SUITS AND TIES

A Social Network Analysis of Democratic Companies in Denmark

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Abstract

Which role do democratic businesses play in the future economy. This is a question, which is currently debated by academics and politicians (Beim & Bæksgaard, 2019). This thesis will analyze the social network of democratic organizations in Denmark, in order to investigate how they are integrated within the Danish economic system. Even though democratic companies are currently debated, they have a long history in the Danish economic and political system, as a movement to secure a fair economic model, starting with co-operatives being established in the late 19th century (Grelle, 2012). The approach, I employ in this thesis in order to investigate the democratic companies, is a board interlock analysis, simply the overlap of leaderships in firms. The literature in this area has shown that organizational practices spread through the network of board members, and that growth in revenue has been associated with higher social capital. The definition and theory of social capital in this thesis, comes from Ronald Burt. Burt's theory of social capital uses the terms brokerage and closure to understand social structures. Brokerage in which actors can be bridgers between various groups of organizations. On the other hand, there is closure, in which organizations are embedded within a social group, which contains plenty of redundant ties (Burt, 2000).

Using this theoretical understanding of social capital within corporate boards, I employ a social network analysis on the interlock between Danish companies registered within the CVR-registry, and test if democratic companies have different social capital than non-democratic companies. I show that democratic companies more often occupy brokerage positions. I furthermore show that democratic firms are well integrated within the core of the Danish business community, and that they often overlap with non-democratic companies. There are a few issues relating especially to the statistical analysis and violated assumptions behind the regression. Furthermore, some of the analysis surrounding the types of connections between the companies can be improved and formalized. Even still, this thesis shows that democratic organizations have the same number of connections as comparable non-democratic organizations, but that democratic organization more often use these connections to occupy advantageous brokerage positions within the network of Danish businesses.

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Introduction

The question of who should own the means of production can be traced centuries back, at least to the days of the Diggers, during the English Revolution of 1649 (Gurney, 2012). Throughout history, this central question has sparked conflict, especially in the 19th and 20th century. Francis Fukuyama (1989) has since proclaimed the "End of History" with the final triumph of the liberal capitalist system and with this end an end to the question of the ownership of the means of production. However, since the fall of the Berlin Wall and the transformation of the communist countries, neither the debate about communal ownership, nor its practice has, in fact ended. In fact, in Denmark, a capitalist country, a large share of the economy is communally controlled (Demokratisk Erhverv, 2019). This is for instance the case in democratic companies. These firms operate under the democratic maxim of "one member, one vote".

These democratic firms in Denmark have a long been a part of the Danish business community. Starting with the co-operative movement in the late 19th century, in which farmers created co-operative companies that sold and distributed their products; these companies continue to exist to this day (Grelle, 2012). This democratic tradition, is not only exemplified with co-operatives, but also associations, consumer, and employee democracies.

Today, democratic companies attract public attention with politicians and academics suggesting regulatory reforms of democratic firms, structure, and finance possibility (Beim & Dæksgaard, 2019; Demokratisk Erhverv, 2019). However, the democratic organizations in Denmark are not well understood, as there has not been much research nor attention given to their function. (Demokratisk Erhverv, 2019). One question is how well integrated Danish democratic firms are within the Danish business community, and whether they are a part of the elite among Danish businesses.

Therefore, this thesis will focus on the social capital of democratic organizations in Denmark, and how that social capital is used in acquiring economic capital. The research question being:

How are democratic companies integrated within the social network of leadership interlocks in the Danish business environment?

In answering that question, I will also investigate:

Which connections do democratic firms have to other democratic and non-democratic organizations?

How do democratic organizations compare to non-democratic organizations in terms of social capital and social network position, using brokerage and closure as metrics?

How does a democratic organization's social capital influence their financial performance?

In order to answer these questions I employ Ronald Burt's definition and theory of social capital and his notion on how social capital can benefit companies and influence their behavior (Burt, 2005). The method, I will use to answer this, is social network analysis that is used for its ability to uncover the social relations between entities - in this instance companies in the Danish Central Company Registry (CVR).

In this thesis, I conclude that democratic organizations are at the core of Danish business life, occupying central positions within it. In fact, democratic organizations are more often the bridge builders within the network, as they occupy advantageous positions within and are able to transmit ideas and information throughout the network. I am not able to establish any causal connection between social and economic capital, even if they do correlate.

Structure

The structure of the thesis is as follows. I will provide the background and setting for the history of democratic companies' in Danish economic history and provide a formal definition of what a democratic organization is. I will then review the literature on board interlocks, the co-occurrence of board members in multiple boards, and these interlocks' effects on firm performance. Following the research of interlocks, I will outline a definition and theory of social capital, which is then implemented through my methods and research design. From this, I will present my findings and discuss their relevance to a broader context, before concluding the thesis.

Background

In this chapter, I will outline the Danish economic and political context in which democratic organizations exist and formulate what I define as a democratic company.

Danish Context:

Denmark has traditionally been categorized as a coordinated market economy within the varieties of capitalism literature (Hall and Soskice, 2001). The reason for this is a tight integration of businesses, state, and unions. One of the main cornerstones of the Danish economic model is the labor agreements, which are usually not set by the state, but rather in a negotiation between the employees and employees unions. The pattern of ownership of Danish businesses are also quite far from the Anglo-Saxon model, which has a strong emphasis on publicly traded companies. Only about 16 % of the largest 1,000 companies in Denmark are publicly traded, only a little bit more than the 13% that is government owned (Larsen & Ellersgaard 2019). The rest is democratically, family, and foundation owned. All of this would traditionally place Denmark in the coordinated market economy group; however, Pedersen & Campbell (2007) argue that the coordinated market economy category leaves out important aspects of the Danish economic system. For instance, the flexicurity model, which allows businesses to hire and fire employees with ease, which is a more traditional liberal market economy feature. At the same time, Danish employees enjoy having high labor protection laws and generous benefits for the unemployed. Furthermore, the state is not strongly present in the market compared to other coordinated market economies (Larsen & Ellersgaard 2019). Pedersen & Campbell argue that this mix of liberal and coordinated market economy logics is typical for the Danish economy, which incorporates both aspects, without suffering from a lack of complementary institutions. Another example is the presence of strong unions, with highly concentrated bargaining power, while at the same time relying on decentralized negotiation on a number of issues, which happens at the local level, the former being a typical coordinated market economy feature and the latter being a liberal market economy. Therefore, the Danish variety of capitalism is a hybrid, which is between the coordinated and liberal market economy and has integrated features from both into a framework in which the different institutions compliment each other.

Democratic Organizations in Denmark

Within Danish economic history, democratic organizations occupy a prominent position, specifically, within the Danish agricultural sector. Denmark was a mostly agrarian economy up until the 1950'es, so the organizations that organized the farmers had large political influence (Johansen, 2005). In the latter part of the 19th century, the Danish agricultural sector began to organize in dairy co-operatives (Grelle, 2012). This expanded to include retail, banking, and dairy industries, which were being made in collaboration in-between the farmers. This was the beginning of large-scale democratic organization of Danish business life, and the companies

created in the late 19th century continue to live on today. Although th last few decades have seen a significant centralization of the Danish co-operatives (Ibid). For example, with the establishment of very large co-operatives, like Arla and Danish Crown, which are fusions of a number of smaller co-operatives. The development of Danish co-operatives marks an important development in the Danish industrial history, as it gave power, not to a small economic elite, but rather the individual farmers, consumers, and citizens. The democratic organizations were a response to unfair market conditions and therefore, an attempt to gain power and control within the economy. From it is beginning, the co-operative movement in Denmark has had as its goal to be locally embedded and to conduct business in a way that benefits small-scale producers, the consumers, and the working poor (ibid).

Democratic Firms Today

The think tank "Demokratisk Erhverv" (2019) has made a report on the democratic sector of the Danish economy. They argue, that democratic organizations are an integral part of the Danish business life and history and that the creation and purpose of democratic organizations can be a response to unfair economic conditions. Be that monopolies, random accidents, or exploitation. They conclude that democratic organizations seem to outperform non-democratic organizations, on several financial measures. They show that 1.9% of all Danish companies are democratic, 5.4% of all Danish employees work in a Democratic organization, and they make up 8.3% of all revenue made by companies in Denmark. Democratic organizations also display specific patterns, in term of their financial structure. Firstly, they are more productive than non-democratic companies, measured by revenue per employee. Although they do have overall lower returns compared to non-democratic companies. Democratic companies are also more solid, in that they have higher asset levels compared to their revenue and lower gearing, than non-democratic organizations. The high solidity levels make sense given the democratic organization's placement within the Danish business history, as a counter the uncertainties of the market. With the goal of providing stable alternatives for producers, consumers and employees, short-term profits takes a backseat.

Democratic Definition

In this thesis, I define a democratic firm as:

An independent commercial organization, which are through its statutes, controlled by a democratic congregation following the principle of "one member, one vote" or in which half of the control and/or ownership can be traced back to such a democratic congregation. Members can be organizations, producers, consumers or citizens, and membership must be relatively open. There are two characteristics of this definition. Firstly, the organization must be governed through democratic principles. Secondly, the organization must have some commercial activities.

This definition is also a formal definition and does not take the actual behavior, culture, and practices into account. It merely follows what is written in the statutes of the company. Furthermore, this includes organizations that are not democratically run, but ultimately democratically owned. For instance, if a company with a democratically elected board appoints board members in their subsidiary that is fully owned by the first company, the subsidiary is democratic. Furthermore, if democratic companies own a subsidiary less than 50 %, it is not democratic.

This definition contains the diversity of democratic organizations. Especially regarding the ownership form. Democratic organizations can vary wildly in their democratic foundation and their democratic constituency. "Demokratisk Erhverv" has identified four archetypes¹.

<u>Consumer-democracies</u>, firms owned or controlled by consumers of the service and/or product of the firm. In Denmark, they are most common in insurance, pensions, utilities and retail.

<u>Employee-democracies</u>, firms owned or controlled by the employees of the company. These types of democracies have a limited presence in Denmark, but a few companies has sprung up in the last few years.

<u>Firm-democracies</u>, firms that are owned or controlled by other firms. This type of organizations are especially prominent in the agricultural sector in Denmark.

Lastly, <u>member-democracies</u>, or <u>association-democracies</u>, in which members, be they individual persons or organizations. These are usually unions, boy scouts or Christian organizations.

Compared to Demokratisk Erhvervs' definition of democratic companies my definition diverges a little bit, by including <u>municipal owned organizations</u>. These companies are most prevalent in the utility industries.

Moving on from the historical background of democratic companies in Denmark, I will proceed to develop an understanding of the mechanism and causes of leadership interlocks between companies.

¹ There is also a type called "multi-stakeholder", which is a mix of the different categories. There are, however, very few of them, and they will therefore not be used in this thesis as a distinct category.

Literature Review

This chapter will provide an overview of the academic work done on social networks in between company boards, and of social networks' impact on financial performance. It will focus both on theoretical causal explanations and of specific case studies in Denmark.

Social network Studies on Board Interlocks

Firstly, I will review some of the work that has been done on the effects of board overlaps and their effects. Because in the last years, the analysis of networks among board members has elicited several studies, some of which I will highlight here, many of them also focus on the network effects on firm performance.

Board Interlocks and Financial performance

Multiple scholars have shown that board interlocks, have effects on the operations of a company. Some of these findings points in different directions. Mark S. Mizruchi's (1996) review on the research on board interlocks concludes that board interlocks are not related to the profitability of a company. However, other studies show that the interlocks of boards and other financial metrics do correlate. Abdollahian et al (2018) show that board interlocks in Fortune 500 companies are correlated with revenue. Vedres and Stark (2010) show that specific constellations of network ties (Called structural folds) cause high revenue growth. They can show this, by adding a temporal dimension to their analysis, thereby establishing a causal relationship. Furthermore, Benton and Cobb (Forthcoming) show that interlocks of directorships make company board plan more long-term in financial planning and that well-connected board. Benton and Cobb argue that this stems from a tension between the managerial body of companies, which is more focused on long term stability, as opposed to the owners, which are usually more interested in short term gains. Through the use of social networks, the longterm perspective becomes more prevalent, as board members become more concerned with keeping good relations to other organizations, rather than just the shareholders. Lastly, Mizruchi finds some studies that show there is a negative correlation between profits and directorships interlocking. An explanation of this phenomenon is that, firms, which seek to get ties to other organizations through interlocks, more often, are organizations that are not faring well. Therefore, the correlation is the other way around, poorer financial performance leads to more directorship interlocks.

Lamb and Roundy (2016) has a more recent review the literature as it comes to the causes and outcomes of board interlocks. They identify two overall perspectives on the causes of board interlocks, the first is the firm perspective, and the other is the personal. The firm perspective focuses on why organizations choose to have people in their board who are also present in other boards. The personal is why individuals choose to sit on

multiple boards. Lastly, the literature also focuses on the outcomes of board interlocks, understood as the performance of firms depending on their boards' interconnectedness with other firms.

Lamb and Roundy conclude that there are four identified reasons why firms choose to interconnect their boards are; resource seeking, monitoring, signaling, and human capital. *Resource seeking* is a tool that a firm can use if they wish to engage another organization's resources. By connecting to an organization with specific resources, the hope is to be able to use those resources. Furthermore, organizations might want to *monitor* another organization. This is especially true for banks that have provided a loan, which might have a wish of controlling their financial stake within the company. A company might also want a specific person on its board in order to *signal* quality. Using the reputation of a specific individual, a company can secure its stakeholders trust the firm. Lastly, the literature shows that firms might choose a person for their *human capital*, simply said how qualified they are. If multiple firms are looking for the same set of competencies, they might end up have an overlap in directorship.

From individual board member's perspective, they sit on multiple boards as a part of their career advancement. Having many board positions gives financial rewards, prestige, and contacts. In this view, the board position is a stepping-stone for the individual career and their personal advancement. Moreover, given that more is more, multiple board positions are a fast way for an individual fast forward their personal goals. A person sometimes sits on multiple boards in order to be part of the elite and to reinforce the elite the person's position within it. The research has shown, also in Denmark as I will review later, that elites cluster around board positions as a way to coordinate and to consolidate power among themselves.

Lamb and Roundy identify several areas in the literature that focuses on the outcome of board interlocks. Firstly, board interlocks reduce uncertainty within environments and especially in highly volatile environments, board interlocks are important for overall financial performance. Furthermore, a firm with connections to other firms, gain access to more, and diverse, information, one of the consequences of this is that diffusion of strategies and practices throughout the various boards. Interlocks also spread reputation. This means that the reputation of one firm can influence the reputation of another through the person that sits on both boards. This goes for bad as well as good reputation.

On the issue of board interlocks impact on the performance of a firm the evidence, as Lamb and Roundy finds it, points in different directions. Some research has shown that interlocks are linked to higher performance, but like Mizruchi, they find that the causation is not entirely clear and contradictory findings do exist. Overall, Mizruchi, and Lamb and Roundy argue, that interlocks sometimes have a negative effect on firm performance due to two factors; the busy director and reverse causation. The busy director sits on so many boards that they are unable to perform fully in single one. Therefore, more interlocks result in worse performance. Reverse causation refers to the reasons why firms might choose to have board interlocks. These reasons might become especially pertinent in cases with bad firm performance. In this case, firms seek more often to interlock themselves with other, more successful, firms. Therefore, it can sometimes seem as if interlocks leasd to worse financial outcomes. On the other hand, interlocks might have a positive effect when it connects the firm to information channels, new practices and strategies, and business opportunities. The literature is unclear on the conditions that make interlocks affect firms and organizations in specific ways. Nevertheless, it is also clear, that this lane of analysis is not fruitless, as it has previously, and in various settings, provided valuable insights.

Criticisms of Board Interlock Research

Mizruchi argues that researching board interlocks is largely beneficial, as the research has consistently shown that board interlocks influence the strategic choices that boards take, even if the relation to financial performance is not clear. He furthermore tackles some of the points of concern about the validity on board interlock research. Mizruchi outlines two main critiques of board interlock research that others have made. The first critique is that the interlock research lacks predictive power and the second is that board interlocks does not contribute to the understanding of the dynamics of board work. Mizruchi answers these two points and argues in favor of continuing the work done on board interlocks.

For the first point, critiques of interlocks point out, that board interlock has consistently not shown any link (or even a negative correlation) to a firm's financial performance. However, Mizruchi argues, that there has been considerable work on board interlocks' effect on strategic choices, such as having golden parachutes for top-management or adopting poison pills bylaws to prevent hostile-takeovers. While such changes and strategic measures are not directly visible in the bottom line of a firm, they are significant for the operation of the firm. So firm interlocks are still impactful, even if they not affect the short-term financial operations of the organizations.

The second point of criticism is that the focus on quantitatively assessing the interlocks between boards neglects the actual mechanics of board work. Hirsch (1982), has conducted interviews with board members, argue, that board members do not have very much power, and the actual impact from board members on the organization is quite limited. In answering the criticism Mizruchi argues, that board members themselves are usually not best at determining their own influence, as power is hard to quantify and that the board members can have an interest in underplaying their own influence. Adding to the criticism, sociologist Andrew Abbot contend the quantifiable nature of social science and argues for a more historical and narrative-driven approach (In Mizruchi, 1996). Mizruchi admits, that this criticism has some value to it, and that narrative driven research approaches to board work is important if academia is to fully understand the nature of boards and how interlocks affect performance. However, that this does not mean, that quantitative interlock research is not valuable, given the proven results of the research. Therefore, Abbot's critique should be word of caution of being caught up in the numbers, and not keeping the context in mind.

Board Interlock Research in Denmark

John Scott (1991) reviews the work done on social networks, as they relate to cooperate life. He notes that the research from coming from different cultural contexts show, that the dynamics of board interlocks are not the same across cultures. Therefore, it is important to keep in mind, that much of the literature cited above is from an American context, and therefore, not necessarily applicable in the Danish context. Some studies on board interlocks have been conducted in Denmark. Larsen et al (2016), have created a mapping, of the Danish network of interlocks. The data is a collection of companies, NGO, special interests' groups, state, regional and municipal boards, advisory groups and so forth. The data is of 4.984 "forums" (Organizations) and 49.990 unique individuals who occupy positions with those forums. The core of the network state-run advisory boards, labor unions and the largest Danish firms, and importantly, these three types of organizations are all interlinked. This is in line with the variety of capitalism argument, about the interconnectedness of those three sectors. When isolating Danish business community as a network, the most prominent organizations is the business interest organization the Confederation of Danish Industry. Democratic companies are also represented among the best-connected organizations, including Danish Crown, Industriens Pension, Landbrug & Fødevarer, and Tulip.

Larsen & Ellersgaard (2019) has mapped Danish companies when it comes to their economic and cultural capital. Using the central company-registry (CVR) in order to extract the financial statements and combining it with the number of publications and media mentions for these companies. They divide the Danish business life into a core and periphery, based on their annual revenue, and analyze the relationship between economic, social, and cultural capital. They show that high revenue is positively correlated with social capital. Furthermore, they show that symbolic capital influences social capital. This study also shows, that the largest firms are the ones that are best connected, and in the largest network component, almost all the largest firms are present. Furthermore, they show that economic, symbolic and social capital all correlate with each other. What Larsen and Ellersgaard do not show, is if social capital is causes a company be more profitable.

Conclusion on Literature Review:

The board interlock research has shown that strategic ideas easily flow through board interlocks and that information is an important aspect of why companies desire to fill their board with persons who sit on other

boards. In terms of board interlocks impact on financial performance, the literature is not clear as both negative, neutral and positive relationships have been found, and the reasons for the differences are not well understood. What is known, is that the cultural setting has a large impact on the way that board interlocks behave. Therefore, it will be important to keep the cultural and historical context in mind when analyzing the network of democratic organizations in Denmark. In conclusion, the social network among boards is important to understand in order to understand how companies' functions, and while it is not necessarily resulting in changes in financial performance, this is sometimes the goal for boards when they establish a link to a different board.

Theoretical Framework

This chapter establishes my theoretical approach to the subject of the social networks of democratic organizations in Denmark. I will outline various definitions of social capital and their potential application to social network analysis. I will then describe in detail Ronald Burt's theory of social capital and social networks, as this is the theoretical perspective I will employ.

Definitions of Social Capital

The goal of the following section is to define social capital as understood in this thesis. As we shall see, there are many definitions of social capital and while they do share many of the same features, there are also significant differences. I will, therefore, begin by discussing some of the most prominent definitions of social capital and in doing so outline the various aspects of social capital. However, I will first discuss the necessity of a social capital definition in relation to a social network analysis.

Social Network Analysis and Social Capital

Social network analysis concerns itself with the ties between actors (Wasserman & Faust, 1994). These ties can signify different types of relationships, such as friendships, co-work relationships, shopping in the same supermarket, attending the same parties, or sitting on the same boards. These ties are hypothesized to create some specific group dynamic, and usually benefit the actors who have the connection, or the network as a whole. The effects of the ties can be described using a definition of social capital. Over all, the reason for using social network theory is that it can uncover the distribution of social capital within a field (Egholm, 2014). This requires then an understanding of social capital. That is necessary in social network analysis, as it is a set of methods, and not coherent theory (Scott, 2000).

Social network analysis must be accompanied by a specific notion of social theory. Ericson (2013) notes, that social network analysis, as a method, does not have enough predictive or explanatory power to be considered a theory. It provides a mathematical and visual analysis of social network interactions, but lacks explanatory features (Musial, 2014).

