.63	0.5268
ln_network_size	-0.01209	0.01399	8711	-0.86	0.3876
Time_on_Board	0.000104	0.002654	8711	0.04	0.9688
Time_in_Role	-0.00230	0.002789	8711	-0.83	0.4092
Time_in_Company	0.000312	0.001588	8711	0.20	0.8440
Number_Quoted_boards	0.001761	0.003542	8711	0.50	0.6192
Qualifications	0.01205	0.007520	8711	1.60	0.1091
Fraction_of_NED	0.1592	0.1036	8711	1.54	0.1243
Employees	-4.3E-6	2.081E-6	8711	-2.07	0.0389
Firm_age	-0.00131	0.001176	8711	-1.11	0.2659
Enterprise_Value	1.567E-6	0	8711	Infty	<.0001
Country_index	0.05526	0.003521	8711	15.69	<.0001
Mean_coun*Mean_ln_ne	-0.00539	0.002286	8711	-2.36	0.0183

Appendix B

Simple Regressions

Tobin`s Q

Unconditional model

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008843	0.005131	1.72	0.0424
UN(1,1)	ISIN(CountryID)	0.02559	0.003801	6.73	<.0001
Residual		0.005237	0.000074	70.87	<.0001

Fit Statistics

-2 Log Likelihood	-23826.2
AIC (smaller is better)	-23818.2
AICC (smaller is better)	-23818.2
BIC (smaller is better)	-23813.7

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16836.17	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4513	0.02611	22	17.28	<.0001

TIME-variable

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008506	0.005024	1.69	0.0452
UN(1,1)	ISIN(CountryID)	0.02573	0.003821	6.73	<.0001
Residual		0.004995	0.000070	70.87	<.0001

Fit Statistics

-2 Log Likelihood	-24301.5
AIC (smaller is better)	-24291.5
AICC (smaller is better)	-24291.5

BIC (smaller is better)	-24285.8

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	17205.84	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4780	0.02586	22	18.48	<.0001
TIME	-0.00847	0.000384	1E4	-22.06	<.0001

Network size

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008893	0.005142	1.73	0.0419
UN(1,1)	ISIN(CountryID)	0.02556	0.003796	6.73	<.0001
Residual		0.005238	0.000074	70.62	<.0001

Fit Statistics

-2 Log Likelihood	-23647.2
AIC (smaller is better)	-23637.2
AICC (smaller is better)	-23637.2
BIC (smaller is better)	-23631.5

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16713.15	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4392	0.02658	22	16.52	<.0001
ln_network_size	0.002546	0.001005	1E4	2.53	0.0113

Time in role

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008935	0.005131	1.74	0.0408
UN(1,1)	ISIN(CountryID)	0.02530	0.003756	6.74	<.0001
Residual		0.005062	0.000072	70.39	<.0001

Fit Statistics

-2 Log Likelihood	-23836.1
AIC (smaller is better)	-23826.1
AICC (smaller is better)	-23826.1
BIC (smaller is better)	-23820.4

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16768.81	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4533	0.02615	22	17.33	<.0001
Time_in_Role	-0.00051	0.000192	1E4	-2.66	0.0078

Time on board

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008914	0.005126	1.74	0.0410
UN(1,1)	ISIN(CountryID)	0.02533	0.003760	6.73	<.0001
Residual		0.005063	0.000072	70.39	<.0001

Fit Statistics

-2 Log Likelihood	-23833.7
AIC (smaller is better)	-23823.7
AICC (smaller is better)	-23823.7
BIC (smaller is better)	-23818.0

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16761.81	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4528	0.02614	22	17.32	<.0001
Time_on_Board	-0.00031	0.000144	1E4	-2.16	0.0308

Time in company

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008909	0.005129	1.74	0.0412
UN(1,1)	ISIN(CountryID)	0.02533	0.003762	6.73	<.0001
Residual		0.005064	0.000072	70.39	<.0001