As mentioned, there are many ways of defining social capital, and in choosing one specific definition, I wanted the definition and theory to fit the following three criteria: 1) it should be compatible with social network analysis. 2) It should be able to create hypotheses about social networks and 3) it should be able to explain organizational outcomes with other types of capitals in mind. I will not do a complete overview of the social capital literature, and it is out of the scope of this paper, but I will explore some of the most prominent definitions, through some of the main works within the field (See Adler & Kwon, 2002 for a more complete overview).

Robert Putnam

Robert Putnam defines social capital as "social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (1995: in Adler & Kwon, 2002). Putnam's definition highlights some of the components found in other definitions. Firstly, it is open, as it allows for social capital in many different settings. Putnam makes this explicit by mentioning networks, norms, and trust. The definition also includes more than the context in which the specific tie exists, and it concerns itself with the social organization as a whole. This includes, how two entities are tied together, but it could also include an entire network of entities and their social organization.

In Putnam's book, "Bowling Alone" (2000), his way of viewing social capital is presented. By describing the civil engagement of U.S. citizens in their local and national communities, he makes the argument that an overall decline in social capital has happened and that it has consequences for everyone. In this view social capital is a common good. By this, Putnam thinks, that social capital not only benefits the persons tied together, but the community at large. Putnam's view on social capital has a stronger focus on "closure" rather than "brokerage". This distinction between closure and brokerage is significant in the social capital literature (Adler & Kwon, 2002). Closure focuses on the dynamic of in-group cohesion; the feature of ties within a community or network. Brokerage, on the other hand, focuses on the dynamics of ties between groups. Closure and brokerage are not mutually exclusive and in fact, much literature includes both perspectives. As such, definitions and research do not have to favor one aspect more than the other does. However, Adler & Kwon (2002) point out that some definitions lend themselves better to one side of the debate rather than the other. What follows from Putnam's work on the American civil society focuses on general trends and averages of the US population, for example, the average number of times a person goes to church and not on specific network constellations.

What is important for Putnam is the sum of social capital within American society and that social cohesion benefits everyone. In addition, while he does acknowledge the brokering/closure dichotomy, on the empirical side he falls on the closure side of the argument. I would argue that Putnam's definition does fit within a social network analysis perspective. However, since the theory is not as developed on the brokerage side, I will not be using this theory. This is because I am interested in the specific network ties of the individual companies and their overall position with the Danish business community.

Nan Lin

Nan Lin is another author that defines social capital. His take is quite different from Putnam, as he defines it as "Investment in social relations with expected returns in the marketplace" (Lin, 2003, p10). In his definition there are four mechanisms of social capital; information, influence, social credentials, and reinforcement. These mechanisms make social capital have value. Social capital and the ties which make them up can spread *information* through a network. Ties can also facilitate the changing of specific outcomes; therefore, social capital also contains the ability to exercise *influence*. Furthermore, through social capital actors can vouch for each other, thereby making each other trustworthy and giving social *credentials*. Lastly, social capital can *reinforce* the identity of the actors who are connected to each other, thereby ensuring social cohesion.

Lin's definition contains a utilitarian assumption. It specifically places social capital in a market situation, even if the market is broadly defined, for example within a school setting and the trading of favors among individuals. Furthermore, Lin defines social capital in terms of investment and *expected* return, Lin therefore, frames the actors who hold capital as rational. In Lin's definition, expected returns are part of the definition, therefore, the assumption is that the actors involved are trying to gain returns in the marketplace. This also means that the connection to other forms of capital, specifically human and economic, is quite explicit, as social capital can be used in the pursuit of economic gains and opportunity for growth in human capital. Lin focuses more on the brokerage side of the spectrum, as he includes more theory on the structural position of actors within the network, with how strategic positioning within a network can provide specific benefits. He does, however, include the reinforcement mechanism, which is a closure argument for the value of social capital.

In terms of usability for this thesis, Lin's definition does fit the boxes. It allows for social network analysis, it has mechanisms which can explain social behavior and, Lin provides links to other forms of capital. Therefore, Lin's definitions would be useful in studying the board interlocks. Lin also argues on both side on closure and brokerage. However, I chose not to use Lin's theory, as the closure argument is not as well developed, as the brokerage argument, when comparing to Ronald Burt's theory.

Pierre Bourdieu

Bourdieu developed his concept of social capital as part of a larger system of explaining different forms of hierarchy. Specifically, social capital is placed alongside economic, cultural, and symbolic capital (Joas & Knöbel, 2009). Bourdieu defines social capital as; "The resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu & Wacquant in Adler & Kwon, 2002, p20)

This definition is in the same category as Lin's by focusing on the specific actor, which can benefit from brokerage positions within the network. Still, Bourdieu does also include the concept of closure, especially as it relates to elites and how they use social capital in order to reinforce their own position in society (De Noor 2003). Bourdieu's theory of social capital is especially useful as it comes with a larger theoretical framework attached to it, and in terms of explanatory power, this theory has proven quite useful in multiple areas of social research (Joas & Knöbel 2009).

However, one issue arises in discussing Bourdieu's concept of social capital in relation to social network analysis is that Bourdieu himself does not see it as a valid method of approaching his concept of social capital (De Noor, 2003). Bourdieu argues that social network analysis does not actually capture social capital as an objective power relationship, but rather the visible results of those objective power relations. Therefore, social network analysis is inadequate and should be disregarded in the pursuit of social capital as it mistakes the causes and effects of social capital (ibid). Furthermore, Bourdieu argues that social network analysis denies the past. By this, he means, that the conditions or habitus, that actors in the network have, are not taken into consideration when studying the effects of social capital in social network analysis (ibid).

Despite these concerns, De Noor argues that it is still possible to use social network analysis within a Bourdieu's framework. For the first concern, De Noor disagrees with Bourdieu that the ties within a social network analysis cannot uncover the underlying objective power relations. De Noor shows, that it is possible to recreate the same analysis Bourdieu himself made, on the prestige of French Universities and their social capital, using social network analysis instead of a correspondence analysis, like Bourdieu did. De Noor manages this, by using social network data as a proxy for actual social capital and analyzing the overall patterns instead of simply focusing on the specific ties and nodes and placing the network within a historical and social context. Thereby, De Noor recreates the correspondence analysis Bourdieu themselves made and De Noor manages to avoid the issue of missing the historical importance of individuals within the network.

Bourdieu's social capital concept therefore seem to be useful within a social network analysis context. In addition, no matter which social capital definition I use it is important to realize that ties are more than the ties themselves and that they are expressions of a field that values specific traits, behavior, and economic power. In other words, social capital must be interpreted within a specific field. However, given Bourdieu's own critique of social network analysis as a tool to be implemented within his theoretical framework, I am reluctant to implement his definition.

Ronald Burt

The last definition of social capital is Ronald Burt's. Burt is most known for his "structural hole" argument (1995) and defining social capital as "the brokerage opportunities in a network" (1997: in Adler & Kwon 2002) which places him with Bourdieu and Nan Lin on the brokerage side of the social capital argument.

However, he has also defined it as "Advantages created by a person or a group's location in a social structure" (2000), and this is the definition I will explore. By defining social like this, Burt places himself between the arguments for closure and brokerage, as he explores both mechanisms. Furthermore, Burt has constructed specific social network analysis measures that allows for quantifying closure within a social network. Given that I am interested in analyzing both the overall network position's impact on firm performance from both a brokerage and closure perspective, I will be using Burt's definition of social capital.

The rest of this section I will unfold Burt's ideas about social networks. I will keep the other definitions in mind, especially Bourdieu's concerns as it relates to putting social network analysis within a context, which I will do in the analysis, and especially in the discussion of this thesis.

A Theory of Social Capital

The section will first explore Mark Granovetter's (1973) framework on the strength of weak ties and how he binds together a formalistic understanding of social networks into hypothesis about empirical data. The reason for introducing this research is that it highlights important aspects of formal network analysis. Also, I am sure, that any academic text about social network analysis must mention this study. From there I will move to Burt's theory of brokerage and closure, and lastly show the implication of the brokerage and closure arguments in an organizational setting.

The strength of weak ties

Granovetter conceptualizes connections between actors as either being strong or weak. While this is a sliding scale, he operationalizes it as a binary measure (Strong/weak). Based on this, he presents an understanding of social dynamics and implications for social theory and social network analysis.

He argues that if actor A has strong ties to C and B, a tie between C and B is almost bound to appear. The constellation pictured in figure 1 is what Granovetter calls a forbidden triad, as actor A has strong ties to both C and B, but there is no tie between C and B. The argument for this is as follows: Ties in time how much time two actors spent



together. If A spends a lot of time with respectively C and B, the odds of C and B then not knowing each other

is quite small, as A would introduce them to each other. This would not happen, if A only had weak ties to C and B, as the odds of C and B being introduced is smaller.

This is an important dynamic, as this leads to the formation of clusters, a set of actors with ties between them. Because A's strong ties will end up having ties between them, this will form a clique² of actors A, B and C. These three actors then all share ties with each other. This logic can be extended. So, if actor B has a strong tie to an actor D, then D would also, over time, become part of the clique. Granovetter therefore argues that over time a series of strong ties will lead to the formation of cliques. Granovetter argues that social ties can carry information about the environment in which the actors are embedded in. Moreover, he argues that it is not just direct ties between actors which can transmit information. For example, if A is tied to B who is tied to D, then information can spread from D to A through B. In this constellation, B would be forming the "bridge" between A and D.

From these analytical points, Granovetter makes his main argument, namely that weak ties spread more information than strong ties. In a clique, there will be less unique information per tie, compared to a constellation, which is not a clique. This is because in the ABC-clique, there are no ties in which unique information spreads. This means that the strong ties that A has are usually not conveying unique information, as they are redundant. Furthermore, given that the strength of a tie is usually measured using a finite resource that is spent between actors (eg. time), an actor can only have a certain number of strong ties before all the actor's resources are tied up. Therefore, actor A's strong ties connect A to relatively few actors. Granovetter argues, that if actor A wants new information, they should be using their weak ties, as these ties connect A to quantitatively more actors, as these weak ties are connected to other cliques' actors with their own set of information.

Granovetter provides empirical evidence for this hypothesis. Granovetter's evidence is a questionnaire given to newly hired managers in American firms, about how they found their current occupation. And what he discovered, is that individuals got information about their current place through their network, usually did so through contacts, that they did not interact with very often.

Granovetter's paper on the strength of weak ties is quite useful, in its way of structuring a network analysis argument, based on a theoretical understanding of social functions, into a testable hypothesis. And much of later network analysis draws on the concepts that Granovetter creates in this paper. As we see with Burt, the concept of information flow and the overall structure of a network, as a predictor of specific outcomes, is quite significant in his theory.

² Cliques in this instance are defined as a set of actors who all have ties (strong or weak) to one another

Brokerage

In his paper on structural holes, Ronald Burt (2004) hypothesizes that "[...] people who stand near the holes in a social structure are at higher risk of having good ideas" (ibid p. 349-350). Figure 2 depicts an example of a structural hole. Actors A, B and C are a group, and actors D, E, F and G are likewise. The two groups are only connected to each other through actor H. Without H, there would be a structural hole in between the two groups, as they would not be connected. Burt's argument is that actor H is in a privileged position within the network, as H acts as the bridge between the two groups. By being in this position, Burt argues, H is more likely to come up with ideas that are valued as being good by the actors in both groups.

H can do this for a few reasons; firstly, H is exposed to more varying kinds of information. If the two groups have different expertise, H is in a position in which H can combine the two areas of knowledge in a way which in-group members cannot. In the position that H is in, H can spot new, good ideas that arise in certain subgroups and has the power to transmit that information to other sub-groups,



therefore, H has an advantage through information arbitrage. Secondly, H is aware of the practices in each group as he is tied to both. Therefore, H knows which ideas are likely to be accepted in a certain group. Thirdly, given that H is attached to the groups, H is also aware of the culture within them. Therefore, H can translate the ideas into a context that fits within a specific group.

This way of viewing the structural hole is formalistic as it provides a theoretical background and idealized examples of how social networks behave. Burt provides empirical observations in order to back up the formalistic claims. He shows that managers who have many connections and can span various departments within a company perform better on a number of metrics such as performance, salary, and speed of promotion. Given that many of the arguments also apply to organizations and not just individuals, the structural hole argument can be used to create hypotheses about organizational performance as well (Burt 2004).

Because actors in structural holes, or otherwise advantageous network positions, are provided information from many places, they are better at taking advantage of that information and their position. Therefore, central network positions are linked with better organizational performance. As mentioned, the structural hole argument is also an argument which focuses on the individual actor within a network. Burt has a conjoined argument, which is many ways argues the opposite than the structural hole argument. The argument is about closure and the importance of many interconnected nodes and redundant ties and I will describe it, in the following section.

Closure

Closure, for Burt, concerns the mechanics of social organizations of tightly intertwined groups. While brokerage is a measurement of how actors binds together other actors who are not connected otherwise, closure is a measure of redundancy in connections. Consider situation 1 and 2 in figure 3.

In both cases A and E are connected, but the dynamics of these situations are vastly different, due the indirect connections between A and E. One example of this is trust. Burt defines trust as "[...] when you commit to a relationship before you know how the other person will behave" (ibid. 93). In situation 1, if A asks E to trust them, then there is no social network to enforce that trust. A is not embedded in the same social group as E, and therefore the social consequences for A, if A betrays the trust of E are non-existent. Furthermore, E is less likely to trust A because E has less access to information about A. In the second situation, when A asks E to trust them, E can get information about A from many different sources, thereby reducing uncertainty about A. In the structural holes and strength of weak ties arguments, in redundant ties are not seen as valuable, given that they would contain no additional information and situation 1 might seem more beneficial for A, given the structural hole that A is bridging. However, in more complex social settings, redundant ties can be used as insurance of good behavior. Burt argues, that the more uncertainty there is about what A is asking E to do, then the access to social capital becomes an important factor for E in deciding whether to trust A. If A, for example, can produce a contract with clear implications for themselves if they renege on their promise, then E can still trust A, due to the contract's clear implications. If not, then E will rely on the network to get both history and information about the trustworthiness of A. E can then rely on the network to punish A if they renege on their promise. The network therefore has value both before and after an act of trust. And therefore, in networks in which social capital is a benefit, closure is social capital. From this definition it is also clear, that social capital can be a common good, as it is associated with a network in which actors can trust each other.

Another aspect of networks with strong cohesion is that they ensure common values within the groups. Burt describes that networks and especially strong internal networks reinforce the values of the group, by punishing deviant behavior. This means that a strongly cohesive group will form the same values and ideas about the



world, reinforcing their cohesion based on similarity. Burt argues, and finds empirical evidence for, that closure stops group erosion over time. This effect is also present when new actors are introduced to a member of the group. If the original member approves of the new potential member, the new member stands a better chance of being integrated into the network, as sympathies can be amplified within the group by the original member. This effect of the environment influences the values within an organization, has been explored in detail by DiMaggio and Powell (1983), who argue, that, for several reasons, organizations over time begin to look like the organizations that they collaborate with.

This means that there is self-selection when entering groups. When actors belong to a specific cohesive group, they will be similar to other members of that group from the moment that they join and over time become even more alike. From a board interlock perspective, we would therefore expect a few things: Firstly, organizations within the same industry are likely to be closer linked together, as the competences and understanding in the industry would mean that with greater ease could transfer into each other's board. Secondly, democratic organizations are likely to be linked together even across industries given their unique organizational structure, as they are more likely to self-select into groups which have democratically organized members.

Granovetter and Burt

Granovetter and Burt show various ways of dealing with network analysis and ways of analyzing the overall structure of the network and its effect on individual actors in the network. Granovetter argues that the overall network structure matters, but only looks at dyadic relationships. Burt creates measures that accounts for more than just dyadic relationship, and instead looks at the larger network structure, which allows him to analyze the individual node within its larger setting. Burt's concepts also allow for multiple different network constellations that can give different results.

Theoretical Framework

I have chosen to use Burt's theory of social capital to be implemented in this thesis because Burt's definition allows for a wide approach to social network analysis. Burt's framework contains a view of social capital, which allows for both advantageous network positions between groups of actors, and for the formation of cliques or groups that can benefit the individual actors within them. Burt therefore balances two sides of a social network tension, which various authors positions themselves on various sides of. Opposed to, for instance Lin, who also includes both closure and brokerage in his definition and theory, Burt's definition and theory is more developed in terms of taking account of closure and brokerage. The overall structure of the network is therefore important, and it is necessary to keep in mind the communities, clusters, cliques and bridges that are formed within the network, in order to understand how the democratic sector in Denmark is placed within the broader business community. Furthermore, in implementing Burt's theory of social capital I will keep in mind the warnings from Bourdieu and Abbot about what constitutes social capital and what exactly is being measured using the social ties of board interlocks.

Research design

In the following chapter, I will outline my research design, describe the core of the thesis, and embed the thesis within a larger framework of current research. I will describe; my selection of the sample, data collection and preparation, how the social network analysis is applied, and how I expect to draw a conclusion from my research (Musial 2014).

Sample

The sample consists of registered companies in the Danish Central Company registry (CVR), primarily differentiated based on democratic nature, as the thesis will compare democratic to non-democratic firms in terms of the social capital.

Data collection

The sample consists of two main parts: The list of democratic companies and their financial data, and the CVR registry's data on the leadership in Danish companies. The first part of the data has been collected through the CVR registry and filtered through a manual coding of the democratic organizations. Demokratisk Erhverv has done the coding on which companies are democratic. The leadership data I have received through my supervisor, Lasse Folke Henriksen, which has already been filtered for various noise. The datasets also contain a meta-data, like the age of the company.

Data Preparation

Both datasets have their origin in the CVR registry and therefore the data structure is the same in both of them. Furthermore, both have already been cleared of some noise. My data treatment mostly consists of merging the dataset, and clearing out some noise in relation to subsidiaries, which I will go into detail with in the methods chapter. I also must make some choices about which organizations and leadership positions to include and how to divide between democratic and non-democratic

Social Network Analysis

The way to apply social network analysis is complicated by the fact that the theoretical frame is not given and that there are many ways of approaching the network as a unit of analysis (Scott 2000). Musial (2014) outlines three ways of approaching network analysis: Full network method, snowball method, and egocentric method. The latter two focus on a localized area of the network or a smaller sample of a potential network. The approach chosen for this thesis is the first, a full network method. Since I have data on all the various nodes in the network, this is the approach which best fits the thesis. Furthermore, this method allows me to quantify the network structures, which the companies are embedded in, using network metrics. The social network analysis will involve two parts, of which the second part is based on the results of the first. Initially, I will generate network measures, like number of ties, centrality and network closure. This will be my social capital indicators. Using these, I will proceed to make a statistical analysis using the social and economic capital as dependent variables and democratic/non-democratic company as the independent. From the creation of the network, I will make a qualitative analysis, which employs more of the latter two strategies of snowball and egocentric analysis. By analyzing the network of the typical democratic company cases or the network in terms of distribution of industry types. The reason for doing this is as noted in the theory chapter, that the context and individual nodes has a specific context attached to them, and a local and deeper analysis better allows me to put the organizations in their proper context. This part of the analysis will also include a visual representation of the social network, of which the analysis is based.

Conclusions

Given the breadth of the data, I expect to be able to have a wide understanding of Danish board interlocks and especially the functioning of democratic organizations within the Danish business community. As mentioned earlier, the overall context in which board interlocks appear is very determining in the effects that they have. Therefore, an overall generalization about democratic organizations everywhere should be made with caution. Denmark has a unique tradition with democratic organizations a specific variety of capitalism (Pedersen & Campbell 2007).

Methods:

This chapter will outline, in greater and operational detail, how I conduct my analysis. I will explore, briefly the mathematic theory behind social network analysis, before describing the dataset, its treatment, and the analysis approach.

Graph Theory

I will firstly present the mathematical theory behind the network analysis and some of the terminology that accompanies the method and analysis. The approach I will use to analyze the dataset comes from the mathematical discipline of graph theory (Wasserman & Faust, 1994) Graph theory provides a way of analyzing networks. The data within graph theory are two-fold, nodes and edges. Nodes are the actors of the network, in this case persons and companies. Edges represent connections between two nodes. In this case, a node is a company and an edge denotes a person within the leadership of that company. These building blocks form social network analysis. Using these data blocks, graph theory allows for a quantitative analysis of the network. I will, throughout the method chapter explain how various metrics are calculated. Some terminology is also required. Network refers to the dataset that forms the analysis as a whole. Degree is the number of edges attached to each node. A component is a set of nodes and edges that are all, directly or indirectly, tied to each other.

Databases

As mentioned there are two databases which form the basis of my dataset. One of them contains a list of companies, which, by Demokratisk Erhverv, have been identified as being democratically organized, and to which degree they are democratic. The level of democracy is a measure of what share of the ownership is democratically founded. For instance, Ørsted A/S is 5 % owned by a democratic organization, and therefore appears in the list. However, my definition of a democratic organization requires a minimum of 50 % democratic ownership. For practical purposes, the actual limit is at 45 %, as the CVR registry gives ownership data in intervals, therefore 45 % is chosen as the functional limit in order to not get false negatives. A selection of companies in the 45-49 % range were selected, in order to check if this created problems in terms of getting false positives, and none were found. Demokratisk Erhverv did this. After clearing the list of the not sufficiently democratic organizations, this list was merged with the second database containing the data on the leadership of all companies.

The second database contains information about individuals connected to any CVR-registered firm. This also contained information on the type affiliation, the timeframe of it and, of course, the name of the person in-volved³. From these categories, I choose to drop some observations. Firstly I had to choose which leadership roles to include and from which period. I have chosen to only include board members and members in the upper leadership in my analysis. Appendix 2 has a list of the roles, their numbers and whether they are included

in the analysis. Furthermore, I choose a single point in time, which is 01-01-2016. Lastly, like the roles, I chose to remove certain types of firms. I have removed financial holding companies and purely investmentbased firms, as these are usually made as appendices to main firms, and therefore they would distort the data. Appendix 1 and 2 shows, like role, the type of firm, their count and whether they are included in the analysis. I removed 10,609 leadership roles from the dataset, most of them were alternates and "stakeholders". I removed 1,085 companies as well. This was done through Excel; the rest of the analysis is conducted using R with various packages. See Appendix 3 for the script.



The initial structure of the network data was a two-mode network like in figure 4, in which the squares are organizations and circles are individuals. Note that organizations are not tied to other organizations, just to individuals. Likewise, with individuals, which are not tied to other individuals' only organizations (Wasserman & Faust, 1994). In order to make it a one-mode network and thereby creating a network of organizations, individuals are transformed from nodes into edges, which looks like figure 6. The network is at this point an undirected, weighed network, which means, that ties between organizations have no direction, but one tie is weight more, if it represents more than one person. This one-mode network of organizations is content for the rest of the analysis.

Ownership

The network as handled so far has one larger problem, namely that organizations with many subsidiaries have many ties, to what is, essentially, the same company. This happens to an extent in which any analysis of the network as a whole comes meaningless. The approach I have chosen in order to solve this problem is to treat

³ All companies AND individuals have a unique number attached to them in order to make sure that, for example, two different people both called Jens Petersen are correct identified as being two different people

organizations with an overlap between leadership of more than 80 %, as the same organization. Thereby reducing the network and in turn, collapsing many of the organizations with many subsidiaries into one organization. See the R script for how this was conducted (Appendix 3). I also chose not to remove individuals that are a part of a board, which is collapsed into another organization, they are simply being treated as being part of that organization. This gives a cleaner dataset and a more accurate depiction of the links between different entities. For the final network to be complete, I will remove the weight from all edges, meaning that all ties are either present or not present, and does not increase with the number of overlaps. This was done in order to simplify the analysis.

Network metrics

Within social network theory, various interpretations of "well-connectedness" exist (Wasserman & Faust 1994). In this section, I will therefore have to operationalize my understanding of social capital and connectedness, using statistical measures found within the social network analysis literature. This means, that I need some way of measuring brokerage and closure within my network, based on Burt's theory. Each of these measures will be some value attributed to a specific node.

One such value is degree count; how many connections does the organization have (Wasserman & Faust 1994). This measurement type is simple as it allows to seeing who has the absolute most connections. As a measure of social capital, it not very complex, and as such it does not capture neither brokerage nor closure well. This is because; it does not capture the context in which these ties exist. I will however still use it in my analysis, as it a useful measure in regards to determining which organizations are tied to most other organizations. However, I also need to use two specialized metrics for brokerage and closure.

Brokerage

The measure I have chosen to measure brokerage is betweenness centrality. The value of betweenness centrality is number of shortest paths that goes through any that node. That means that nodes, which bind together many other nodes, will have a high betweenness centrality score. I choose to normalize the betweenness measure, which is betweenness centrality over the number 2of possible paths (Wasserman & Faust 1994). This gives a measure between 1 and 0, in which node with the betweenness centrality of 1 would have all possible paths between all nodes pass through that node. Moreover, 0 would be no paths. Betweenness centrality is a global measurement, meaning that the measurement does not differentiate between short and long paths.

Closure

In order to measure the embeddedness within a community, I will be using the social constraint measure, created by Ronald Burt (2008). The measure is an index from 0 to 1 and it measures the how many of the

companies direct connections are also connected. This means, that a clique with ties to no one outside the clique will have high constraint measure, while a node with only non-redundant ties has low constraint. This measure therefore captures how much of nodes' resources is tied up with redundant ties.

The two measures of brokerage and closure will be the main independent variables in my analysis, testing the hypothesis that both are correlated with higher firm performance.

Betweenness and constraint are be negatively correlated (ibid). That is, if a node has a high constraint score, it will low betweenness score. Burt himself uses the social constraint measure, as a variable, which measures the lack of structural holes. Understood, as high constraint means no structural hole. The reason for using both metric is the difference in locality. Betweenness measures across the entire network and can give the nodes value in terms of how it performs within the entire network. It very large networks, this means, that even a path very far from ego, can increase. Therefore, betweenness centrality can identify which organizations are at the center of the network.

Performance Measure

I will use financial data as my performance measure. It should be noted, that only 10 % of democratic companies have financial data available, and the data is not complete for all of them. In order to evaluate the performance of the democratic companies, I have chosen one specific measurement; profit. Profit is simply measuring how much a company is able to be profitable and traditionally this is the ultimate purpose of a company. However, since long-term profits sometimes come at the cost of short-term profits, other measurable might also be useful, and ideally, I would use more complex measurements. The reason for keeping simple is that most companies only report assets and profits, as these are required. Other measures, such as revenue, is not required and therefore, not used. The financial data is from the financial year of 2017.

Control Measures

In my analysis, I will include a number of control variables, which I use in my statistical analysis, as they are likely linked to the dependent variables in my statistical analysis. I will use the age of the company, measured in years. I have data on all companies, except 7, on their age. I will use the top level CVR industry code, which divides the companies into 20 sub categories based on their industry. There will also be included a size control variable. The specific control variable will depend on the dependent variable. For the network metrics, I will use number of full-time equivalents (employees) reported to the CVR-registry. These are in intervals, and therefore not exact numbers. For profits, I will use assets for the proxy for size. The reason for replacing full time employees is that it is not an interval, but a specific number and therefore more precise, and employee numbers are not available for all the companies with financial data. The last control variable used is the size

of the leadership. That is, I control for the fact that some organization's management is simply larger than others are, and therefore have a better chance of creating ties.

Visualization

For the qualitative analysis, I will use visual representations of the network. This will include a mapping of the core of the largest component of the network, a network of democratic organizations alone. This will include highlighting the democratic organizations within the network of all firms and using that to investigate how well integrated the democratic sector is within the larger Danish business life. Using these visual representations, I can describe general tendencies within the network. For a more systematic approach, I will create ego-networks for organizations with the largest amount of capital (social and economic) in order to identify any patterns or unique position for the dominant players within the democratic sector

Analysis Set-up:

My statistical analysis will be built around three ways of approaching the data. First: A descriptive analysis based on the visual representation of the data and their summary statistics of the variables. Secondly, a naïve pair-wise correlation table, using Pearson's correlation (Rousseau et al, 2018). The Pearson correlation is a statistical test for a linear relationship between to variables. This is used to determine the overall correlations in the data.

In order to come closer to the ideal of establishing causality, a third statistical tool is used. I will attempt to predict the value of the network metrics using my control variables as independent variables and democratic/non-democratic variable. Using multivariate OLS regression, I show the correlation between democratic organizational type and their social capital, while controlling for the factors, mentioned above.

OLS regression is a linear regression, which tries to minimize the squared residual, which is the error term, in function that looks like this (Agresti & Finlay 2009):

$$\mathbf{y} = \beta + a_1 x_1 + a_2 x_2 \dots + a_n x_n + \epsilon$$

The beta signifies the intercept the with the y-axis, when all variables having a value of 0. The alphas are the coefficients, these are values with which y increases, as x^n increases by 1. The effect of x on y, is assumed linear, meaning an increase from 0 to 1 is as significant as 1 to 2. The last term, ϵ , is the error term, which is the variance of the dependent variable that not explained by the input variables.

Using the control variables and the dummy variable for democratic firm, I run a regression on the social network metrics, degree, betweenness, and constraint. I will use the social constraint measurement as my independent variables in the statistical analysis of performance the reason for that is that the social constraint measure, encapsulated both brokerage and closure.

The OLS regression works using a set of assumptions. Firstly, that the relationship between X and Y is linear, as mentioned. Furthermore, residuals have to be normally distributed. An additional issue can arise, if there are influential outliers, which can affect the result of the regression. All of these assumptions will be tested for and any violation of these assumptions will be taken into account in the analysis of the results.

Analysis

This next chapter is the analysis of the network created as described in the methods chapter, the network metrics created alongside it, and their influence as a predictor on economic performance. The structure of the analysis is the following; firstly, I will conduct a visual analysis on the core of the network and on individual companies' network. I will then analyze the statistical results of the network analysis, firstly based on summary statistics of the individual variables, then an analysis of a naïve pairwise correlation table. Then I will present the regressions run using the network metrics as the dependent variable and with network metrics as the independent variable and economic performance as the dependent. Thirdly, the analysis will conclude with analyzing the assumptions behind the OLS regression and that they can tell us about the data and the regression.

Descriptive Analysis

In the following section I will analyze the network using the network mapping tool; Gephi. By illustration the network created, I will analyze the trends displayed in the network. Firstly, I will analyze the core of the network, which in this case I have defined as organizations with three ties or more (K-core) and the largest component of those.

The Core of the Network

Appendix 4 is an illustration of the core of the network, with democratic and non-democratic organizations color-coded, red for democratic and green for non-democratic. The network contains 1,754 nodes, which is 9.7 % of the all of nodes, and 5,748 edges, which is 41.3 % of all the edges in the network. 2.4 % of this core is democratic organizations, so it is in line with the distribution in the total population, which is 2.4 % as well. Of course, there is the apparent problem, of trying to establish something general about the networks of democratic organizations, using a non-representative subsection of the network. This is the reason why I later analyze the network statistically. However, the conclusions I draw from this analysis, I do believe I can draw some, at least tentative, conclusions based on, given that, while I exclude 90.3 % of the nodes in the network, I maintain 41.3 % of the edges.

The map reveals a core of the network, which is composed of many clusters of organizations, which are tied together by bridge builders. For example, DLA Agro AMBA, and the cluster of organizations related to it, is tied to the rest of the network by NAGRO A/S, and Hornsyld Ejendomme A/S. This a relatively common pattern, that large sections of organizations clustered together, and only remain tied to the component through a few links.

In terms of the distribution of democratic and non-democratic organizations, a few observations can be made. Firstly, chances of being connected to democratic companies does seem to increase, if the organization is democratic. That means that democratic organizations are more often tied to other democratic organizations than non-democratic organizations are. An example of this phenomenon is Middelfart Sparekasse, a consumer-owned bank located on Fyn. Middelfart Sparekasse has six ties, four of them to democratic organizations, which is a lot more than one would expect if ties were random, given the 2.4 % representation of democratic organizations in the network. This means, that democratic organizations do tend to more often share networks. On the other hand, the opposite can also easily happen. Maj Invest is one of the best-connected democratic organizations in the network, and it is not tied to other democratic organizations.

As such, there is no democratic cluster, as most democratic organizations are spread out in the network. Only one cluster seems to have a predominance of democratic organizations, and that is the one surrounding DLA Agro. The cluster does mostly consist of subsidiaries of DLA Agro, which is by then defined as being democratic. Appendix 5 is a mapping of only the democratic companies within the network, and from that, it is clear, that in democratic organizations do not make a sector as such.

Subsidiaries

DLA Agro's network highlights an issue with the data. Despite the fact, that I tried to root out organizations that are subsidiaries, and therefore have organizations with many daughter companies overrepresented in the network, this has not succeeded completely. Organizations like DLA Agro or EDC are represented by many different nodes in the network, which does boost their degree numbers in a way, which does not reflect the kind of board interlocks which is of interest in this study, which is links between different organizations.

Network of Industries

Companies and their subsidiaries do not drive the clusters in the network alone; the clusters are in large part also driven by industry likeness. Appendix 6 is the same network map as appendix 4, but rather than colorcoded on democratic and non-democratic, it is colored on the company's industry code. In this network shows that nodes are more closely connected to other organizations in the same industry. For example, Netgroup A/S, an IT hosting service, has four ties, three of them to other IT-related companies. Danish Crown A/S a butchering company is another example, which is also a democratic organization. Danish Crown A/S has six connections. One is Danish Crown AMBA, the mother company, which is categorized as being in a different industry than Danish Crown A/S. Within the same industry, Danish Crown A/S has ties to DAT-Schaub, a casing producer, specifically for meat products. The other ties that Danish Crown A/S have are outside the industry. This highlights one of the issues with using the CVR-registry's industry code. The CVR registry codes the type of organization, which means, that a holding company for companies related to agriculture, is coded as a holding company, not as agricultural business, which might be more appropriate in some contexts.

Ego Networks

In the following section, I will analyze a few democratic organizations' network. The ego networks are based on the network as a whole, and not just the core of the network. I will choose a select few organizations from different sectors, which features in the history of democratic companies. I will therefore analyze Thy Sparekasse (Bank), Arla (Dairy Co-operative), Coop (Supermarket chain), RAH's (Utility company) and VikingGenetics (A cattle semen retailer) and their networks. All of these are in the appendices from 7 to 10.

Thy Sparekasse

Sparekassen Thy is a consumer-owned bank. The bank has seven ties. However, in effect it is only to three organizations; Maabjerg Energy Center, Vest Forsyning and Hanstholm. Vest Forsyning is a publicly owned utility company, which is represented by four companies in Sparekassen Thy's Network; Vest Forsying, heating, electricity, water, and wastewater. Maabjerg Energy Center is a biogas supplier and lastly, Sparekassen Thy is connected to two entities of the Hanstholm cooperate family which is a transport company. Thy Sparekasse's connections are to companies located in the same area as Thy Sparekasse. Hanstholm and Måbjerg are areas located around Thy. Vestforsyning has their headquarters in Holstebro, not far from Måbjerg, in fact. Furthermore, none of these companies are in the same industry as Thy Sparekasse, and rather the ties that Thy Sparekasse has is to their local environment. This makes sense given their organizational goals, which is to be the best bank in the local area. Thereby, the mission of the bank is to be locally embedded.

Arla

Arla is represented by five nodes in this network: Arla Foods AMBA, Arla Food Holding A/S, and Arla Foods Ingredients Groups P/S. Their network contains CBI GP ApS and Fidan A/S which are also a subsidiary of Arla. Arla is connected to Rynkeby Foods and Cocio International, which are two food producing companies outside the Arla family. Arla is also connected to Remien Holding APS and Himmerland Erhverv APS, which are two property management companies. They are also connected to Ryk-Fonden, which is a foundation which gives out scholarships. Lastly, they are connected to Mejeriforeningen, which is the Danish Dairy Association, a collection of Danish dairy companies.

Arla is connected to the same industries which are themselves a part of, by being connected to Rynkeby, which is known for their juices and Cocio, a chocolate milk brand. Furthermore, being connected to the Dairy association links Arla to other companies within the same industry, although the connects are indirect. Remien Holding is a property renting company which is located in Århus, the same city as Arla has its headquarters.
Furthermore, Ryk-Foden connects Arla to Danish Crown, another very large Danish agricultural Co-operative.

Coop

Coop is a Danish consumer-owned supermarket chain. There are three Coop nodes in the network; Coop Danmark, Coop Trading and Coop Holding. These companies are connected to Travelmarket A/S, a travel agency, Osuma.dk a supermarket, Kulturøen, which is a community center and to Direct Gruppen A/S a consultant agency. Coop's network is not that large compared to Arla's for example, and within its own industry it only has one tie, otherwise, Coop is connected to a smaller travel agency and consultancy.

RAH

The second to last organization I will investigate is RAH. RAH, which stands for Ringkøbing Amts Højspændingsforsyning, is a consumer-owned energy provider for the Ringkøbing area. RAH has two companies in the network, RAH Service and RAH Net. They are connected to Vestjystudvikling A/S, an investment company focus on the Western Part of Jutland, Hydromann Holding, a holding company for property management companies, Iron Pump Ejendomme A/S another property management company and Conset A/S a company that sells desktops. Like Thy Sparekasse, RAH's connection is mostly to companies in their local area. With the exception of Hydromann Holding, which is located in Søborg, all the connections are to companies in eastern Jutland.

VikingGenetics

The last organization I will look at is VikingGenetics, which is a co-operative that sells cattle semen. Viking-Genetics is the largest, independent, democratic firm in the network without any connections. Despite begin large with 53 million DKK in assets and a co-operative for firms in Denmark, they are not connected to anyone.

Conclusion of the Descriptive Analysis

This part of the analysis has shown that democratic organizations seem to more often connect to other democratic organizations; compared to how often non-democratic organizations are connected to democratic organizations. There is, however, not as democratic sector as such, and democratic organizations more often connect to companies within their same industry. Furthermore, democratic organization also seem to make connections within their local areas and remaining locally rooted through their connection to local businesses. This is in line with the theoretical outline of Burt's concept of social capital. Social ties are more easily formed between nodes that share some similarities. The similarities found, is being within the same industry and having the same corporate governance.

Table 1		Tabl	e 1
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Table 1 Descriptive statistics for companies in the network							
				Vari	able values		
Variables	n	Minimum	1st Qu	Median	Mean	3rd Qu	Maximum
Betweenness	18,093	0.00E+00	0.00E+00	0.00E+00	2.42E-05	0.00E+00	4.72E-03
Degree	18,093	0.00	0.00	0.00	1.54	2.00	39.00
Constraint	18,093	0.09	0.93	1.00	0.88	1.00	1.00
Number of Rolls	18,093	1.00	2.00	2.00	2.58	3.00	18.00
Employees	7,739	0.00	1.00	5.00	17.36	10.00	1000.00
Assets	374	1.00E+00	5.46E+06	3.60E+07	4.89E+08	1.94E+08	1.95E+10
Profit and Loss	374	-1.34E+08	-3.52E+04	1.52E+05	1.44E+07	3.38E+06	5.75E+08
Age	18,085	1.00	8.00	12.00	13.05	16.00	115.00
Democratic Companies	430						

Table 2 Industries in the network	
Industries	n
Dealership of cars and motorcycles	3291
Banking, Finance and Insurance	2783
Property	2728
Liberal, scientific and technical services	2070
Production Enterprises	1428
Information and Communications	1379
Construction	1213
Administrative services	883
Transport and handling of goods	516
Hotel and restaurant business	346
Agriculture, hunting, forestry and fisheries	327
Medical and social services	241
Culture, amusements and sport	230
Electricity, gas, and heat distribution	222
Other services	154
Water supply, sanitation, and cleaning of earth and water	131
Teaching	102
Raw material extraction	35
Unknown	10
Public defense and health insurance	3

Statistical Analyses:

The following sections will be the statistical analysis of the network. The results are presented in ascending complexity. Firstly, I will go through the summary statistics of my variables. I will also present a Pearson correlation matrix, in order to investigate the various connections within the dataset. I will then present the regression, and lastly, I will discuss the assumptions behind the OLS regression as they relate to my analysis.

Summary Statistics:

Network Metrics

The network as an entity in itself can be described using various metrics. It is possible to compare different networks using these metrics-. They will not be used directly in answering my research question, as I do not compare different networks to each other, however they still give an a picture of the network as a whole. The network contains 18,093 nodes and 13,903 edges; this means that the average degree is 0.76. The diameter of the network is 38, which is the longest path between two nodes while the average path length is 13.4.



Degree

Most nodes in the network are not connected to any other node. Out of the 18,093 nodes, 9,674 are not connected to any other node and the most connected node has 39 connections. The distribution of degrees is therefore very unequal. In fact, the distribution is close to a 20/80 distribution, as the 22 % best connected organizations have 80 % of the connections. Figure 6 is the distribution of degrees in the network. It shows that most organizations have very few connections and that only a very small number has more than 10 connections, 342 to be exact.

Betweenness

The value of normalized betweenness ranges from 0 to 1, in which 1 would have all possible paths between any node pass through one single node. The highest value is only 0.0047 in my network, meaning that 4.7 ‰ of all possible paths pass through one node. Betweenness is even more unequally distributed than degrees. Only 2,506 of the nodes in the network has any betweenness value. 386 companies make up 80 % of the sum of all betweenness value in the network. 386 is 15 % of all companies with any betweenness value and 2 % of the companies in the network. Figure 7 shows the distribution of betweenness value, and it is clear that betweenness value very quickly drops off.



Constraint

Constraint is a local measure, unlike betweenness that is a global measure. Therefore, it is not unequally distributed in the same manner as betweenness and degree. It is more flatly distributed around 0.5 when removing all nodes with the value of 1. As nodes with 0 ties has a constraint value of one, this is the most common value for constraint and thus skewing the data in that direction. Figure 8 is the distribution of constraint values, excluding values of 1. (In the figure, it rounds some numbers to 1, so it appears as if that is their value). This is to be expected, as it is a local measure, which means that organizations which are otherwise on the fringes of the network, by for example, having long average paths to the rest of the network and thereby have low betweenness value, can have still have a low constraint value.

Explanatory Variables

Leadership size

The leadership size of the various companies does not vary that much, with most companies having less than 5 people in their leadership and a mean of 2.58. While there are a few outliers with many roles, only 122 companies have more than 8 people in their leadership.