Fit Statistics

-2 Log Likelihood	-23831.2
AIC (smaller is better)	-23821.2
AICC (smaller is better)	-23821.2
BIC (smaller is better)	-23815.6

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16763.62	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4522	0.02613	22	17.30	<.0001
Time_in_Company	-0.00016	0.000104	1E4	-1.48	0.1376

Number of quoted boards

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008893	0.005122	1.74	0.0413
UN(1,1)	ISIN(CountryID)	0.02534	0.003763	6.73	<.0001
Residual		0.005064	0.000072	70.39	<.0001

Fit Statistics

-2 Log Likelihood	-23830.9
AIC (smaller is better)	-23820.9
AICC (smaller is better)	-23820.8
BIC (smaller is better)	-23815.2

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16715.23	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4502	0.02612	22	17.24	<.0001
Number_Quoted_boards	0.000379	0.000281	1E4	1.35	0.1782

Qualifications

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008892	0.005127	1.73	0.0414
UN(1,1)	ISIN(CountryID)	0.02535	0.003765	6.73	<.0001
Residual		0.005065	0.000072	70.39	<.0001

Fit Statistics

-2 Log Likelihood	-23830.0
AIC (smaller is better)	-23820.0
AICC (smaller is better)	-23820.0
BIC (smaller is better)	-23814.3

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16747.96	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4501	0.02613	22	17.22	<.0001
Qualifications	0.000647	0.000666	1E4	0.97	0.3316

Board size

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.009167	0.005229	1.75	0.0398
UN(1,1)	ISIN(CountryID)	0.02557	0.003797	6.74	<.0001
Residual		0.005218	0.000074	70.87	<.0001

Fit Statistics

-2 Log Likelihood	-23861.5
AIC (smaller is better)	-23851.5
AICC (smaller is better)	-23851.5
BIC (smaller is better)	-23845.8

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16854.19	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4178	0.02699	22	15.48	<.0001
Board_size	0.002213	0.000372	1E4	5.95	<.0001

Fraction of NED

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008854	0.005136	1.72	0.0424
UN(1,1)	ISIN(CountryID)	0.02558	0.003801	6.73	<.0001
Residual		0.005237	0.000074	70.87	<.0001

Fit Statistics

-2 Log Likelihood	-23826.2
AIC (smaller is better)	-23816.2
AICC (smaller is better)	-23816.2
BIC (smaller is better)	-23810.5

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16829.60	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4516	0.02633	22	17.15	<.0001
Fraction_of_NED	-0.00082	0.009829	1E4	-0.08	0.9339

Employees

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008712	0.005177	1.68	0.0462
UN(1,1)	ISIN(CountryID)	0.02378	0.003743	6.35	<.0001
Residual		0.005145	0.000074	69.49	<.0001

Fit Statistics

-2 Log Likelihood	-23094.8
AIC (smaller is better)	-23084.8
AICC (smaller is better)	-23084.8
BIC (smaller is better)	-23079.1

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	15584.73	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4602	0.02748	22	16.75	<.0001
Employees	-4.72E-7	0	9744	-Infty	<.0001

Firm age

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008214	0.01060	0.77	0.2192
UN(1,1)	ISIN(CountryID)	0.1917	0.03762	5.09	<.0001
Residual		0.005075	0.000073	69.90	<.0001

Fit Statistics

-2 Log Likelihood	-23567.3
AIC (smaller is better)	-23557.3
AICC (smaller is better)	-23557.3
BIC (smaller is better)	-23551.7

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16663.26	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.9678	0.05408	22	17.90	<.0001
Firm_age	-0.00602	0.000324	9996	-18.59	<.0001

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Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.008753	0.005053	1.73	0.0416
UN(1,1)	ISIN(CountryID)	0.02527	0.003750	6.74	<.0001
Residual		0.005237	0.000074	70.87	<.0001