Employees

The employee variable is the first variable with many missing values. Only 7,739 companies have provided their employee numbers. Most companies are small and medium-sized businesses and have 49 employees or fewer, with the average being 17.36 (using the lower interval as the numeric value). There are only 288 companies with more than 100 employees. In figure 9 is the number of employees registered by the CVR-registry. The intervals are given by the data from the CVR registry.



Age

The age of the companies is 13.5 on average, and the oldest company in the dataset is 115. The median 50 % is 8 to 16 years old. Figure 10 shows the distribution of ages in 5 years categories. It shows a sharp drop off from the 16-20 category to the 21-25. I do not know why is occurs. It could be a naturally occurring phenomenon, in which most companies were created after 2000. More probable, it is some kind of coding phenomenon, in which companies have been approved or recorded in the CVR registry after 2000. It is therefore likely that this represents a data error, which needs to be considered.



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Economic Data

The economic data has many missing values, as it for democratic organizations only. Therefore, for assets and profit/loss, there is only 374 observations, and for revenue, there is 201. The economic capabilities of the companies are very skewed towards the high end, with the average assets being 14 times higher than the median, which similar ratios for profits and revenue. Figure 11 shows the distribution of assets in the dataset. Note the logarithmic scale. It shows the unequal distribution of assets in the network, with a few companies having the most assets. 32 (the top 8%) of the richest companies owned 80 % of the assets.



Industries:

Table 2 contains a list and frequency of industries present in the dataset. The most common industry is distribution of cars and motorcycles, followed by banking, Finance, and Insurance, and property management.

Table 3	Between-	Degree	Con-	Demo-	Number	Employ-	Assets	Profit	Revenue	Age
Pearson-pair-wise correlation table	ness		straint	cratic	of Roles	ees				
				Company						
Betweenness	-									
Degree	0,402***	-								
Constraint	-0,389***	-0,855***	-							
Democratic Company	0,072***	0,074***	-0,092***	-						
Number of Roles	0,208***	0,328***	-0,373***	0,181***	-					
Employees	0,106***	0,094***	-0,116***	0,090**	0,133***	-				
Assets	0,312**	0,142**	-0,162**	NA	0,105*	0,346**	-			
Profit	0,315**	0,163**	-0,167**	NA	0,111*	0,280**	0,639***	-		
Revenue	0,350**	0,146*	-0,155*	NA	0,152*	0,445**	0,651***	0,488**	-	
Age	-0,001	-0,045**	0,038**	0,063***	0,051**	0,120***	0,063	0,082	0,149*	-
Agriculture, hunting, forestry and fisheries	0,025**	0,042**	-0,044**	-0,000	0,007	0,001	0,107*	0,053	-0,014	0,028**
Liberal, scientific and technical services	0,000	-0,002	-0,001	-0,004	0,025**	-0,016	-0,033	-0,021	-0,005	0,036**
Hotel and restaurant businesses	0,012	-0,028**	0,022**	-0,017*	-0,008	-0,031**	0,001	-0,032	-0,029	-0,039**
Dealership of cars and motorcycles	-0,009	-0,011	0,009	-0,005	-0,019**	-0,004	-0,031	-0,025	-0,015	-0,011
Medical and social services	-0,044**	-0,047**	0,066***	-0,012	-0,043**	-0,039**	-0,091	-0,057	0,000	0,042**
Administrative services	0,039**	0,089***	-0,099***	0,001	-0,016*	-0,048**	-0,013	0,091	-0,064	-0,000
Production enterprises	-0,010	-0,031**	0,023**	-0,025**	-0,011	0,010	-0,026	-0,038	-0,018	-0,034**
Transport and handling of goods	-0,023**	-0,030**	0,036**	-0,022**	-0,038**	-0,017	-0,047	-0,036	-0,017	-0,018*
Property	0,002	-0,004	0,008	-0,014*	0,039**	0,098***	0,111*	0,199**	0,285**	0,051**
Information and communication	-0,008	-0,027**	0,023**	0,044**	0,005	-0,001	-0,043	-0,032	-0,021	-0,000
Construction	-0,002	-0,012	0,010	-0,006	-0,014*	0,034**	-0,053	-0,035	-0,023	-0,033**
Other services	-0,009	-0,024**	0,026**	0,007	-0,009	-0,008	-0,025	-0,019	-0,009	-0,007
Banking, finance and insurance	-0,004	-0,021**	0,017*	-0,011	-0,000	-0,001	-0,018	-0,015	NA	-0,023**
Teaching	0	-0,015*	0,014*	-0,018*	0,016*	0,032**	-0,020	-0,013	NA	0,000
Culture, amusements and sport	0,012	0,004	-0,011	0,027**	0,060**	-0,015	-0,051	-0,037	-0,017	-0,004
Water supply, sanitation, and cleaning of earth and water	0,002	0,033**	-0,025**	0,140***	0,116***	0,009	0,053	-0,020	-0,045	-0,037**
Electricity, gas, and heat distribution	0,002	0,075***	-0,072***	0,127***	0,068***	0,055**	0,063	-0,058	-0,015	-0,024**
Public defense and health insurance	-0,003	-0,010	0,009	-0,003	0,003	NA	NA	NA	NA	-0,012
Unknown	0,001	0,005	-0,005	-0,002	0,013	NA	NA	NA	NA	-0,009

Signif, codes: <0,001 '***' 0,01 '**' 0,05 '*' 0,1 ','

Pairwise, Pearson Correlation

Table 3 is the pairwise Pearson correlation between the variables. I will not go through all pairwise correlation; instead, I will note what I have found interesting, as it relates to my research question.

Network Data

The three network metrics all correlate in the direction that is expected. Degree and betweenness are positively correlated, with degree explaining about 42 % of the variation in betweenness centrality. Furthermore, the number of degrees can explain 85 % of the variation in constraint. This is expected, as, in order to occupy a brokerage position, one needs at least two ties. Moreover, since most nodes do not have ties, they cannot have betweenness and their constraint value would be hard coded as 1. Furthermore, it is easier to occupy brokerage positions, if a node has more ties. So, while the network metrics to measure different aspects of social capital, they are highly correlated.

All the network metrics point towards democratic companies being more often in brokerage positions. Between 7 and 9 percent of the change in degree, betweenness, and constraint explained by whether a company is democratic.

Control Variables

Leadership Size

The number of leadership positions has a positive impact on brokerage possibilities for the companies. Between 20 and 37 % of the variation in degree, betweenness, and constraint can be explained by the variation in leadership size. This is not very surprising, as adding more people into the leadership increases the chance of that company now being connected to another company. Furthermore, democratic companies have more people in their leadership than other companies. One possible explanation is that democratic organizations are also larger, as counted by the number of employees, which also correlate with leadership size. Larger and older organizations also have more positions in their leadership.

Age

Older organizations have fewer degrees and higher constraint values but they do not have lower betweenness centrality scores. They are more often democratic and larger when measured on employee numbers. However, as noted before, the age variable should be interpreted with caution.

Size

The number of employees account for about 10 % of the variation in degree, betweenness, and constraint. Larger organizations, therefore, have more possibility for brokerage positions and in general have more ties than smaller organizations. Larger organizations are also more commonly democratic, explaining 9% of the variation.

Economic Variables

The economic variables cannot correlate with democratic organizational type, as only democratic organizations have economic data available. The number of assets that the firm possess can explain 31 % of the variation in betweenness centrality. It is, therefore, a stronger predictor than employment size. That can be explained with two data-related reasons. First, assets are given precisely, and not in intervals, like employee numbers. Furthermore, not all companies that report their profits also report their employee number. All the economic variables correlate positively with brokerage possibility. Higher assets also correlate with more persons in the leadership.

Industry

Some industries are better connected than others are, but in general, industry-type is not a very strong predictor of social capital, explaining maximum 8.9 % of the variation. However, the average variation in network metrics explained is 2 %. The industries with the most ties are agriculture and administrative services. The medical and social service industry has fewer social ties than the rest. However, it seems that while most of the industries are relatively even on the number of ties, the brokerage possibilities are not the same. Agriculture and administrative services are joined by water and electricity companies in having higher betweenness scores, while liberal services, social and medical, production enterprises, transportation, information, banking and finance and the 'other' category all have lower betweenness scores. These industry trends are also mirrored in their constraint scores.

Democratic Industries

Democratic organizations are more prevalent in water management, electricity, culture, and information industries. On the other hand, democratic organizations are less prevalent in hotel and restaurants, production companies, transportation, property management, and education. That democratic companies are overrepresented in water and electricity management, is to be expected, given the history of these industries, which is driven by consumer-owned and municipal companies. It is more surprising, that they are not common in the agricultural sector. This can maybe be explained by the consolidation that has happened within the Danish cooperatives in that industry, and the large Danish co-operatives are not sufficient in numbers to make the category statistically significant (Grelle, 2012). It is also very surprising that Democratic organizations are not a larger part of the property management category, given the common occurrence of occurrence co-operativehousing (Democratisk Erhverv, 2019). However, the co-operative-housing companies might be removed in the leadership-role filter, as they often do not report their leadership and are therefore not in the dataset.

Overall, it seems, based on the simple and naïve analysis of pair-wise correlations that democratic organizations are better connected than their non-democratic counterparts are. They have a higher degree and betweenness values and lower constraint values than non-democratic organizations. However, democratic organizations also have a higher number of roles than non-democratic, which might explain the higher connectivity. They are larger as well, which is another confounding factor on brokerage possibility.

Profit is positively linked with degree, betweenness and negatively correlated with constraint, so it seems that at least in this naive analysis, that social capital, and brokerage especially, is linked to economic performance. Furthermore, all the economic variables correlate positively with each other, which is to be expected. Of course, there is a general correlation between size and social capital, which could explain the link between profits and the network metrics. While this correlation table shows many things of interest, it would be wrong to conclude anything about causation Because of confounding factors, which might explain the variation in social and economic capital.

Regressions

Appendices 11-14 show the four regressions in their entirety with degree, betweenness centrality, constraint, and profits as the dependent variables. In table 5 below there is a shortened version.

	Degree	Betweenness	Constraint	Profit
(Intercept)	-0,70***	-6,01E-05***	1,074***	1,15E+07
Democratic Company	0,33'	4,99E-05***	-0,066***	
Log of Employees	0,17***	6,46E-06***	-0,014***	
Number of roles	0,64***	2,18E-05***	-0,056***	
Age	-0,00*	-5,09E-09	0,000	-1,37E+07
Constraint				-1,39E+07
Assets				2,99E-02***
Industries				
Other services	-0,54*	-4,65E-06	0,043	1,35E+06
Construction	-0,04	1,16E-06	0,015**	-6,85E+05
Electricity, gas, and heat distribution	0,94*	-2,44E-05	-0,086	-2,15E+07
Dealership of cars and motorcycles	-0,05	3,38E-06	0,008***	8,31E+06
Property	0,78***	3,16E-05**	-0,055	1,63E+07
Production enterprises	0,09	1,11E-05	0,003	1,37E+07
Information and communication	0,11	1,25E-05	-0,009	-8,68E+06
Culture, amusements and sport	-0,25	-8,89E-06	-0,000	1,58E+06
Agriculture, hunting, forestry and fisheries	0,03	7,75E-06	0,002	-1,66E+06
Liberal, scientific and technical services,	0,08	2,46E-05**	-0,005	-8,29E+06
Hotel and restaurant businesses	0,14	8,77E-06	-0,009**	-1,06E+06
Banking, Finance and insurance	0,53***	2,30E-05*	-0,036	-8,41E+06
Raw material extraction	-0,31	-5,76E-06	-0,007	
Medical and social services	-0,19	2,23E-05	0,008	-6,32E+06
Transport and handling of goods	-0,17	1,24E-05	0,016	
Teaching	-0,28	-8,53E-07	0,031	-2,93E+06
Nater supply, sanitation, and cleaning of earth and water	0,50	-4,82E-06	-0,040***	-1,37E+07

Regression One; Degree

Model one predicts the number of ties of each company, with "democratic company" being a dummy variable, the log of the number of employees, size of the leadership, age of the company, and industry type as independent variables. The regression explains 15 % of the variation in degrees (R^2).

Industry

The regression has administrative services as the default industry; this means that the estimated impact of the industry is in relation to that. This means, that, for example, "other services" has estimated 0.54 fewer ties than administrative services. Beyond "other services", no other industry has fewer ties than administrative services. Electricity, property management, banking, finance, and insurance industry have more ties.

Age

The age of the company does have an effect on the number of ties that a company has. In the Pearson correlation table, it also had an impact, but in controlling for other variables, the independent effect of age on degree has been dampened. Every one-year increase in age leads to 0.005 increase in degree. This means that the oldest company in the network would have 0.575 more ties than the youngest. It is, therefore, a minor effect.

Size of Leadership

The size of the management still has an independent effect on the number of ties that a company has. Every increase in management by one, leads to an increase in degree of 0.64 and is therefore quite significant in determining the social capital of the company. The average degree was 2, the average company would increase their ties by 32 % by a new person into their leadership.

Size of Company

The size of the company, here measured by the log of their employee number, has an independent and significant effect. One log increase of 1 in employee number leads to an increase of 0.17 ties. This would mean, that a company with 1000 employees would have 1.1 more ties than a company with 0 employees. However, this is also controlling for the size of the leadership, which also increases with the size of the company.

Democratic Organization

The democratic nature of an organization does not have a statistically significant impact on the number of ties. Democratic organizations have 0.33 more ties than non-democratic organizations, but the p-value is 0.07 and therefore outside the traditional 5% confidence interval. I will, therefore, conclude the democratic companies, in my analysis, do not have more ties than non-democratic companies do.

Regression Two; Betweenness

The next model uses the same independent variables in order to predict betweenness centrality, instead of degree.

Industry

Liberal and scientific industries, banking, finance, and insurance and property management industries all have significantly higher betweenness values. Banking and property management industries also had higher degrees, so that would explain why they have higher betweenness values. The liberal and scientific industries did not, instead, the explanation must be, that the ties that they do have are better than the rest. The industry effect ranges from $2.46 \cdot 10^{-5}$ to $3.16 \cdot 10^{-5}$. In contrast, the average betweenness centrality score is $2.42 \cdot 10^{-5}$.

Age

Age of the company does not have a significant effect on the betweenness centrality. The minor effect on degree does not translate into a significant difference in betweenness centrality.

Size of Leadership

The size of the leadership has a significant and independent effect on betweenness centrality. Given the leadership size's effect on degree, this is not surprising. Increasing the number of people in the leadership corresponds to increasing the betweenness with 2.18·10⁻⁵.

Company Size

Company size increases the betweenness centrality of companies. The slope of the employee variable corresponds to increasing the betweenness value with $4.46 \cdot 10^{-5}$ from a company with 0 to one with 1000+ employees.

Democratic Organization

Being a democratic company has an independent positive effect on betweenness centrality. Democratic organizations have a higher betweenness score of $4.99 \cdot 10^{-5}$. In other words, it has more of an effect than being in the largest firm category or being in the best-connected industry. It seems as if, that even if democratic organization do not have more ties than other organizations, but they more often bridge structural holes.

A Note on the R^2

The explanatory power of this model is low. Only 5 % of the variation can be explained using this model. I will return to this issue, when I discuss the assumptions behind the OLS regression.

Regression Three; Constraint

The third regression is running the same regression as before, but on constraint, rather than betweenness.

Industry

The construction, and car and motorcycle dealerships are more constrained than other industries. Hotel and restaurant and water supply business are less constrained than other businesses. The fact that none of these industries had statistically significant results in the betweenness centrality regression is curious. Betweenness and constraint do measure brokerage positions differently, and betweenness and constraint was 'only' correlated 38 % in the Pearson correlation table. However, it would still be expected that the same industries that have high betweenness centrality values would also be less constrained. The explanation might be that, industries with higher betweenness scores, but not lower constraint, are more present in the center of the network, but they are no per say better connected. The reverse can be said about industries with higher constraint and lower betweenness, they are not more centrally located, and instead they have better local ties. This could explain, that the local measure, constraint, gives a significant result, but the global measure, betweenness centrality, does not.

Age

In this regression, age does not have an independent significant effect on constraint.

Size of Leadership

Again, the size of leadership contributes positively to a company's brokerage position. Each person added to the leadership decreases the constraint value by 0.056. In contrast, the average constraint value is 0.88.

Company Size

Number of employees affect the company's ability to occupy brokerage positions. The largest company's constraint value is expected to be 0.097 lower than the smallest company is

Democratic Organization

Lastly being a democratic organization also lowers the constraint value of the company by 0.066. It is thereby more significant than adding one person to the leadership.

The control variables, age, leadership size, company size, and democratic organization are significant in both the betweenness and constraint regressions, which is good, as these two network metrics should negatively correlated. This third regression also has a much larger explanatory power than the second does. The constraint regression can explain 18 % of the variation, while the betweenness regression could only explain 5 %.

Regression Four; Profit

The last regression predicts profits based on age, constraint, assets, and industry type. Democratic Organization, employee numbers, and leadership number are dropped as independent variables. Democratic organization, because only democratic organizations have economic data available. Employee numbers, because assets are used as proxy for the size of the company and because not all companies had employee number, therefore this variable was left out. I also removed leadership size as it was deemed to not matter, as long a social capital variable was included. Constraint was chosen for the social capital metric to be presented here, as, it being the local measure, would best capture the social capital at the company's immediate disposal⁴. Only assets were statistically significant in determining the profits of the company. It explains 59% of the variation. Age was not statistically significant in the pairwise correlation with profit, so that is not in the regression either, it not surprising. Constraint does not have an independent effect on profits either.

Assumption Tests

Before concluding on the regression, I will to go through the assumptions that is the basis of the OLS regression, and I will test if they are violated. The three assumptions I will be testing for is, no influential outliers, homoscedasticity and linearity. Appendix 15 includes 4x4 tables, which controls these assumptions for each regression. I will do through the regressions' assumption tests one by one.

One assumption, already tested, is multicollinearity. Consulting the Pearson-correlation table it is visible shown that none of the independent variables are too closely correlated to establish an independent effect on the dependent variable (Agresti & Finlay 2012).

The diagrams in the appendices show:

<u>Quantile-quantile</u> plot of residuals, and should ideally be a straight line, as that would indicate a normal distribution of the residuals of the dependent variables. <u>Residuals vs fitted plot</u> it shows the expected values of the observation and its residuals (the error term). This plot is used to check for homoscedasticity and linearity.

⁴ I did run regressions using degree and betweenness as the dependent variables, and the results were similar

<u>Residuals/leverage</u> plot, with Cook's distance lines. A Cook's distance of more than 0.5 is deemed to be influential and with high leverage on the regression. Any such outlier should be concerning, as they might negatively affect the quality of the regression. <u>Scalar location plot</u>, which show if residuals are equal as the predicted increase and can be used to check homoscedasticity. If any of these assumptions are violated, it means that the OLS regressions are less reliable.

Degree

Outliers

Consulting the residual and leverage plot, it shows that, while there are a few observations with very high leverage, their residual scores are very low, and therefore, they do not raise concerns as to the quality of the regression.

Homoscedasticity and Linearity

The residuals are not distributed normally. This is most evident in the residual vs fitted plot, in which it is clear, that residuals about the fitted value have higher a higher numerical value that the ones below. This means, that the model is bad at predicting high values, and therefore the residuals are tailed in that direction. This is most likely due to, most companies have relatively few ties, and the model is not fed any independent variable which can differentiate when a company has relatively few ties and a many. The distribution of errors does not seem to increase as the fitted values increase, so that part of the assumption is not violated. However, in the scalar-location plot, it shows, that as the fitted value increases, the residuals do as well, there are however not many data points, as we move further out, so their effects are minor.

Normal Distribution

The QQ-plot shows a heavy skew to the right, as high numbers of degree are way off from the normalized distribution. The normal distribution of degree is violated. In conclusion, the degree regression does violate some of the OLS regression assumptions; normal distribution and homoscedasticity.

Betweenness

Outliers

On the residual and leverage plot of the betweenness regression, there are a few observations with high leverage and some with high residuals, however, none of them have both high residuals and high leverage. So, there does not seem to be any cause for concern.

Homoscedasticity and Linearity

The betweenness regression contains some of the same problems as the degree regression, with violation of homoscedasticity assumption. The residuals increase as the fitted value increase and the model is not good at guessing large values, resulting in a residual skew.

Normal Distribution

The QQ-plot of the betweenness regression is like the degree plot, with a large skew towards higher numbers. In conclusion the regression violates some of the OLS regression assumptions.

Constraint

Outliers

The constraint regression does, like other two, no influential outliers, in the leverage vs residual plot.

Homoscedasticity and Linearity

The residuals decrease as the constraint value increase. In the scale-location and residuals vs fitted value plot, the observations with the value of 1 are very visible, leaving a "trail" in the regression. These two plots, like the previous two regressions, indicate that this regression does not follow the homoscedasticity assumption.

Normal Distribution

The QQ-plot of the constraint value is the reverse of the degree and betweenness regressions, with a skew towards lower values. The reasons for the diverse direction, is that brokerage in degree and betweenness is associated with higher values, while they are associated with lower values in constraint. In conclusion, this regression also violates the OLS assumptions.

Profit

Outliers

Unlike the other regressions, this one does indeed have a few influential outliers. One with a Cook's distance of more than 0.5 and one with more than 1. These could be skewing the results.

Homoscedasticity and Linearity

The two outliers are also visible in the residual vs fitted and scale-location plots. When not taking them into account the fitted vs residual plot does indeed seem to fulfill the assumption of homoscedasticity and linearity. However, the scale-location does slightly lower residuals, in the lower end, but it is not as extreme as the network metrics.

Normal Distribution

The QQ-plot for the profit regression shows a heavy tailed output, and it therefore violates this assumption. In conclusion, this regression does violate the OLS assumptions, but not as heavily as the network metric regressions.

The regressions for network metrics suffer from the violation of the OLS assumptions. Therefore, the results of the regressions should be taken with caution, as the standard errors and therefore the p-value of these regressions are affected by the assumptions' violation. For the regression on profit, there are a few outliers, however given the non-result of the regression I did not remove them.

Conclusion of the Analysis:

My analysis show that democratic organizations are an integrated part of Danish business community. They have connection throughout the network of Danish businesses. Democratic organizations do more often connect with other democratic organizations, than would be expected if their connections were random. There is however, there is no democratic cluster as such, as there is not a large clique of organizations that are tied together. Instead, organizations in general, seem to leadership overlap with organizations that are within the same industry and/or local area.

Democratic companies only have more ties than other companies when not controlling for other employee numbers, leadership size, age of the company and their industry. Both company size and number of roles are also significant factors in number of degrees. Similarly, there are statistically variations among the industries. However, while democratic organizations do not have more ties than non-democratic companies, they more often occupy brokerage positions within the network. This can be seen in their increased betweenness centrality scores, and with their lower constraint score.

Looking at profits, the variable for democratic companies is dropped, as well as the variable for the number of employees, as I choose assets as a better proxy for the size of the company. In this regression, assets are the only significant variable in explaining the variation in profits. Therefore, even though social capital and profits are correlated, this does mean that social capital does not seem to affect the profits for these companies. This does not mean that social capital definitely does not have an impact on economic capital, because other research (See literature review) has shown that, board interlocks can produce positive results for a company's financial bottom line. However, a more complex approach is likely needed in order to establish any relationship. Overall, it can be concluded that democratic organizations more often are positioned as brokers within the network compared to non-democratic organization. The ties that they have are provide better brokerage possibility and they are therefore less constrained in their network. They also to have a larger leadership overall, which also contributes to a larger social capital. Moreover, there is no correlation between social and economic capital in this analysis.

Democratic Companies as Bridge Builders

Democratic organizations might more easily fill the role of a broker and that would explain why they have more access to advantageous positions within the network of Danish businesses. That they more often have brokerage positions is not driven by an increase in number of ties. An explanation can be that members of the leadership of democratic organizations are more easily trusted, and therefore board members of democratic organizations are more often bridge builders, as the resources spent by members of democratic firms' can be spent in sitting in bridge building board positions. Because, democratic and non-democratic organizations have the same number of ties, therefore, the amount of resources tied up is the same, but non-democratic organizations are more constrained. This might mean that they need the social trust that come with closure, more often than they need the information that comes with brokerage. Alternatively, that it is not possible to create connections outside their cluster.

We also saw how democratic organizations have social networks within their local area, and perhaps democratic organizations are more likely to be brokers within a specific regional area, especially if their organizational purpose is to embed themselves in their community. Thereby making sure that they have social ties to their local area. The reverse cause might also be true, in that local business want to engage with their local democratic organization, and therefore board members in those businesses seek to be elected for the democratic organizations' boards. However, the same phenomena might be true for non-democratic companies.

One thing to keep in mind is that the OLS assumptions behind these regressions are violated. The Homoscedasticity, linearity and normal distribution were all violated in the network metrics regressions. This means, that the results should be taken with caution, as these violations do indeed affect the quality of the OLS regression. Overall, it has the impact that the confidence intervals are not a reliable as they could otherwise be. Very large numbers of "0" values for betweenness, degree, and "1"'s for constrained might introduce some of the errors. The model might be better without them. However, it would be a mistake to remove them, as these are valid values for these variables.

Limitations and Further Research

In this chapter, I discuss some of the drawbacks of my research design, the errors introduced to the analysis, and how improvement can be made to the overall thesis.

Variables

I have mentioned throughout the analysis some of the errors in the data, and before starting the discussion on what my finding means, I want to reflect on the errors in my data and their effect on my conclusions.

Firstly, the age variable seems to be wrong. The distribution is at least skewed in the direction of younger, and there is a very sharp drop-off for companies from before 2000. This is very likely some kind of data error, and therefore, this variable is much less reliable than desired.

Furthermore, while I did remove many subsidiaries from the network, I was not successful in completely removing them. As I showed with, for instance, Arla and Coop, they are represented in the network through multiple sub-organizations. This means, that the data is skewed towards organizations that organize through many different boards, as the board cannot be the same people, as those would have been removed in the coding. Nevertheless, Coop's way of organizing means, that their boards are different in the various sub-organizations as they fill different roles. One way to make sure, that this does not happen, is to incorporate the ownership data, which the CVR registry has, and together with the 80 % board overlap rule, I believe that it would mitigate this issue.

Another related issue is the fact that the merging technique I used only keeps one company name, and it is not obvious which companies have been included in a 'merger'. Therefore, the smaller of the two companies merged, can end up, as the final name in the network. This does not affect the statistical analysis, but rather the network mapping and interpretation.

Furthermore, given the collection of the data, in which the democratic nature of a company was determined in 2018 and the network data is from 2016, which might create some false positives and negatives. For example, Nordea Liv & Pension Livsforsikringsselskab A/S, is coded as a democratic organization, even though Nordea is not a democratic firm. The reason this error, is that the company was sold after 2016 to Velliv, which is a democratic firm. However, this is relatively minor and likely does not have a huge influence on the network.

Assumptions

One of the larger problems with my analysis, and specifically the statistical treatment of my data, is that the OLS regressions do not live up to the assumptions behind them. I have tried various ways of solving this issue. One potential solution was to log or square the dependent variable (see Appendix 16 for a regression and assumptions tests with the log of betweenness as the dependent variable); it did however not solve the problem. Another approach is to remove all 0-values (1-values for constraint) from the network metrics, and this did seem to improve the assumption. However, removing 0-values has two apparent problems. Firstly, it would remove a lot of data point. Secondly, 0 is a valid value for a network metric and removing them, would make the analysis less complete, so I, therefore, chose to keep them, even if the assumptions are violated.

Further Research

When it comes to the economic performance of democratic companies, a few improvements can be made for the analysis. Firstly, a better metric than mere profits could have been used. Profit is, in some regards, extraction and democratic companies, are often not profit focused (Grelle, 2012). Furthermore, companies, which desire to grow, might also run a deficit in order to do it. In my analysis, such an expansion would be seen as a negative performance. For this reason, a better metric than profit should be used. One way of approaching the creation of such a metric, which would also deepen the analysis, would be to add a time dimension to the analysis. This would allow for multiple new ways of looking at the network and performance. Firstly, by introducing an economic variable that looks at economic performance over time. For instance, growth in revenue, which others have used before (See Vedres & Stark, 2014). This would also make any causality link between economic performance and social capital clear, as it would allow for a fixed effect analysis. This would also allow for tracking the changes in the network and a look at how the different sectors, industries, organizational types, and so forth experience change in their social capital.

Within the current framework, of a single time frame, more complexity could still be added to the analysis. In this thesis, I have not worked with edge attributes that assigns codes to the ties between nodes. An example of such an edge attribute would be proximity. In my analysis, I noted that some democratic companies have many ties to other companies in their local area. By creating a systematic way of testing this (for example by marking when two companies are from the same town), the nature of the ties would be explored more in depth. Furthermore, I could include these attributes into the statistical analysis. This would also allow for a systematic approach to the claim that democratic organizations are more often tied to other democratic organization than non-democratic organizations are.

Introducing different types of democratic organizations could deepen the analysis, by providing a more complex understanding of how different organizational types use their social capital. Furthermore, like countries, not all company democracies are likely created equal, and as we have seen, there multiple different ways of organizing the commercial operations of a democratic company. For instance, doing like Coop, and have an AMBA and an A/S. It would seem likely that the exact democratic function of the company could influence the social capital of the company. One way this could happen would be through the process of finding directors, as different processes would likely produce different types of individuals, the social capital present in the leadership could depend on the specific process.

This thesis does have quite a few limitations and data errors, and much more could be learned from future work with the dataset, and especially more work on an expanded dataset would yield interesting insights into the nature of how democratic organizations are placed within the social network of Danish companies. However, I still contend that the findings are solid given the consistency in my findings across different statistical models. Therefore, when keeping in mind the various limitations, my findings are still useful in answering my research questions.

Discussion

In this chapter, I will reflect back on the literature on board interlocks and social capital in general and how it relates to my findings. I will also put my findings into the Danish business-historical context and the current public debate about democratic companies. First, I will discuss how generalizable my findings are.

Generalizability

My findings are specific to the Danish context, and a direct generalization of my findings to other national contexts would not be possible. This is a result of both the theoretical perspective and the choice of focus. As Scott (1991) has shown, the social capital that board interlocks signify and the mechanics driven by social capital varies from country to country. Therefore, findings of board interlocks in Denmark cannot be transferred to other social contexts. The specific case of democratic companies complicates any generalizability even more, as the history of democratic companies in Denmark is unique, and presumably democratic organizations in other national contexts are set-up differently and thereby, their positions in the social network are likely to be different.

Business and Politics

One of the interesting contrasts can be made from comparing it to "Magtens Atlas" (Larsen et al, 2016). Larsen et al. build their network from more types of organizations types than I do, as they include government, NGO's, and foundations. A wider array of organizations gives a wider selection of the types of relations and instances of social capital. Larsen et al find that the best-connected organization is the government's economic council, a political forum. Moreover, the best-connected companies are the largest companies. And while, in my findings, the larger the company is the more connected it is, it is not the absolutely largest companies which have the largest social capital, be that measured in degree or betweenness centrality. This suggests that the largest companies in Denmark are more closely integrated with the Danish political system, as they more often have ties to political forums. This goes for democratic organizations as well as non-democratic organizations. For instance, in the Confederation of Danish Industry's Business-Political Council, there are members from Arla and Danish Crown, two very large Danish agricultural co-operatives. These two organizations had relatively few connections in my analysis.

Democratic Companies in the Danish Context

The co-operative movement in Denmark started as a reaction to unstable economic conditions in the late 19th century. The co-operative movement in Denmark has roots with the socialist movement and the idea was to

"liberate the working class from the claws of the Bourgeoisie" (Grelle, 2012, p. 26). As such, co-operatives were seen as being an alternative to the capitalist, non-democratic businesses.

My findings show that democratic companies are tightly integrated with the Danish business community and do not appear to place themselves in opposition to non-democratic companies, given the many ties between the two organizational types. A large driving force in the creation of those ties seems to be similarities in industry and physical proximity between the companies. Democratic and non-democratic organizations are not so dissimilar that they cannot work together. Because if they were, there would not be the frequency of board interlocks as is visible in the data. This is due to the fact, that board interlocks, and social groupings in general, appear when the actors are similar. Both Burt (2005), in his social capital theory and organizational theory scholars like DiMaggio & Powell (1989) makes the argument that interaction implies similarity. These scholars show, that similarity breeds interaction and interaction breeds similarity. By this they mean, that board and organizations in general, socialize and maintains group practices through social capital and organizations, which act alike, are also more often interact. Therefore, social ties can be used as a proxy for organizational similarity.

The interaction and interlocks between democratic and non-democratic organizations indicate that democratic organizations are the normalized within the Danish economic system. Thus, it instead becomes merely a specific organizational choice rather than a protest against other organizational modes. Yet, this does not necessarily imply that the vision of a democratic economy is non-existent among Danish companies. Since the creation of the first co-operative, Danish non-democratic companies have implemented measures, which ensures the employees more rights and decision power. For instance, in Danish companies with more than 35 full-time equivalents, employees can claim to have a representative on the company board (Bekendtgørelse om medarbejderrepræsentation i aktie- og anpartsselskaber, 2012). Furthermore, Danish unions are some of the strongest in the world, and they often have close relationships with the corporate sector, thereby securing Danish employee a say in their working conditions (Campbell & Pedersen, 2007; Larsen et. al, 2016).

The integration of democratic and non-democratic organization can be seen as an expression of the hybrid variety of capitalism, explored by Campbell & Pedersen (2007). The Danish hybrid variety of capitalism is characterized by tight economic integration in the labor market, liberal market regulation, local coordination of labor rights and negotiation without state intervention. Within the framework of compatible national economic institutions, democratic companies could fit within the hybrid variety of capitalism. Democratic firms could coordinate with labor unions and it could happen locally while leaving out government involvement like non-democratic organization. Given democratic firms' integration with the rest of Danish businesses and their long history in Denmark, there is reason to believe that democratic organizations are a well-established entity

within the Danish economy. Although there does lack a systematic review of democratic organizations' integration within the political system. But given the findings of Larsen et al (2016), there is no reason to believe that democratic organizations are not as integrated into the political system, as they are in the economic. Therefore, given the nature of democratic companies, and their integration within the community in which they operate, be that in the local areas, with producers or consumer, the democratic organizational model is a good fit for the Danish variety of capitalism, and this might be the reason for the high social integration of democratic and non-democratic firms.

Current Debate

Recently, Danish parties left of the middle have proposed a series of reforms that they argue would make it easier to finance democratic companies in Denmark (See: Beim & Bæksgaard, 2019 & Enhedslisten, 2019). There have also been suggestions for tax-breaks for democratic companies. The motivation for these parties to propose this is that they view democratic organizations as being a potential solution to rising inequality, global warming, and an unfair market. On the other hand, the current government's response has been to call these proposals a backdoor to socialism and claim that liberal democracies, in the Francis Fukuyama sense, have been the only system that has produced true prosperity (Beim & Bæksgaard, 2019). What is interesting is that the debate makes democratic and non-democratic companies competing for organizational types that are in opposition to each other and pursue diverging goals. However, as I have shown the social network of companies in Denmark is not divided into democratic and non-democratic terms, and in fact, the two organizational types seem to blend.

A perspective from the social capital and board interlock literature is that democratic companies, through their placement within the social network of Danish business and their brokerage position might contribute to a more stable overall economy. As discussed in the literature review, research on boards in the US has shown that a more cohesive economic sector with more board interlocks can make companies act more long-term (Benton & Cobb, forthcoming). In this sense, the social capital of democratic companies viewed as a common good. Such an analysis of the Danish business network is reminiscent of Putnam's view on social capital, in which higher integration of the business environment benefits everyone (2000). If Benton & Cobb's findings hold true in the Danish context, as they do in the American, this would mean, that democratic companies companies to non-democratic companies, the introduction of more democratic companies more often create bridges compared to non-democratic organizations are more solid compared to non-democratic companies, the introduction of more internally integrated. Furthermore, combined with the fact that democratic organizations are more solid compared to non-democratic companies, they could, following the institutional isomorphism argument, make other Danish companies more solid, by affecting their

risk-willingness in general (Demokratisk Erhverv, 2019; DiMaggio & Powell, 1983). The isomorphic effect could also explain why democratic companies, that started out as part of a protest movement, over time became more integrated with the general business community, as they adopt practices from the community.

International Perspective

It is not only in Denmark that the idea of democratic companies is getting attention. In the UK, there is a political party dedicated to the co-operative movement, the Co-operative party, which currently has 38 of the 650 seats in the British House of Commons. The British Co-op network, called Co-operative UK, states that there are over 7,000 co-operatives in the UK (Co-Operative UK, 2019). Furthermore, the initial inspiration for creating co-operatives in Denmark came from France and the companies that had been created there (Grelle, 2012) and in the United States, Bernie Sanders is running on a platform of, among other things, revitalizing local communities through the establishment of co-operatives (Cohen, 2018). Clearly, the idea of the democratic organization is not unique to Denmark. However, since countries like the UK and US have a different variety of capitalism than Denmark, it is likely that democratic organizations would interact differently with the business community as a whole, and therefore their social capital would be different (Hall & Soskice, 2001). It is likely because inter-firm relations and relationships with unions and the state are quite different between varieties of capitalism, and therefore, board interlocks follow different patterns (Scott, 1991). Furthermore, the reason for the establishment of co-operatives in Denmark in the late 19th century was in large part a response to perceived unfair economic conditions and the lack of state-sponsored welfare to change those conditions for the working poor (Grelle, 2012). In that light, the motivations in the UK and US, for starting and maintaining democratic organizations might be different, as the state welfare is lower in these liberal market economies (ibid; Hall & Soskice, 2001). It would, therefore, be worth inquiry to investigating the social capital of democratic firms in these settings, and establish how different political and social contexts affect the network of businesses and the placement of democratic companies within them.

Conclusion

This thesis has shown that democratic firms in Denmark have social capital, which embed them within the larger Danish business community. Using a social network analysis and OLS-regressions to analyze the ties and, thereby, the social capital of democratic firms in Denmark, I have shown that democratic companies more often occupy brokerage positions than their non-democratic counterparts do. Companies, in general, seem to have connections to organizations that are like them, which means that industries typically cluster together. For democratic organizations, it means, that they more frequently have ties to other democratic firms than expected if the ties were random, compared to their non-democratic counterparts. There is, however, not a large democratic sector as such, meaning a group within the network solely consisting of democratic organizations. The pattern is instead the result of a higher number of democratic organizations within certain industries.

I have not been able to establish a link between social capital and financial performance. Nevertheless, it would be wrong to conclude that no such causal relationship exists. As the literature shows, the connection between social and economic capital has been hard to establish, and the findings are contradictory. In order to establish a proper relationship, a temporal dimension would have to be established and included in the analyses. Overall, there is still much to research regarding the social capital of democratic organizations in Denmark. For instance, I can conclude that the networks of democratic firms are often within the local areas of the businesses, however, what the conditions are for these relationships are; I am not able to explain fully.

The understanding of democratic firms in this thesis is that they are a type of organization that embeds itself at the core of the Danish business environment by occupying positions of brokerage within the network of Danish businesses. Democratic organizations manage to do this by having larger leaderships and by having ties which more often span across clusters of organizations. Despite having a history of being in opposition to the established companies in terms of purpose and organizational structure, today, democratic firms are closely aligned with other, non-democratic, organizations. The specific way, in which democratic and non-democratic companies interact, might be possible due to institutional isomorphism, driven by board interlocks. In this process, the two types of companies begin to adopt the same practices and strategies over time.

Within the current public debate about democratic companies, the promotion of these types of organizations becomes a way in which politicians can discuss the present economic issues. Democratic organizations are promoted by arguing that they can decrease income inequality, global warming, and corporate shortsightedness. What this analysis has shown, is that the corporate leadership of democratic and non-democratic firms intermingle within the network. This does not mean, that any of the claims about democratic firms are untrue,

but rather that the practices and behaviors in democratic and non-democratic firms are like to be similar. Whether a democratic market is a way of achieving a less polluted world or fairer economic system remains to be seen. What is evident is that a more interconnected corporate system is a more long-sighted one as democratic organizations are often the organizations that create the connections within the network. Furthermore, democratic firms are more solid and take fewer financial risks (Demokratisk Erhverv, 2019). Within this view, organizing the economy democratically might produce a less volatile economy, by increasing the amount of social capital within the system through the democratic companies' brokerage positions within the Danish business network.