Fit Statistics

-2 Log Likelihood	-23827.6
AIC (smaller is better)	-23817.6
AICC (smaller is better)	-23817.6
BIC (smaller is better)	-23812.0

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	16757.54	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4615	0.02731	22	16.90	<.0001
HHI_index	-0.02362	0.01969	1E4	-1.20	0.2304

Palepu index

The Mixed Procedure

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.001981	0.001943	1.02	0.1541
UN(1,1)	ISIN(CountryID)	0.01924	0.002970	6.48	<.0001
Residual		0.005211	0.000076	68.44	<.0001

Fit Statistics

-2 Log Likelihood	-22317.1
AIC (smaller is better)	-22307.1
AICC (smaller is better)	-22307.1
BIC (smaller is better)	-22301.9

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	14778.28	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4211	0.02578	20	16.33	<.0001
Palepu_index	0.02382	0.02519	9447	0.95	0.3443

Enterprise value

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.009098	0.005165	1.76	0.0391
UN(1,1)	ISIN(CountryID)	0.02587	0.003830	6.75	<.0001
Residual		0.005118	0.000072	70.87	<.0001

Fit Statistics

-2 Log Likelihood	-24055.4
AIC (smaller is better)	-24045.4
AICC (smaller is better)	-24045.4
BIC (smaller is better)	-24039.7

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	17065.20	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4386	0.02641	22	16.61	<.0001
Enterprise_Value	1.654E-7	0	1E4	Infty	<.0001

Country index

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.009306	0.005095	1.83	0.0339
UN(1,1)	ISIN(CountryID)	0.02527	0.003726	6.78	<.0001
Residual		0.004865	0.000069	70.87	<.0001

Fit Statistics

-2 Log Likelihood	-24566.9
AIC (smaller is better)	-24556.9
AICC (smaller is better)	-24556.9
BIC (smaller is better)	-24551.3

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	17508.89	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	0.4083	0.02651	22	15.40	<.0001
Country_index	0.007404	0.000267	1E4	27.73	<.0001

ROA

Unconditional model

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.1874	0.1522	1.23	0.1090
UN(1,1)	ISIN(CountryID)	1.1998	0.1806	6.64	<.0001
Residual		0.5937	0.008659	68.56	<.0001

Fit Statistics

-2 Log Likelihood	22625.6
AIC (smaller is better)	22633.6
AICC (smaller is better)	22633.6
BIC (smaller is better)	22638.2

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	7217.51	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6644	0.1477	21	11.27	<.0001

Time-variable

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.1921	0.1537	1.25	0.1057
UN(1,1)	ISIN(CountryID)	1.2061	0.1814	6.65	<.0001
Residual		0.5879	0.008576	68.56	<.0001

Fit Statistics

-2 Log Likelihood	22535.3
AIC (smaller is better)	22545.3
AICC (smaller is better)	22545.3
BIC (smaller is better)	22551.0

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	7282.92	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.7971	0.1494	21	12.03	<.0001
TIME	-0.04116	0.004320	9494	-9.53	<.0001

Network size

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.1868	0.1524	1.23	0.1101
UN(1,1)	ISIN(CountryID)	1.2061	0.1816	6.64	<.0001
Residual		0.5954	0.008716	68.31	<.0001

Fit Statistics

-2 Log Likelihood	22494.8
AIC (smaller is better)	22504.8
AICC (smaller is better)	22504.8
BIC (smaller is better)	22510.5

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	7148.49	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6293	0.1569	21	10.39	<.0001
ln_network_size	0.007212	0.01103	9426	0.65	0.5133

Time in role

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.1996	0.1526	1.31	0.0954
UN(1,1)	ISIN(CountryID)	1.1580	0.1744	6.64	<.0001
Residual		0.5894	0.008655	68.10	<.0001

Fit Statistics

-2 Log Likelihood	22266.3
AIC (smaller is better)	22276.3
AICC (smaller is better)	22276.3
BIC (smaller is better)	22281.9

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	6955.72	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6873	0.1488	21	11.34	<.0001
Time_in_Role	-0.00413	0.002142	9370	-1.93	0.0539

Time on board

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.2002	0.1528	1.31	0.0950
UN(1,1)	ISIN(CountryID)	1.1581	0.1744	6.64	<.0001
Residual		0.5896	0.008657	68.10	<.0001

Fit Statistics

-2 Log Likelihood	22268.9
AIC (smaller is better)	22278.9
AICC (smaller is better)	22278.9
BIC (smaller is better)	22284.6

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	6937.48	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6786	0.1489	21	11.27	<.0001
Time_on_Board	-0.00167	0.001617	9370	-1.03	0.3010

Time in company

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.2007	0.1529	1.31	0.0946
UN(1,1)	ISIN(CountryID)	1.1571	0.1743	6.64	<.0001
Residual		0.5896	0.008658	68.10	<.0001

Fit Statistics

-2 Log Likelihood	22269.7
AIC (smaller is better)	22279.7
AICC (smaller is better)	22279.7
BIC (smaller is better)	22285.3

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	6955.54	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6742	0.1489	21	11.24	<.0001
Time_in_Company	-0.00068	0.001181	9370	-0.58	0.5649

Number of quoted boards

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.2010	0.1531	1.31	0.0945
UN(1,1)	ISIN(CountryID)	1.1572	0.1743	6.64	<.0001
Residual		0.5896	0.008658	68.10	<.0001

Fit Statistics

-2 Log Likelihood	22269.8
AIC (smaller is better)	22279.8
AICC (smaller is better)	22279.8
BIC (smaller is better)	22285.4

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	6955.84	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6658	0.1489	21	11.19	<.0001
Number_Quoted_boards	0.001460	0.003129	9370	0.47	0.6408

Qualifications

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.1968	0.1517	1.30	0.0973
UN(1,1)	ISIN(CountryID)	1.1579	0.1744	6.64	<.0001
Residual		0.5895	0.008657	68.10	<.0001

Fit Statistics

-2 Log Likelihood	22268.1
AIC (smaller is better)	22278.1
AICC (smaller is better)	22278.1
BIC (smaller is better)	22283.8

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	6925.30	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6531	0.1484	21	11.14	<.0001
Qualifications	0.01020	0.007391	9370	1.38	0.1678

Board size

The Mixed Procedure

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.1855	0.1515	1.22	0.1104
UN(1,1)	ISIN(CountryID)	1.1965	0.1806	6.62	<.0001
Residual		0.5937	0.008660	68.55	<.0001

Fit Statistics

-2 Log Likelihood	22625.6
AIC (smaller is better)	22635.6
AICC (smaller is better)	22635.6
BIC (smaller is better)	22641.2

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	6729.18	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6792	0.1599	21	10.50	<.0001
Board_size	-0.00099	0.004056	9494	-0.24	0.8081

Fraction of NED

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.1902	0.1543	1.23	0.1088
UN(1,1)	ISIN(CountryID)	1.2028	0.1813	6.63	<.0001
Residual		0.5935	0.008657	68.56	<.0001

Fit Statistics

-2 Log Likelihood	22623.8
AIC (smaller is better)	22633.8
AICC (smaller is better)	22633.8
BIC (smaller is better)	22639.4

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	7218.46	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6170	0.1524	21	10.61	<.0001
Fraction_of_NED	0.1424	0.1044	9494	1.36	0.1727

Employees

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.2109	0.1502	1.40	0.0800
UN(1,1)	ISIN(CountryID)	1.0669	0.1679	6.35	<.0001
Residual		0.5114	0.007619	67.13	<.0001

Fit Statistics

-2 Log Likelihood	20311.0
AIC (smaller is better)	20321.0
AICC (smaller is better)	20321.0
BIC (smaller is better)	20326.7