References

- Abdollahian, M., Yang, Z., & Thomas, J. (2018). Relationships Matter: Directors and Revenue Performance in the Fortune 500 Network. Advances in Intelligent Systems and Computing, 594, 106-115.
- Adler, P., & Kwon, S. (2002). Social Capital: Prospects for a New Concept. Academy of Management Review, 27(1), 17-40.
- Agresti, A., & Finlay, B. (2009). Statistical methods for the social sciences (4.th ed.). Upper Saddle River, N.J: Pearson Prentice Hall.
- Bekendtgørelse om medarbejderrepræsentation i aktie- og anpartsselskaber (2012) BEK nr 344 of 30/03/2012 https://www.retsinformation.dk/Forms/r0710.aspx?id=141221
- Benton, R., & Cobb, JA. (Forthcoming). Eyes on the Horizon? Fragmented Elites and Short-Term Focus of the American Corporation. American Journal of Sociology, forthcoming.
- Beim, JH., & Bæksgaard, A. (2019, april 30th.). Rødt pres på Mette Frederiksen: Flere partier kræver, at borgerne får magten i flere private virksomheder, Politiken. Retrieved from: <u>https://politiken.dk/indland/art7166564/Flere-partier-kr%C3%A6ver-at-borgernef%C3%A5r-magten-i-flere-private-virksomheder</u>
- Burt, R. (2000). The Network Structure Of Social Capital. Research in Organizational Behavior, 22, 345-423.
- Burt, R. (2005). Brokerage and closure: An introduction to social capital. Oxford: Oxford university press.
- Burt, R. (2004). Structural Holes and Good Ideas. American Journal of Sociology, 110(2), 349-399.
- Burt, R. (2008), Appendix B, Measuring Access to Structural Holes. Retrieved from: <u>http://fac-ulty.chicagobooth.edu/ronald.burt/research/files/NNappB.pdf</u>
- Campbell, JL., & Pedersen, OK. (2007). The Varieties of Capitalism and Hybrid Success: Denmark in the Global Economy. Comparative Political Studies, 40(3), 307–332.
- Cohen, RM. (2018, december 26th) COULD EXPANDING EMPLOYEE OWNERSHIP BE THE NEXT BIG ECONOMIC POLICY? The Intercept. Retrieved from: <u>https://theinter-cept.com/2018/12/26/esop-plans-employee-ownership-bernie-sanders/</u>

Co-Operative party (2019) About. Co-operative Party. Retrieved from: party.coop/about/

- Co-Operative UK (2019) What is a Co-op. Retrieved from: <u>www.uk.coop/sites/default/files/up-loads/attachments/what_is_a_co-op_leaflet_final.pdf</u>
- De Noor, W. (2003) Fields and networks: correspondence analysis and social network analysis in the framework of field theory in Poetics Vol: 31, Issue: 5, Page: 305-327.
- DeMaggio, P. & Powell, W. (1983) The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields in The Sociology of Organizations (2003) p. 243-253. Published by Sage Publications
- Demokratisk Erhverv (2019) Danmarks Demokratiske Virksomheder. Copenhagen; Demokratisk Erhverv
- Egholm, L. (2014) Philosophy of Science. Hans Reitzels Forlag 1st edition.
- Enhedslisten (2019) Et mere Demokratisk Erhvervsliv. Enhedslisten. Retrived from: <u>enhedslisten.dk/temaer/et-mere-demokratisk-erhvervs-</u> <u>liv?fbclid=IwAR3Q5zkOR9yCz5B7aidf0fZdpY-</u> FupwpAoO2mv12vS288eY2FqJpx_mIXzvM
- Erikson, E. (2013). Formalist and Relationalist Theory in Social Network Analysis. Sociological Theory, 31(3), 219–242
- Fukuyama, F. (1989). The End of History? The National Interest,(16), 3-18. Retrieved from http://www.jstor.org/stable/24027184
- Granovetter, M. (1973) Strength of Weak Ties. In American Journal of Sociology, Vol. 78, No. 6 (May, 1973), pp. 1360-1380 Published by: The University of Chicago Press
- Grelle, H., Arbejdermuseet, & Arbejderbevægelsens Bibliotek og Arkiv. (2012). Det kooperative alternativ, arbejderkooperationen i Danmark 1852-2012. Kbh.: Arbejdermuseet Arbejderbevægelsens Bibliotek og Arkiv.
- Gurney, J.S. (2012). Gerrard Winstanley : The Digger's Life and Legacy, Pluto Press. ProQuest Ebook Central, <u>https://ebookcentral.proquest.com/lib/kbhnhh-ebooks/detail.action?do-</u> <u>cID=3386694</u>.
- Hall PA and Soskice DW (2001) An introduction to varieties of capitalism. In: Hall PA and Soskice DW (eds) Varieties of Capitalism: The Institutional Foundations of Comparative Advantage. Oxford: Oxford University Press, pp. 1–68.
- Hirsch PM. 1982. Network data versus personal accounts: the normative culture of interlocking directorates. Hirsch PM. (1982). Network data versus personal accounts: the normative culture of interlocking directorates. Pres. Annu. Meet. Am. Sociol. Assoc., San Francisco Pres. Annu. Meet. Am. Sociol. Assoc., San Francisco

- Joas, H. & Knöbel, W. (2009) Between structuralism and Theory of Practice. The cultural sociology of Pierre Bourdieu. In Joas, Hans & Knöbel, Wolfgang (2009): Social Theory; Twenty Introductory Lectures. Cambridge University Press
- Johansen, H. C. (2005) Gyldendal og Politikens Denmark historie, bind 17. Statistik og register. Gyldendal og Politikens forlag.
- Lamb, Nai H. & Roundy, Philip (2016) "The "ties that bind" board interlocks research: a systematic review", Management Research Review, Vol. 39 Issue: 11, pp.1516-1542
- Larsen, A. G., & Ellersgaard, C. H. (2019). Who listens to the top? Integration of the largest corporations across sectoral networks. Acta Sociologica, 62(1), 4–19.
- Larsen, A; Ellersgaard, C & Steinitz, S. (2016) Magtens Atlas Kort over netværk i Danmark. Foreningen for Elite- og Magtstudier
- Lin, Nan (2003) Social Capital A Theory of Social Structure and Action. Published by Cambridge University Press.
- Mizruchi, M. (1996). What Do Interlocks Do? An Analysis, Critique, and Assessment of Research on Interlocking Directorates. Annual Review of Sociology, 22, 271-298. Retrieved from http://www.jstor.org/stable/2083432
- Musial, K. (2014) Research Methodology. In: Alhajj R., Rokne J. (eds) Encyclopedia of Social Network Analysis and Mining. Springer, New York, NY
- Newman, M. E. (2016). Mathematics of networks. The new Palgrave dictionary of economics, 1-8.
- Putnam, R. (2000). Bowling alone, the collapse and revival of American community. New York: Simon & Schuster.
- Rousseau, R; Egghe, L & Guns R. (2018) Becoming Metric-Wise A Bibliometric Guide for Researchers Chandos Information Professional Series Pages 67-97
- Scott, J. (1991) Networks of Corporate Power, a Comparative Assessment. Annual Review of Sociology Vol. 17:181-203
- Scott, J. (2000): Social Network Analysis a handbook. SAGE Publications Ltd
- Vedred, B. & Stark, D. (2010) Structural Folds: Generative Disruption in Overlapping Groups. AJS Volume 115 Number 4: 1150–90
- Wasserman, S. & Faust, K. (1994) Social Network Analysis Methods and Applications. Cambridge University Press

Appendices

Appendix 1 Table of Industries

Industry	Count	Included	Industry	Count	Included
Administration af fast ejendom på kontraktba- sis	11	Yes	Administration af og bidrag til erhvervsfremme	66	Yes
Administration af sundhedsvæsen, undervis- ning, kultur og sociale forhold undtagen social sikring	148	Yes	Agenturhandel med blandet sortiment	93	Yes
Agenturhandel med brændstoffer, malme, metaller og kemiske produkter til industrien	8	Yes	Agenturhandel med landbrugsråvarer, levende dyr, teks- tilmaterialer og halvfabrikata	338	Yes
Agenturhandel med maskiner, teknisk udstyr, skibe og flyvemaskiner	306	Yes	Agenturhandel med møbler, husholdningsartikler og isen- kram	254	Yes
Agenturhandel med specialiseret varesorti- ment i.a.n.	62	Yes	Agenturhandel med tekstiler, beklædning, pelsværk, fod- tøj og lædervarer	29	Yes
Agenturhandel med tømmer og andre bygge- materialer	70	Yes	Aktiviteter vedrørende fysisk velvære	79	Yes
Aktiviteter, der udøves efter produktion af film, video- og tv-programmer	732	Yes	Aldersintegrerede institutioner	291	Yes
Almennyttige boligselskaber	3	Yes	Alment praktiserende læger	120	Yes
Almindelig rengøring i bygninger	715	Yes	Anden agenturhandel med føde-, drikke- og tobaksvarer	541	Yes
Anden anlægsvirksomhed i.a.n.	107	Yes	Anden bygge- og anlægsvirksomhed, som kræver speciali- sering	563	Yes
Anden bygningsfærdiggørelse	55	Yes	Anden bygningsinstallationsvirksomhed	4	Yes
Anden detailhandel fra ikke-specialiserede for- retninger	15	Yes	Anden detailhandel med fødevarer i specialforretninger	65	Yes
Anden detailhandel undtagen fra forretninger, stadepladser og markeder	54	Yes	Anden finansiel formidling undtagen forsikring og pensi- onsforsikring, i.a.n.	190	Yes
og grøntsager	108	Yes	Anden forretningsservice i.a.n.	254	Yes
Anden forsikring	101	Yes	Anden forskning og eksperimentel udvikling inden for na- turvidenskab og teknik	84	Yes
Anden fremstillingsvirksomhed i.a.n.	68	Yes	Anden it-servicevirksomhed	29	Yes
Anden måling og teknisk analyse	14	Yes	Anden pensionsforsikring	57	Yes
Anden personaleformidling	1	Yes	Anden reklamevirksomhed	3	Yes
Anden rengøring af bygninger og rengøring af erhvervslokaler	79	Yes	Anden restaurationsvirksomhed	33	Yes
Anden råstofindvinding i.a.n.	160	Yes	Anden teknisk rådgivning	235	Yes
Anden telekommunikation	7	Yes	Anden trykning	11	Yes
Anden udgivelse af software	128	Yes	Anden udgivervirksomhed	159	Yes
Anden udlejning af boliger	174	Yes	Anden undervisning i.a.n.	99	Yes
Andre forlystelser og fritidsaktiviteter	8	Yes	Andre former for institutionsophold	20	Yes
Andre hjælpetjenester i forbindelse med fi- nansiel formidling	25	Yes	Andre hjælpetjenester i forbindelse med forsikring og pensionsforsikring	102	Yes
Andre informationstjenester i.a.n.	17	Yes	Andre kreditinstitutter	78	Yes
Andre kreditselskaber	14	Yes	Andre liberale, videnskabelige og tekniske tjenesteydelser i.a.n.	61	Yes
Andre organisationer og foreninger i.a.n.	195	Yes	Andre overnatningsfaciliteter	14	Yes
Andre personlige serviceydelser i.a.n.	219	Yes	Andre post- og kurertjenester	72	Yes
Andre rengøringsydelser	26	Yes	Andre reservationstjenesteydelser og tjenesteydelser i forbindelse hermed	97	Yes
Andre sociale foranstaltninger uden instituti- onsophold i.a.n.	32	Yes	Andre sportsaktiviteter	141	Yes
Andre tjenesteydelser i forbindelse med trans- port	420	Yes	Anlæg af broer og tunneller	37	Yes
Anlæg af jernbaner og undergrundsbaner	21	Yes	Anlæg af ledningsnet til elektricitet og kommunikation	38	Yes
Anlæg af ledningsnet til væsker	29	Yes	Anlæg af vandveje, havne, diger og dæmninger	19	Yes
Anlæg af veje og motorveje	32	Yes	Apoteker	98	Yes
Arbejdsformidlingskontorer	2	Yes	Arkitektvirksomhed	288	Yes
Arkiver	794	Yes	Autoreparationsværksteder mv.	26	Yes

Avl af andet kvæg og bøfler	14	Yes	A
Avl af malkekvæg	61	Yes	A
Avl af smågrise	19	Yes	F
Banker snarekasser og andelskasser	526	Ves	F
Bohandling og bortskaffolse af farligt affald	1	Voc	
Pehandling og boltskarleise af fange analu	1	165	
holskadede	33	Yes	E
Blandet drift	61	Yes	E
Bogbinding og lignende serviceydelser	47	Yes	E
Boliganvisning, ferieboligudlejning mv.	424	Yes	E
Bortskaffelse af affald med energiproduktion	75	Yes	E
Brandvæsen	19	Yes	E
Duraching himraning of redningsumsen			C
mv.	10	Yes	E
Bygning af både til fritid og sport	1113	Yes	E
Børnehaver	72	Yes	(
Call centres virksomhed	528	Yes	(
Charter- og taxiflyvning	37	Yes	(
Computerprogrammering	<i>4</i> 17	Voc	
Computer programmering	417	Yes	
Dagcentre mv.	/8	Yes	L
Databehandling, webhosting og lignende ser- viceydelser	2511	Yes	0
Destillation, rektifikation og blanding af alko- hol	9	Yes	0
Detailhandel med andre varer fra stadepladser	64	Yes	0
og markeder Detailhandel med andre varer i.a.n. via inter-	10	Voc	r
net	45	res	
Detailhandel med belysningsartikler samt hus- holdningsartikler i.a.n.	3	Yes	0
Detailhandel med brød, konditori- og sukker-	13	Yes	0
varer Detailbandel med bøger kontorartikler musik			
eller film via internet	404	Yes	0
Detailhandel med drikkevarer	283	Yes	0
Detailhandel med elektroniske eller elektriske			0
apparater samt fotoudstyr via internet	44	Yes	s
Detailhandel med husholdnings- eller boligud- styr, bortset fra elektriske apparater, via inter- net	273	Yes	[
Detailhandel med kosmetikvarer og produkter til personlig pleje	55	Yes	[\
Detailhandel med medicin og produkter til	27	Voc	
personlig pleje via internet	57	res	
Detailhandel med musik- og videooptagelser	26	Yes	۵
Detailhandel med reservedele og tilbehør til motorkøretøier	7	Yes	0
Detailhandel med tekstiler, beklædningsartik- ler og fodtøj fra stadepladser og markeder	684	Yes	0
Detailhandel med tæpper, vægbeklædning og gulvbelægning	11	Yes	C S
Detailhandel med ure, smykker og guld- og sølvvarer	29	Yes	0
Discountforretninger	125	Yes	[
Distribution af film, video- og tv-programmer	201	Yes	0
Drift af betalingsveiebroer og -tunneler	135	Yes	0
Drift af teater- og koncertsale, kulturhuse my	2	Yes	г
Durkning of andra atôriga ofaredar	76	Vec	
Dyrkning at anule etalige digi guer	/0	162	L
rodknolde	344	Yes	0
Dyrkning af korn (undtagen ris), bælgfrugter og olieholdige frø	23	Yes	0
Dyrkning af træer og andre skovbrugsaktivite- ter	33	Yes	[

Avl af heste og dyr af hestefamilien	49	Yes
Avl af pelsdyr mv.	20	Yes
Babyudstyrs- og børnetøjsforretninger	88	Yes
Bedemænd og begravelsesvæsen	364	Yes
Behandling og bortskaffelse af ikke-farligt affald	6	Yes
Biografer	98	Yes
Blomsterforretninger	12	Yes
Bogføring og revision: skatterådgivning	1277	Yes
Boligtekstilforretninger	308	Yes
Botaniske og zoologiske haver samt naturreservater Brydning af pynte- og bygningssten, kalksten, gips, kridt og skifer	43 91	Yes Yes
- Byggemarkeder og værktøjsmagasiner	56	Yes
Bygning af skibe og flydende materiel	1083	Yes
Cafeér, værtshuse, diskoteker my.	66	Yes
Campingpladser	198	Yes
Computer facility management	23	Yes
Cykel- og knallertforretninger	108	Yes
Dagplejemødre	78	Yes
Demontering af udtjente køretøjer, skibe, maskiner mv.	27	Yes
Detailhandel fra postordreforretninger	127	Yes
Detailhandel med andre varer i.a.n.	269	Yes
Detailhandel med aviser og papirvarer	4	Yes
Detailhandel med brugte varer i forretninger	12	Yes
Detailhandel med bøger	72	Yes
Detailhandel med computere, ydre enheder og software	46	Yes
Detailhandel med elektriske husholdningsapparater	732	Yes
Detailhandel med hobbyartikler, musikinstrumenter, sportsudstyr, legetøj, cykler via internet	57	Yes
Detailhandel med kjolestoffer, garn, broderier mv.	4	Yes
Detailhandel med køkkenudstyr, glas, porcelæn, bestik, vaser, lysestager mv.	338	Yes
Detailhandel med medicinske og ortopædiske artikler	27	Yes
Detailhandel med personbiler, varebiler og minibusser	86	Yes
Detailhandel med spil og legetøj	5	Yes
Detailhandel med telekommunikationsudstyr	210	Yes
Detailhandel med tøj, sko, lædervarer, ure eller babyud- styr via internet	19	Yes
Detailhandel via Internettet med digitale produkter	39	Yes
Distribution af elektricitet	377	Yes
Distribution af gas	1975	Yes
Drift af sportsanlæg	107	Yes
Dyrehandel	3	Yes
Dyrkning af andre flerårige afgrøder	102	Yes
Dyrkning af kernefrugter og stenfrugter	29	Yes
Dyrkning af krydderiplanter, aromaplanter og lægeplanter	4	Yes
Dyrlæger	76	Yes

Dækservice	34	Yes	Døgninstitutioner for børn og unge	439	Yes
Døgninstitutioner for personer med fysisk handicap	466	Yes	Døgninstitutioner for personer med psykiske handicap	437	Yes
Efterbehandling af tekstiler	6	Yes	Ejendomsmæglere mv.	607	Yes
Ejerforeninger	1957	Yes	El-installation	39	Yes
Engros- og detailhandel med campingkøretø- jer, små trailere mv.	200	Yes	Engros- og detailhandel med lastbiler og påhængsvogne mv.	17	Yes
Engroshandel med affaldsprodukter	526	Yes	Engroshandel med andre husholdningsartikler	70	Yes
Engroshandel med andre kontormaskiner og andet kontorudstyr	22	Yes	Engroshandel med andre maskiner og andet udstyr	31	Yes
Engroshandel med andre råvarer og halvfabri- kata	74	Yes	Engroshandel med beklædning	176	Yes
Engroshandel med blomster og planter	28	Yes	Engroshandel med bøger, papir og papirvarer	19	Yes
Engroshandel med computere, ydre enheder og software	299	Yes	Engroshandel med cykler, sportsartikler og lystbåde	344	Yes
Engroshandel med elektriske husholdningsar- tikler	32	Yes	Engroshandel med elektronisk udstyr	221	Yes
Engroshandel med fast, flydende og luftfor- migt brændstof og lignende varer	46	Yes	Engroshandel med fisk og fiskeprodukter	285	Yes
Engroshandel med fodtøj	694	Yes	Engroshandel med fotografiske og optiske artikler	306	Yes
Engroshandel med frugt og grøntsager	43	Yes	Engroshandel med huder, skind og læder	63	Yes
Engroshandel med hårde hvidevarer	417	Yes	Engroshandel med indspillede videoer, cd'er, dvd'er mv.	4	Yes
Engroshandel med isenkram, varmeanlæg og tilbehør	121	Yes	Engroshandel med kaffe, te, kakao og krydderier	5	Yes
Engroshandel med kemiske produkter	81	Yes	Engroshandel med kontormøbler	168	Yes
Engroshandel med korn, uforarbejdet tobak, såsæd og foderstoffer	285	Yes	Engroshandel med kufferter og lædervarer	3	Yes
Engroshandel med kød og kødprodukter	139	Yes	Engroshandel med lak, maling, tapet, gulvbelægning mv.	26	Yes
Engroshandel med landbrugsmaskiner, -udstyr og tilbehør hertil	7	Yes	Engroshandel med levende dyr	9	Yes
Engroshandel med læge- og hospitalsartikler	196	Yes	Engroshandel med maskiner til minedrift og bygge- og an- lægsvirksomhed	6	Yes
Engroshandel med maskiner, udstyr og tilbe- hør til tekstilindustrien	10	Yes	Engroshandel med medicinalvarer og sygeplejeartikler	25	Yes
Engroshandel med mejeriprodukter, æg samt spiselige olier og fedtstoffer	201	Yes	Engroshandel med metaller og metalmalme	35	Yes
Engroshandel med møbler, tæpper og belys- ningsartikler	81	Yes	Engroshandel med parfumerivarer og kosmetik	98	Yes
Engroshandel med personbiler, varebiler og minibusser	72	Yes	Engroshandel med porcelæns- og glasvarer	26	Yes
Engroshandel med radio og tv mv.	7	Yes	Engroshandel med rengøringsmidler	72	Yes
Engroshandel med reservedele og tilbehør til motorkøretøjer	837	Yes	Engroshandel med sukker, chokolade og sukkervarer	13	Yes
Engroshandel med tekstiler	51	Yes	Engroshandel med telekommunikationsudstyr	30	Yes
Engroshandel med tobaksvarer	143	Yes	Engroshandel med træ, trælast og byggematerialer	448	Yes
Engroshandel med ure, smykker og guld- og sølvvarer	145	Yes	Engroshandel med vin og spiritus	18	Yes
Engroshandel med værktøjsmaskiner	186	Yes	Engroshandel med øl, mineralvand, frugt- og grøntsags- saft	166	Yes
Erhvervs- og arbejdsgiverorganisationer	344	Yes	Erhvervs- og institutionsvaskerier	8	Yes
Erhvervshavne	200	Yes	Event catering	7	Yes
Fagforeninger	252	Yes	Faglige sammenslutninger	120	Yes
Familiepleje	27	Yes	Farve- og tapetforretninger	11	Yes
Fastnetbaseret telekommunikation	120	Yes	Ferieboliger og andre indlogeringsfaciliteter til kortvarige ophold	255	Yes
Ferskvandsbrug	91	Yes	Finansiel leasing	14	Yes
Finansielle holdingselskaber	65	No	Finansielle hovedsæders virksomhed	101	Yes
Fiskeauktioner	152	Yes	Fiskeforretninger	21	Yes
Fitnesscentre	66	Yes	Fjerkræavl	26	Yes
Flytteforretninger	73	Yes	Folkeskoler o.lign.	179	Yes
Forarbejdning af afgrøder efter høst	19	Yes	Forarbejdning af andet kød	53	Yes
Forarbejdning af frø/sædekorn til udsæd	9	Yes	Forarbejdning af svinekød	79	Yes
Forarbejdning af te og kaffe	4	Yes	Forarbejdning og konservering af fisk, krebsdyr og blød- dyr, undtagen fiskemel	121	Yes
Forarbejdning og konservering af fjerkrækød	167	Yes			
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Forbehandling og spinding af tekstilfibre	13294	Yes			
Foreninger, legater og fonde med sygdomsbe-	141	Yes			
kæmpende, sociale og velgørende formål					
Forhandlere af lystbade og udstyr hertil	1	Yes			
Forhandlere af sports- og campingudstyr	8	Yes			
Formning og forarbejdning af planglas	11	Yes			
virksomhed	5	Yes			
Forskning og eksperimentel udvikling indenfor					
bioteknologi	172	Yes			
Forvaltning af kapitalmarkeder	28	Yes			
Fotografisk virksomhed	111	Yes			
Fremstilling af aluminium	15	Yes			
Fremstilling af andet elektrisk udstyr	27	Yes			
Fremstilling af andre beton-, gips- og cement-	96	Voc			
produkter	90	163			
Fremstilling af andre elektroniske og elektriske ledninger og kabler	14	Yes			
Fremstilling af andre fødevarer i.a.n.	323	Yes			
Fremstilling af andre haner og ventiler	124	Yes			
Fremstilling af andre kemiske produkter i.a.n.	157	Yes			
Fremstilling af andre maskiner til generelle	32	Yes			
formål i.a.n.	400				
Fremstilling at andre organiske basiskemikaller	490	Yes			
Fremstilling af andre plastprodukter	27	Yes			
klædningsartikler	3	Yes			
Fremstilling af andre tekniske og industrielle	60	Voc			
tekstiler	69	res			
Fremstilling af andre transportmidler i.a.n.	1676	Yes			
Fremstilling af andre uorganiske basiskemika- lier	298	Yes			
Fremstilling af arbejdsbeklædning	12	Yes			
Fremstilling af batterier og akkumulatorer	453	Yes			
Fremstilling af bijouteri og lignende varer	7	Yes			
Fremstilling af boligtekstiler	104	Yes			
Fremstilling af byggematerialer af gips	26	Yes			
Fremstilling af bygningstømmer og snedkeriar-	6	Yes			
tikler i øvrigt	67	Voc			
Fromstilling of computers og ydre opheder	221	Voc			
Fremstilling af damnkedler undtagen central-	331	163			
varmekedler	13	Yes			
Fremstilling af elektrisk og elektronisk udstyr	125	Yes			
Fremstilling af elektriske fordelings- og kon-					
trolannarater	222	V			
ti oluppul utel	233	Yes			
Fremstilling af elektriske motorer, generatorer	233 235	Yes Yes			
Fremstilling af elektriske motorer, generatorer og transformere Fremstilling af elektroniske komponenter og	233 235	Yes Yes			
Fremstilling af elektriske motorer, generatorer og transformere Fremstilling af elektroniske komponenter og plader	233 235 4	Yes Yes Yes			
Fremstilling af elektriske motorer, generatorer og transformere Fremstilling af elektroniske komponenter og plader Fremstilling af farmaceutiske råvarer	233 235 4 69	Yes Yes Yes Yes			
Fremstilling af elektriske motorer, generatorer og transformere Fremstilling af elektroniske komponenter og plader Fremstilling af farmaceutiske råvarer Fremstilling af fibercement	233 235 4 69 69	Yes Yes Yes Yes Yes			
Fremstilling af elektriske motorer, generatorer og transformere Fremstilling af elektroniske komponenter og plader Fremstilling af farmaceutiske råvarer Fremstilling af fibercement Fremstilling af finerplader og træbaserede pla-	233 235 4 69 69 134	Yes Yes Yes Yes Yes Yes			
Fremstilling af elektriske motorer, generatorer og transformere Fremstilling af elektroniske komponenter og plader Fremstilling af farmaceutiske råvarer Fremstilling af fibercement Fremstilling af fibercement Fremstilling af fibercement Fremstilling af fibercement	233 235 4 69 69 134	Yes Yes Yes Yes Yes Yes			
Fremstilling af elektriske motorer, generatorer og transformere Fremstilling af elektroniske komponenter og plader Fremstilling af farmaceutiske råvarer Fremstilling af fibercement Fremstilling af finerplader og træbaserede pla- der Fremstilling af flasker, drikkeglas mv. Fremstilling af friske baggriprodukter	233 235 4 69 69 134 119 231	Yes Yes Yes Yes Yes Yes Yes			
Fremstilling af elektriske motorer, generatorer og transformere Fremstilling af elektroniske komponenter og plader Fremstilling af farmaceutiske råvarer Fremstilling af fibercement Fremstilling af finerplader og træbaserede pla- der Fremstilling af flasker, drikkeglas mv. Fremstilling af friske bageriprodukter Fremstilling af færdipblandet beton	233 235 4 69 69 134 119 231 30	Yes Yes Yes Yes Yes Yes Yes Yes			

Forarbejdning og konservering af kartofler Forberedende byggepladsarbejder	38 223	Yes Yes
Forhandlere af gaveartikler og brugskunst	26	Yes
Forhandlere af musikinstrumenter	144	Yes
Forlystelsesparker o.l.	23	Yes
Formueforvaltning	98	No
Forskning og eksperimentel udvikling inden for samfunds- videnskab og humanistiske videnskaber	150	Yes
Forsvar	9	Yes
Fotoforretninger	98	Yes
Fotokopiering, dokumentbehandling og anden specialiseret kontorservice	72	Yes
Fremstilling af anden yderbeklædning	46	Yes
Fremstilling af andre beklædningsartikler samt tilbehør	50	Yes
Fremstilling af andre dele og tilbehør til motorkøretøjer	39	Yes
Fremstilling af andre færdige metalprodukter i.a.n.	112	Yes
Fremstilling af andre gummiprodukter	15	Yes
Fremstilling af andre ikke-metalholdige mineralske pro- dukter i.a.n.	10	Yes
Fremstilling af andre keramiske produkter	78	Yes
Fremstilling af andre møbler	51	Yes
Fremstilling af andre papir- og papvarer	1957	Yes
Fremstilling af andre pumper og kompressorer	158	Yes
Fremstilling af andre tanke og beholdere af metal	82	Yes
Fremstilling af andre tekstiler i.a.n.	70	Yes
Fremstilling af andre træprodukter: fremstilling af varer af kork, strå og flettematerialer	5	Yes
Fremstilling af andre værktøjsmaskiner	120	Yes
Fremstilling af asfalt og tagpap	837	Yes
Fremstilling af bestrålingsudstyr og elektromedicinsk og	58	Yes
Fremstilling of bly zink og tin	13	Yes
Fremstilling af byggematerialer af beton	6	Yes
Fremstilling af bygningsartikler af plast	220	Yes
Fremstilling af bølgepap og pap og emballage af papir og	21	Yes
Fremstilling af cider og anden frugtvin	66	Yes
Fremstilling af cykler og invalidekøretøjer	33	Yes
Fremstilling af døre og vinduer af metal	209	Yes
Fremstilling af elektriske belysningsartikler	16	Yes
Fremstilling af elektriske husholdningsapparater	41	Yes
Fremstilling af elektronik til husholdninger	6	Yes
Fremstilling af farmaceutiske præparater	221	Yes
Fremstilling af farvestoffer og pigmenter	113	Yes
Fremstilling af fiberdug og varer af fiberdug undtagen be- klædningsartikler	384	Yes
Fremstilling af fiskemel	45	Yes
Fremstilling af fodtøj	69	Yes
Fremstilling af frugt- og grøntsagssaft	163	Yes
Fremstilling af færdige foderblandinger til kæledyr	10	Yes

Fremstilling af færdige foderblandinger til	17	Yes	
landbrugsdyr Fremstilling af færdigretter	156	Vec	
Fremstilling af glasfiber	190	Yes	
Fremstilling af gødningsstoffer og nitrogennro-			
dukter	10	Yes	
Fremstilling af hydraulisk udstyr	16	Yes	
Fremstilling af håndværktøj	607	Yes	
Fremstilling af ildfaste produkter	47	Yes	
Fremstilling af kakao, chokolade og sukkerva-	6	Yes	
Fremstilling af karosserier til motorkøretøjer: fremstilling af påhængsvogne og sættevogne	208	Yes	
Fremstilling af keramiske husholdningsartikler og pyntegenstande	63	Yes	
Fremstilling af kobber	9	Yes	
Fremstilling af konsumis	7	Yes	
Fremstilling af kontorartikler af papir	18	Yes	
Fremstilling af koste og børster	1033	Yes	
Fremstilling af køle- og ventilationsanlæg (til			
industriel brug)	39	Yes	
Fremstilling af lejer, tandhjul, tandhjulsud- vekslinger og drivelementer	2	Yes	
Fremstilling af lim	75	Yes	
Fremstilling af luft- og rumfartøjer o.l.	21	Yes	
Fremstilling af lyslederkabler	8	Yes	
Fremstilling af løfte- og håndteringsudstyr	1033	Yes	
Fremstilling af madrasser	281	Yes	
Fremstilling af maling, lak og lignende overfla- debehandlingsmidler, trykfarver samt tæt- ningsmaterialer	9	Yes	
Fremstilling af margarine o.l. spiselige fedt-	342	Yes	
Fremstilling af maskiner til metallurgi	39	Yes	
Fremstilling af maskiner til produktion af plast			
og gummi	17	Yes	
industrien samt bygge og anlæg	289	Yes	
Fremstilling af metalforarbejdende værktøjs- maskiner	2	Yes	
Fremstilling af metaltønder og lignende behol-	5	Yes	
Fremstilling af motorcykler	904	Yes	
Fremstilling af motorer og turbiner undtagen	501	105	
motorer til vindmøller, flyvemaskiner, motor-	1	Yes	
køretøjer og knallerter Fremstilling af mursten, tegisten og hvøgema-			
terialer af brændt ler	108	Yes	
Fremstilling af mølleriprodukter	163	Yes	
Fremstilling af olier og fedtstoffer	151	Yes	
Fremstilling af ovne, ildsteder og fyringsaggre-	51	Yes	
gater Fremstilling af parfume, hårshampoo, tandpa-	39	Yee	
sta mv. Fromstilling of ploder, ork, set og slonger somt	55	103	
profiler af plast	16	Yes	
Fremstilling af plast i ubearbejdet form	2	Yes	
Fremstilling af printplader o.l.	4	Yes	
Fremstilling af raffinerede mineralolieproduk- ter	79	Yes	

Fremstilling af færdige tekstilvarer undtagen boligtekstiler	54	Yes
og beklædningsartikler Fremstilling af gas	71	Yes
Fremstilling af gummidæk og gummislanger: vulkanisering af dæk	6	Yes
Fremstilling af husholdningsartikler og hygiejneartikler samt toiletartikler af papir og pap	11	Yes
Fremstilling af høreapparater og dele hertil	63	Yes
Fremstilling af ikke-elektriske husholdningsapparater	105	Yes
Fremstilling af industrigasser	86	Yes
Fremstilling af kalk og gips	3624	Yes
Fremstilling af kemofibre	172	Yes
Fremstilling af keramiske sanitetsartikler	108	Yes
Fremstilling af kommunikationsudstyr	53	Yes
Fremstilling af kontor- og butiksmøbler	54	Yes
Fremstilling af kontormaskiner og -udstyr (undtagen com-	4	Yes
Fremstilling af køkkenmøbler	16	Yes
Fremstilling af landbrugs- og skovbrugsmaskiner	1540	Yes
Fromstilling of lotmotolomballage	46	Voc
Fremstilling af lokomotiver og andet rullende materiel til	40	.,
jernbaner og sporveje Fremstilling af lukkeanordninger, bolte, skruer og møtrik-	27	Yes
ker Fremstilling af læskedrikke: fremstilling af mineralvand og	238	Ves
andet vand på flaske	200	
Fremstilling af lase og hængsler	416	Yes
Fremstilling af magnetiske og optiske media	12	Yes
Fremstilling af malt	328	Yes
Fremstilling af maskiner til føde-, drikke- og tobaksvarein- dustrien	121	Yes
Fremstilling af maskiner til produktion af papir og pap	11	Yes
Fremstilling af maskiner til produktion af tekstiler, be-	22	Yes
Fremstilling af medicinske og dentale instrumenter samt udstvr hertil	467	Yes
Fremstilling af metalkonstruktioner og dele heraf	18	Yes
Fremstilling af militære kampkøretøjer	116	Yes
Fremstilling af motordrevet håndværktøj	60	Yes
Fremstilling af motorkøretøjer	112	Yes
Fremstilling af musikinstrumenter	304	Yes
Fremstilling af mørtel	29	Yes
Fremstilling af optiske instrumenter og fotografisk udstyr	4	Yes
Fremstilling af papir og pap	1172	Yes
Fremstilling af pesticider og andre agrokemiske produkter	1	Yes
Fremstilling af planglas	102	Yes
Fremstilling af plastemballage	331	Yes
Fremstilling af radiatorer og kedler til centralvarmeanlæg	43	Yes
Fremstilling af reb, tovværk, sejlgarn og netstoffer	39	Yes

Fremstilling af rør og hule profiler og tilhø- rende fittings af stål	4	Yes
Fremstilling af sammensatte parketstave	39	Yes
Fremstilling af smagspræparater og krydderier	33	Yes
Fremstilling af spil og legetøj	39	Yes
Fremstilling af stivelse og stivelsesprodukter	12	Yes
Fremstilling af stålbånd ved koldvalsning	97	Yes
Fremstilling af sæbe, rengørings- og rensemid- ler samt noleremidler	10	Yes
Fremstilling af tilbehør til ledninger og kabler	42	Yes
Fremstilling af trikotagestoffer	300	Yes
Fremstilling af trådvarer, kæder og fjedre	71	Yes
Fremstilling af tæpper	5	Yes
Fremstilling af underheklædning	1	Ves
Fremstilling af varer af nelsskind	30	Ves
Fromstilling of vindmøllor og dolo bortil	126	Voc
Fremstilling of storicko olior	24	Voc
Fremstilling af øvrige maskiner til snecielle for-	54	res
mål i.a.n.	37	Yes
Frisørsaloner	10	Yes
Funderingsundersøgelser	171	Yes
Fysio- og ergoterapeuter	47	Yes
Genbrug af sorterede materialer	63	Yes
Genforsikring	231	Yes
Gennemløbsholdingselskaber	533	No
Glarmestervirksomhed	65	Yes
Godstransport med tog	76	Yes
Handel med elektricitet	69	Yes
Havbrug	97	Yes
Historiske monumenter og bygninger og lig- nende attraktioner	3	Yes
Hjælpeaktiviteter i forbindelse med scene-	68	Ves
kunst	10	
Hospitaler	10	Yes
Husholdninger med ansat medhjælp	108	Yes
Ikke-finansielle hovedsæders virksomhed	66	Yes
drikke- og tobaksvarer	129	Yes
Indsamling af ikke-farligt affald	605	Yes
Industriel design og produktdesign	76	Yes
Indvinding af råolie	7	Yes
Inkassovirksomhed og kreditoplysning	62	Yes
Institutionsophold med sygepleje i.a.n.	103	Yes
Investeringsselskaber	58	No
Juridisk bistand	64	Yes
Kenneler	279	Yes
Koldbehandling	1028	Yes
Kombinerede serviceydelser	22	Yes
Konferencecentre og kursusejendomme	13	Yes
Kontrol af levnedsmidler	13	Yes
Kunstnerisk skaben	66	Yes
Købmænd og døgnkiosker	60	Yes
Landbrugskonsulenter	6	Yes
Leasing af intellektuelle ejendomsrettigheder		
og lignende, dog ikke ophavsretsbeskyttede værker	107	Yes
Lotteri- og anden spillevirksomhed	337	Yes
Lystbådehavne	98	Yes

Fremstilling af råjern og råstål samt jernlegeringer	715	Yes
Fremstilling af slibemidler	1622	Yes
Fremstilling af smykker i ædle metaller og relaterede pro- dukter	185	Yes
Fremstilling af sportsudstyr	49	Yes
Fremstilling af strikkede og hæklede strømpevarer	7	Yes
Fremstilling af sukker	6038	Yes
Fremstilling af tasker, kufferter, sadelmagervarer mv.	67	Yes
Fremstilling af tobaksprodukter	8	Yes
Fremstilling af træemballage	17	Yes
Fremstilling af tvebakker og kiks: fremstilling af konserve- rede kager, tærter mv.	7	Yes
Fremstilling af udstyr til måling, afprøvning, navigation og kontrol	7	Yes
Fremstilling af ure	25	Yes
Fremstilling af vin af druer	261	Yes
Fremstilling af våben og ammunition	42	Yes
Fremstilling af øl	173	Yes
Fremstilling og bearbejdning af andet glas (herunder tek- nisk glas)	21	Yes
Frugt- og grøntforretninger	177	Yes
FVC-selskaber	18	Yes
Garvning og beredning af læder: beredning og farvning af pelsskind	11	Yes
Generelle offentlige tjenester	884	Yes
Gennemførelse af byggeprojekter	138	Yes
Geologiske undersøgelser og prospektering, landinspektører mv.	4	Yes
Godshåndtering	8	Yes
Grus- og sandgravning: indvinding af ler og kaolin	338	Yes
Handel med gas gennem rørledninger	80	Yes
Havfiskeri	81	Yes
Hjemmehjælp	9	Yes
Hjælpeydelser i forbindelse med undervisning	23	Yes
Hoteller	54	Yes
Ikke-finansielle holdingselskaber	1799	Yes
Ikke-specialiseret engroshandel	51	Yes
Indretningsarkitekter og rumdesign	13	Yes
Indspilning af lydoptagelser og udgivelse af musik	153	Yes
Industriel fremstilling af brød: kager mv.	24	Yes
Indvinding og agglomerering af tørv	21	Yes
Installation af industrimaskiner og -udstyr	51	Yes
Investeringsforeninger	22	No
Jagt, fældefangst og serviceydelser i forbindelse hermed	31	Yes
Karosseriværksteder og autolakererier	46	Yes
Kiropraktorer	27	Yes
Kombinerede administrationsserviceydelser	64	Yes
Kommunikationsdesign og grafisk design	3	Yes
Konsulentbistand vedrørende informationsteknologi	62	Yes
Kunsthandel og gallerivirksomhed	159	Yes
Køb og salg af egen fast ejendom	289	Yes
Køreskoler	22	Yes
Landskabspleje	25	Yes
Livsforsikring	143	Yes
Lufttransport af gods	99	Yes
Indonuaroforratningar		
Lædelvaleionetiniger	56	Yes

Malerforretninger	17	Yes	Markedsanalyse og offentlig meningsmåling	1	Yes
Maskinforarbejdning	14	Yes	Mejerier samt ostefremstilling	71	Yes
Murere	6	Yes	Museer	415	Yes
Møbelforretninger	43	Yes	Nedrivning	45	Yes
Opførelse af bygninger	52	Yes	Oplagrings- og pakhusvirksomhed	344	Yes
Opsamling og behandling af spildevand	228	Yes	Opstilling og levering af færdige fabriksanlæg	204	Yes
Optikere	51	Yes	Organisering af kongresser, messer og udstillinger	24	Yes
Overfladebehandling af metal	5	Yes	Oversættelse og tolkning	92	Yes
Overvågning	18	Yes	Pakkerier	69	Yes
Parkering og veihiæln my	2	Yes	Passagertransport med regional- eller fierntog	16	Yes
Pengemarkedsforeninger	1	Yes	Pensionskasser	134	Yes
Pizzeriaer grillbarer isbarer my	20	Voc	Planteforbandlere og bavecentre	136	Voc
Planteformering	121	Voc		10	Voc
Posttionoctor omfattat af forsyningspligton	1/2	Voc	Praktisorondo speciallæger	105	Voc
Prostijenester onnattet ar forsynnigspiigten	145	Vec	Prantisci ciuci specializeri	21	Vec
	27	Yes	Prepress- og premedia-arbejde	21	Yes
Pressebureauer	81	Yes	Private andeisboligforeninger	92	res
Private vagt- og sikkernedstjenester	703	Yes	Produktion af elektricitet	98	Yes
Produktion af film og videofilm	/	Yes	Produktion af kød- og fjerkrækødprodukter	8	Yes
Produktion at slagtesvin	76	Yes	Produktion af tv-programmer	178	Yes
Psykologisk rådgivning	12	Yes	Public relations og kommunikation	703	Yes
Radio- og tv-forretninger	20	Yes	Radiovirksomhed	12	Yes
Realkreditinstitutter	23	Yes	Rejsearrangører	221	Yes
Rejsebureauer	42	Yes	Reklamebureauer	117	Yes
Reklameplads i medier	328	Yes	Religiøse institutioner og foreninger	339	Yes
Renserier, selvbetjeningsvaskerier mv.	233	Yes	Rensning af jord og grundvand og anden form for forure- ningsbekæmpelse	17	Yes
Reparation af andet udstyr	8	Yes	Reparation af andre varer til personligt brug og hushold- ningsbrug	118	Yes
Reparation af computere og ydre enheder	35	Yes	Reparation af elektrisk udstyr	8	Yes
Reparation af elektronisk og optisk udstyr	4	Yes	Reparation af forbrugerelektronik	6	Yes
Reparation af husholdningsapparater og red- skaber til hus og have	313	Yes	Reparation af jern- og metalvarer	5	Yes
Reparation af kommunikationsudstyr	197	Yes	Reparation af maskiner	6	Yes
Reparation af møbler og boligudstyr	143	Yes	Reparation af skotøj og lædervarer	5	Yes
Reparation og vedligeholdelse af andre trans- portmidler	19	Yes	Reparation og vedligeholdelse af luft- og rumfartøjer	178	Yes
Reparation og vedligeholdelse af skibe og både	103	Yes	Reproduktion af indspillede medier	468	Yes
Restauranter	221	Yes	Revalideringsinstitutioner	12	Yes
Risiko- og skadesvurdering	47	Yes	Rutebuskørsel, by- og nærtrafik	123	Yes
Rutebuskørsel, fjerntrafik og skolebusser	45	Yes	Ruteflyvning	97	Yes
Rørtransport	66	Yes	Rådgivende ingeniørvirksomhed inden for byggeri og an- lægsarbejder	16	Yes
Rådgivende ingeniørvirksomhed inden for pro- duktions- og maskinteknik	56	Yes	Salg, vedligeholdelse og reparation af motorcykler og re- servedele og tilbehør hertil	2120	Yes
Saltindvinding	267	Yes	Satellitbaseret telekommunikation	528	Yes
Selvstændigt udøvende scenekunstnere	78	Yes	Servicestationer	25	Yes
Serviceydelser i forbindelse med husdyravl	47	Yes	Serviceydelser i forbindelse med indvinding af råolie og naturgas	14	Yes
Serviceydelser i forbindelse med luftfart	17	Yes	Serviceydelser i forbindelse med planteavl	28	Yes
Serviceydelser i forbindelse med sikkerhedssystemer	86	Yes	Serviceydelser til skovbrug	71	Yes
Skibsmæglere	12	Yes	Skorstensfejning	34	Yes
Skotøjsforretninger	197	Yes	Skovning	264	Yes
Skønheds- og hudpleje	293	Yes	Slagter- og viktualieforretninger	74	Yes
Smedning, presning, sænksmedning og vals- ning af metal: pulvermetallurgi	131	Yes	Specialiseret engroshandel med fødevarer i.a.n.	22	Yes
Specialskoler for handicappede	2	Yes	Speditører	6	Yes
Sportsklubber	330	Yes	Stationer, godsterminaler mv.	6	Yes
S-togstrafik, metro og andre nærbaner	9	Yes	Støbning af andre ikke-jernholdige metalprodukter	36	Yes
Støbning af jernprodukter	1277	Yes	Støbning af letmetalprodukter	102	Yes
Støbning af stålprodukter	58	Yes	Sundhedspleie, hiemmesvgepleie og jordemødre my	26	Yes
				-	. 20