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	7018.40	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6737	0.1625	21	10.30	<.0001
Employees	-9.68E-7	2.441E-6	9097	-0.40	0.6917

Firm age

The Mixed Procedure

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.1077	0.1278	0.84	0.1997
UN(1,1)	ISIN(CountryID)	1.3128	0.2121	6.19	<.0001
Residual		0.5994	0.008819	67.97	<.0001

Fit Statistics

-2 Log Likelihood	22383.1
AIC (smaller is better)	22393.1
AICC (smaller is better)	22393.1
BIC (smaller is better)	22398.7

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	7049.11	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	2.2295	0.1834	21	12.16	<.0001
Firm_age	-0.00698	0.001458	9349	-4.79	<.0001

HHI-index

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.1881	0.1525	1.23	0.1087
UN(1,1)	ISIN(CountryID)	1.1993	0.1806	6.64	<.0001
Residual		0.5937	0.008659	68.56	<.0001

Fit Statistics

-2 Log Likelihood	22625.6
AIC (smaller is better)	22635.6
AICC (smaller is better)	22635.6
BIC (smaller is better)	22641.3

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	7186.70	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.6704	0.1594	21	10.48	<.0001
HHI_index	-0.01308	0.1341	9494	-0.10	0.9223

Palepu index

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.2956	0.1473	2.01	0.0224
UN(1,1)	ISIN(CountryID)	0.5878	0.09386	6.26	<.0001
Residual		0.5130	0.007698	66.64	<.0001

Fit Statistics

-2 Log Likelihood	19980.5
AIC (smaller is better)	19990.5
AICC (smaller is better)	19990.5
BIC (smaller is better)	19995.7

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	6456.95	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.5863	0.1835	20	8.64	<.0001
Palepu_index	-0.01146	0.1453	8962	-0.08	0.9372

Enterprise value

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.2321	0.1722	1.35	0.0889
UN(1,1)	ISIN(CountryID)	1.3023	0.1954	6.66	<.0001
Residual		0.5857	0.008544	68.56	<.0001

Fit Statistics

-2 Log Likelihood	22509.9
AIC (smaller is better)	22519.9
AICC (smaller is better)	22519.9
BIC (smaller is better)	22525.6

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
2	7016.93	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.5656	0.1590	21	9.85	<.0001
Enterprise_Value	1.269E-6	0	9494	Infty	<.0001

Country index

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(1,1)	CountryID	0.3433	0.1943	1.77	0.0386
UN(1,1)	ISIN(CountryID)	1.1767	0.1755	6.70	<.0001
Residual		0.5670	0.008271	68.56	<.0001

Fit Statistics

-2 Log Likelihood	22198.2
AIC (smaller is better)	22208.2
AICC (smaller is better)	22208.2
BIC (smaller is better)	22213.9

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq

2	7613.57		<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	1.3408	0.1729	21	7.76	<.0001
Country_index	0.06149	0.002938	9494	20.93	<.0001

Appendix C

Testing for collinearity

The measures applied are:

VIF= $\frac{1}{1-R_j^2}$

Where R^2 is the coefficient of determination of the model that includes all predictors except the *j*th predictor. A high VIF-value of above 5 or then suggests that multicollinearity is present. The tolerance measure is simply the inverse VIF-value and a low value of below 0.2 or 0.1 is an indication of multicollinearity.

Tobin`s Q Level-1 Collinearity check

Parameter Estimates

Variable	Label	DF	Tolerance	Variance Inflation
Intercept	Intercept	1	.	0
TIME	TIME	1	0.98018	1.02022
ln_network_size	ln_network_size	1	0.56249	1.77780
Time_in_Role	Time_in_Role	1	0.46313	2.15920
Time_in_Company	Time_in_Company	1	0.44787	2.23277
Time_on_Board	Time_on_Board	1	0.28188	3.54758
Number_Quoted_boards	Number_Quoted_boards	1	0.67343	1.48493
Board_size	Board_size	1	0.85531	1.16917
Fraction_of_NED	Fraction_of_NED	1	0.93917	1.06477
Enterprise_Value	Enterprise_Value	1	0.70057	1.42741

Tobin`s Q Level-2 Collinearity check

Parameter Estimates

Variable	Label	DF	Tolerance	Variance Inflation
Intercept	Intercept	1	.	0
TIME	TIME	1	0.76963	1.29933
ln_network_size	ln_network_size	1	0.56208	1.77911
Time_in_Role	Time_in_Role	1	0.46313	2.15920
Time_in_Company	Time_in_Company	1	0.44785	2.23291
Time_on_Board	Time_on_Board	1	0.28188	3.54762
Number_Quoted_boards	Number_Quoted_boards	1	0.67216	1.48775
Board_size	Board_size	1	0.83396	1.19910
Fraction_of_NED	Fraction_of_NED	1	0.93914	1.06480
Enterprise_Value	Enterprise_Value	1	0.66474	1.50435
Country_index	Country_index	1	0.75074	1.33201

ROA Level-2 Collinearity check

Parameter Estimates

Variable	Label	DF	Tolerance	Variance Inflation
Intercept	Intercept	1	.	0
TIME	TIME	1	0.96787	1.03320
Palepu_index	Palepu_index	1	0.86945	1.15016
ln_network_size	ln_network_size	1	0.48100	2.07901
Time_in_Role	Time_in_Role	1	0.46684	2.14204
Time_on_Board	Time_on_Board	1	0.28554	3.50212
Time_in_Company	Time_in_Company	1	0.44926	2.22586
Number_Quoted_boards	Number_Quoted_boards	1	0.66877	1.49529
Qualifications	Qualifications	1	0.76150	1.31320
Fraction_of_NED	Fraction_of_NED	1	0.88503	1.12991
Board_size	Board_size	1	0.73054	1.36886
Employees	Employees	1	0.63101	1.58477
Firm_age	Firm_age	1	0.91504	1.09285
Enterprise_Value	Enterprise_Value	1	0.53991	1.85218

ROA Level-3 collinearity check

Parameter Estimates

Variable	Label	DF	Tolerance	Variance Inflation
Intercept	Intercept	1	.	0
TIME	TIME	1	0.70676	1.41490
Palepu_index	Palepu_index	1	0.87129	1.14772
ln_network_size	ln_network_size	1	0.48324	2.06935
Time_in_Role	Time_in_Role	1	0.46182	2.16533
Time_on_Board	Time_on_Board	1	0.28188	3.54756
Time_in_Company	Time_in_Company	1	0.44286	2.25805
Number_Quoted_boards	Number_Quoted_boards	1	0.66835	1.49622
Qualifications	Qualifications	1	0.75999	1.31581
Fraction_of_NED	Fraction_of_NED	1	0.88140	1.13456
Board_size	Board_size	1	0.71957	1.38972
Employees	Employees	1	0.51678	1.93507
Firm_age	Firm_age	1	0.90472	1.10531
Enterprise_Value	Enterprise_Value	1	0.48247	2.07268
Country_index	Country_index	1	0.62126	1.60964

Appendix D

Calculations

Variance decompositions

Tobin`s Q

Estimates		Percentage
L1	0,005237	13,20 %
L2	0,02559	64,51 %
L3	0,008843	22,29 %
Time	0,004995	4,62 %

ROA

Estimates		Decomposition
L1	0,5937	29,97 %
L2	1,1998	60,57 %
L3	0,1874	9,46 %
Time	0,5879	15,07 %

The level-percentages are calculated as: level-specific variance/Total variance

The calculation of the contribution of the time-variable:

$$(Level1\ variance_{Unc.model} - TIME\ variance_{Level1model})/Level1\ variance_{Unc.model}$$