Sundhedsvæsen i øvrigt i.a.n.	56	Yes	Supermarkeder	44	Yes
Sø- og kysttransport af gods	78	Yes	Sø- og kysttransport af passagerer	69	Yes
Tagdækningsvirksomhed	344	Yes	Taxikørsel	61	Yes
Teater- og koncertvirksomhed	137	Yes	Teknisk afprøvning og kontrol	50	Yes
Tekniske skoler og fagskoler	32	Yes	Tilhugning, tilskæring og færdigbearbejdning af sten	18	Yes
Tobaksforretninger	168	Yes	Transmission af elektricitet	87	Yes
Transport af gods ad indre vandveje	25	Yes	Transport af passagerer ad indre vandveje	69	Yes
Trykning af dagblade	36	Yes	Trådløs telekommunikation	9	Yes
Turistkørsel og anden landpassagertransport	45	Yes	Tv-virksomhed	1975	Yes
Tøjforretninger	34	Yes	Tømrer- og bygningssnedkervirksomhed	242	Yes
Udførelse af gulvbelægninger og vægbeklæd- ning	13	Yes	Udgivelse af aviser og dagblade	112	Yes
Udgivelse af bøger	22	Yes	Udgivelse af computerspil	185	Yes
Udgivelse af distrikts- og annonceblade	76	Yes	Udgivelse af telefonbøger og adresselister	293	Yes
Udgivelse af ugeblade og magasiner	2	Yes	Udlejning af erhvervsejendomme	120	Yes
Udlejning af kontormaskiner og -udstyr, com- putere og it-udstyr	22	Yes	Udlejning af videobånd og videodisks	259	Yes
Udlejning og leasing af andet materiel, udstyr og andre materielle aktiver i.a.n.	323	Yes	Udlejning og leasing af andre varer til personlig brug og husholdningsbrug i.a.n.	352	Yes
Udlejning og leasing af biler og lette motorkø- retøjer	299	Yes	Udlejning og leasing af entreprenørmateriel	208	Yes
Udlejning og leasing af landbrugsmaskiner og - udstyr	97	Yes	Udlejning og leasing af lastbiler	37	Yes
Udlejning og leasing af luftfartøjer	57	Yes	Udlejning og leasing af skibe og både	1	Yes
Udlejning og leasing af varer til fritid og sport	6	Yes	Udsavning og høvling af træ	541	Yes
Undervisning i kulturelle discipliner	4	Yes	Undervisning inden for sport og fritid	60	Yes
Undervognsbehandling	34	Yes	Uoplyst	264	No
Vandforsyning	14	Yes	Varmeforsyning	32	Yes
Vejgodstransport	30	Yes	Ventureselskaber og kapitalfonde	45	No
Videregående uddannelser ikke på universi- tetsniveau	10	Yes	Videregående uddannelser på universitetsniveau	131	Yes
Vikarbureauer	60	Yes	Vinduespolering	30	Yes
Virksomhedsrådgivning og anden rådgivning om driftsledelse	495	Yes	VVS- og blikkenslagerforretninger	151	Yes
Værdipapir- og varemægling	81	Yes	Vævning af tekstiler	67	Yes
Webportaler	76	Yes			

Appendix 2 List of Leadership Roles

Role Type	Included	Count	Role Type	Included	Count
BESTYRELSE	Yes	71277	DIREKTION	Yes	36667
adm. dir	Yes	6730	formand	Yes	16212
SUPPLEANT	No	722	INTERESSENTER	No	9767
næstformand	Yes	1578	økonomidirektør	Yes	204
DIREKTØR	Yes	29	udpeget af andre	No	1
ADM. DIR.	Yes	12	FILIALBESTYRERE	No	84
HOVEDSELSKAB	Yes	82	ordførende direktør	Yes	25
PRÆSIDITET	Yes	7	præsident	Yes	1
UDDELER	No	116	BESTYRELSESMEDLEM	Yes	119
Leder	Yes	171	Reel ejer	No	64
TILSYNSRÅD	No	26	teknisk direktør	No	6
SKOVRIDER	No	1	MEJERIBESTYRER	No	1
1. næstformand	Yes	1	LEDELSE	Yes	4
DAGLIG LEDELSE	Yes	12	forretningsfører	No	14
CITYCHEF	No	1	gruppe a	No	1
ADMINISTRATOR	No	4	finans- og økonomidirektør	Yes	1
DEPOTSELSKAB	No	1	managing director	Yes	1
RevisionsvirksomhedLeder	No	6	REPRÆSENTANTSKAB	Yes	9
KOMMANDITISTREPRÆSENTANT	Yes	16	DRIFTSLEDER	Yes	4
TEGNINGSBERETTIGEDE	No	13	sekretær	No	2
underdirektør	No	24	salgsdirektør	No	1
GENERALAGENT	No	10	ØVERSTE LEDELSESORGAN	Yes	3
ADMINISTRATIONSORGAN	No	3	centerleder	Yes	1
TEGNINGSBERETTIGET	No	3	vice administrerende direktør	No	3
KONTROLRÅD	No	7	ANSVARLIG DELTAGER	No	2
KOMMITTERET	No	3	STYRELSE	Yes	1
KOMPLEMENTARER	No	15	ANDET LEDELSESORGAN	Yes	1
daglig leder	Yes	1	OBSERVATØR	No	3
KONSORTIEKOMITE	No	1	viceformand	Yes	1
ADM. DIREKTØR	Yes	2	koncerndirektør	Yes	1
HOVEDBESTYRELSE	Yes	7	overdirektør	Yes	1
produktdirektør	Yes	1	formand for økonomiudvalget	Yes	1
medarbejderrepræsentant	Yes	1	kurator	No	1
indkøbsdirektør	Yes	1	сео	Yes	1
BESTYRELSESFORMAND	Yes	1			

Appendix 3 R-Script

remove(list = ls()) #Resets the Global Environment, so that everything starts from strach

setwd("~/Speciale/Den Store Datamappe") #Sets the working directory

Sys.setlocale("LC_CTYPE", locale="Danish") #Sets the R language to Danish, #This is done so R can read the danish characters in the dataset

#This import the various packages that I am doing to be using #igraph is the basic tool for network analysis, dplyr and readr are data manipulation packages #ggplot2 is used for graphic display of the regressions that I have made

library(igraph) library(dplyr) library(readr) library(ggplot2) library(Hmisc) library(fastDummies)

This line creates a simple edgelist,

#that is it is two coloums from DF which are the nodes of the network and ties between them
It also filters out any person not in an important role or in a wrong industry.
Preg <- DF %>%select (CVR, NAME) %>% filter(DF\$ImportantRole == "Yes" & DF\$GodBranche == "Ja")# Create a dataframe using a unique company number, which is the unique ID given to all persons in the network

#This creats a graph object based on the edgelist in "Preg"
g <- graph.edgelist(as.matrix(Preg), directed = F)</pre>

#This line marks the two types of nodes in the network #One coloum of the edgelist is persons and the other is companies V(g)\$type <- bipartite.mapping(g)\$type</pre>

#This is an object used to make the two modes. #It is a projection which allowes to use persons as edges between organizations and vice versa gProjecttion <- bipartite.projection(g)</pre>

#This uses the project to create an object in which organizations are egdes and persons are nodes gPersons <- gProjecttion\$proj2

This does the same, but opposite as before, making persons into edges gOrgs <- gProjecttion\$proj1</pre>

#This line (s any selfloops in the network, that is self referental ties gOrgs <- simplify(gOrgs, remove.multiple = F, remove.loops = T)</pre> #The following lines will be disentangle the various companies which overlaps to such a degree #that they have to be removed from the dataset

The first lines creats a tabel which R can read based on the network data of the companies write_graph(gOrgs, "tmpg.CSV", "ncol") tmpg <- read_table("tmpg.CSV", col_names = FALSE) colnames(tmpg) <- c("SourceID", "TargetID","Weight")</pre>

#This next lines creates two dataframes which each side of the edgelist #and attachs the network data to the metadata from the original dataframe about the number of #members in the company

DF3 <- merge(DF[, c("CVR", "AntalRoller")], tmpg, by.x = "CVR", by.y = "SourceID", all.y = TRUE) DF4 <- merge(DF[, c("CVR", "AntalRoller")], tmpg, by.x = "CVR", by.y = "TargetID", all.y = TRUE)

#Makes the coloum names of DF3 and DF4 distinct colnames(DF3) <- c("CVR", "AntalRollerSource", "target", "WeightA")</pre>

#Recombines DF3 and DF4 with the data from the orginal dataframe DF3 <- merge(DF3, DF4, by.x = c("CVR", "target"), by.y = c("SourceID", "CVR"))</pre>

```
#Deletes the one weight coloum from DF3, as it is redundant
DF3 <- select(DF3, -c("WeightA")) #</pre>
```

```
#Gives the correct coloumnames to the coloums in DF3
colnames(DF3) <- c("Source", "Target", "AntalRollerSource", "AntalRollerTarget", "Weight")
```

#This creates to variables, which determine the percentage of the companies members are contained #within a single edge DF3\$Sourceshare <- (DF3\$Weight)/(DF3\$AntalRollerSource) DF3\$Targetshare <- (DF3\$Weight)/(DF3\$AntalRollerTarget)</pre>

#This line removes duplicates
DF3 <- unique(DF3)</pre>

#The following lines will determine if a tie lives up to the 80 % limit in which two nodes have to be combined.

```
DF3$qualifySource <- "no"
DF3$qualifySource[DF3$AntalRollerSource >= 0 & DF3$Sourceshare > 0.8] <- "yes"
```

DF3\$qualifyTarget <- "no" DF3\$qualifyTarget[DF3\$AntalRollerTarget >= 0 & DF3\$Targetshare > 0.8] <- "yes"

#THis is a code for, if both nodes of an edge qualifies for replacement, due to the same edge containing more than 80 % of the leadership in that node DF3\$Bothqualify <- "no" DF3\$Bothqualify[DF3\$qualifySource == "yes" & DF3\$qualifyTarget == "yes"] <- "yes"</pre>

#This creates a DF for if one of the nodes qualify for replacement DF4 <- DF3 %>% filter(DF3\$qualifySource == "yes" & DF3\$Bothqualify == "no") colnames(DF4) <- c("replace", "replacewith","AntalRollerSource", "AntalRollerTarget", "Weight", "Targetshare", "Sourceshare", "qualifySource", "qualifyTarget", "bothqualify")

```
#This creates a DF for the cases in which both nodes qualify for replacement
DF5 <- DF3 %>% filter(DF3$qualifyTarget == "yes" & DF3$Bothqualify == "yes")
colnames(DF5) <- c("replacewith", "replace","AntalRollerSource", "AntalRollerTarget", "Weight", "Targetshare",
"Sourceshare", "qualifySource", "qualifyTarget", "bothqualify")
DF5 <- DF5[, c(2,1,3,4,5,6,7,8,9,10)]</pre>
```

This combines the two previous DFs in a way, in which I can replace them ReplaceDF <- rbind(DF4,DF5) ReplaceDF <- ReplaceDF %>% distinct(replace, .keep_all = TRUE)

```
#This creates a list of the old CVR numbers and what they should be replaced with
Preg2 <- merge(Preg, ReplaceDF, by.x = "CVR", by.y = "replace", all.x = TRUE)
NATEST <- is.na(Preg2$replacewith)
Preg2$CVRny<- Preg2$replacewith
Preg2$CVRny[NATEST] <- Preg2$CVR[NATEST]</pre>
```

```
#This creates an edgelist, with CVR numbers and names of persons
Preg3 <- Preg2 %>% select(CVRny, NAME)
Preg3 <- Preg3 %>% distinct(CVRny, NAME, .keep_all = TRUE)
```

#The following lines repeats the line above, because some organizations were both replaced another and were to be replaced. Preg4 <- merge(Preg3, ReplaceDF, by.x = "CVRny", by.y = "replace", all.x = TRUE) NATEST <- is.na(Preg4\$replacewith) Preg4\$CVRnyny<- Preg4\$replacewith Preg4\$CVRnyny[NATEST] <-Preg4\$CVRny[NATEST]</pre>

Preg5 <- Preg4 %>% select(CVRnyny, NAME) Preg5 <- Preg5 %>% distinct(CVRnyny, NAME, .keep_all = TRUE)

#The folloiwn lines recreates a the graph of the one-mode organizational network g2 <- graph.edgelist(as.matrix(Preg5), directed = F) g2 <- simplify(g2, remove.multiple = T, remove.loops = T) # Simplyfies the graph by removing any loops and multiple ties between nodes.

V(g2)\$type <- bipartite.mapping(g2)\$type gProjecttion2 <- bipartite.projection(g2, multiplicity = F) #This is an object used to make the two modes. It is a projection which allowes to use persons as edges between organizations and vice versa

gPersons2 <- gProjecttion2\$proj2 #This uses the project to create an object in which organizations are egdes and persosn are nodes gPersons2 <- simplify(gPersons2, remove.multiple = T, remove.loops = T)

gOrgs2 <- gProjecttion2\$proj1 # This does the same, but opposite as before, making persons into edges. gOrgs2 <- simplify(gOrgs2, remove.multiple = T, remove.loops = T)

#These lines integrate the node information on, democratic organization, name of the comapny and their industry V(gOrgs2)\$demo=as.character(DF\$ReeltDemokratisk[match(V(gOrgs2)\$name,DF\$CVR)])

V(gOrgs2)\$Comp=as.character(DF\$AFFILIATION[match(V(gOrgs2)\$name,DF\$CVR)])

V(gOrgs2)\$Branche=as.character(DF\$BrancheStor[match(V(gOrgs2)\$name,DF\$CVR)])

```
#These lines create network metrics for the new graph
deg <- degree(gOrgs2)
ebet <- betweenness(gOrgs2, normalized = TRUE)
cons <- constraint(gOrgs2)</pre>
```

```
cent_dfgOrgs2 <- data.frame(deg, ebet, cons)
cent_dfgOrgs2 <- cbind(rownames(cent_dfgOrgs2), cent_dfgOrgs2)
rownames(cent_dfgOrgs2) <- NULL
colnames(cent_dfgOrgs2) <- c("CVR", "Degree", "Betweeness", "Constraint")</pre>
```

```
#This line exports the graph file
write.graph(gOrgs2, "SecondTry.graphml", format = "graphml")
```

#This merges the original with the network metric data. Note that is only does it, for CVR numbers that remain, and therefore still excludes all the dropped CVR numbers. FinalNetwork=merge(cent_dfgOrgs2, DF, by.x = "CVR", by.y = "CVR", all.x = TRUE)

```
#This imports the economic data
Econ <- read delim("EcoData.csv", ";",
                escape_double = FALSE,
          col_types = cols(Assets = col_number()),
                trim_ws = TRUE)
# And merges it
DF7 <- merge(FinalNetwork, Econ, by.x = "CVR", by.y = "CVR", all.x = T)
EconNetwork <- DF7 %>% distinct(CVR, .keep all = TRUE)
EconNetwork <- EconNetwork %>% filter(EconNetwork$ReeltDemokratisk == "JA" & EconNetwork$Assets > 0)
transform(EconNetwork, Assets = as.numeric(Assets))
EconNetwork <- EconNetwork %>% select("CVR", "Assets", "ProfitLoss", "Revenue")
FinalNetwork <- merge (FinalNetwork, EconNetwork, by.x = "CVR", by.y = "CVR", all.x = T)
# This creates dummy variables for all the industry codes
Branche <- FinalNetwork %>% select(BrancheStor)
Branche <- distinct(Branche)
Branche <- fastDummies::dummy cols(Branche)
Branche <- distinct(Branche)</pre>
#And merges it back
FinalNetwork <- merge(FinalNetwork, Branche, by.x= "BrancheStor", by.y = "BrancheStor", all.x = T)
```

```
FinalNetwork <- FinalNetwork %>% distinct(FinalNetwork$CVR, .keep_all = T)
```

```
#THis recodes all constraint values of NA to 1
FinalNetwork$Constraint[is.na(FinalNetwork$Constraint)] <- 1
FinalNetwork$Constraint[(FinalNetwork$Constraint > 1)] <- 1</pre>
```

```
#This make the democratic variable a numeric variable
FinalNetwork$ReeltDemokratisk[FinalNetwork$ReeltDemokratisk == "JA"] <- 1
FinalNetwork$ReeltDemokratisk[FinalNetwork$ReeltDemokratisk == "NEJ"] <- 0
FinalNetwork$ReeltDemokratisk <- as.numeric(FinalNetwork$ReeltDemokratisk)</pre>
```

```
#This creates a variable which is the log of employee number, and it recodes errors into 0
FinalNetwork$Aarsvaerk2 <- log(as.numeric(FinalNetwork$Aarsvaerk))
FinalNetwork$Aarsvaerk2[FinalNetwork$Aarsvaerk2 == "-Inf"] <- 0
#This is the regression on degree
#It simply state the indepentent and depentent variable.
Degreefit <- Im(FinalNetwork$Degree ~ as.numeric(FinalNetwork$ReeltDemokratisk) +
          FinalNetwork$BrancheStor + FinalNetwork$Aarsvaerk2 +
         FinalNetwork$AntalRoller + FinalNetwork$Alder
        , data=FinalNetwork)
#These codes exports the results.
write.csv(confint(Degreefit), "DegreeConf.csv")
sink("Degree.txt")
print(summary(Degreefit))
sink()
#This is the regression on Constraint
Constraintfit <- Im(FinalNetwork$Constraint ~ as.numeric(FinalNetwork$ReeltDemokratisk) +
      FinalNetwork$BrancheStor + FinalNetwork$Aarsvaerk2 +
      FinalNetwork$AntalRoller + FinalNetwork$Alder, data=FinalNetwork)
write.csv(confint(Constraintfit), "ConstraintConf.csv")
sink("Constraint.txt")
print(summary(Constraintfit))
sink()
#This is the regression on betweenness
Betweennessfit <- Im(FinalNetwork$Betweeness ~ as.numeric(FinalNetwork$ReeltDemokratisk) +
      FinalNetwork$BrancheStor + FinalNetwork$Aarsvaerk2 +
      FinalNetwork$AntalRoller + FinalNetwork$Alder, data=FinalNetwork)
write.csv(confint(Betweennessfit), "BetweennessConf.csv")
sink("Betweeness.txt")
print(summary(Betweennessfit))
sink()
#This is the regression on profit
Profitfit <- Im(FinalNetwork$ProfitLoss ~
            FinalNetwork$BrancheStor +
            FinalNetwork$Alder + FinalNetwork$Assets +
            FinalNetwork$Constraint, data=FinalNetwork)
write.csv(confint(Profitfit), "ProfitfitConf.csv")
sink("Profit.txt")
print(summary(Profitfit))
sink()
#The following lines plots the regression assumptions
plot(Betweennessfit)
plot(Constraintfit)
plot(Degreefit)
plot(Profitfit)
```

```
write.csv(crosstabEX, "CrosstabEX.csv")
```

```
write.csv(summary(crosstabEX, items = T), "sum.csv")
```

```
# This creates the pearson cross tabulation and exports it
corralation <- rcorr(as.matrix(crosstabEX))</pre>
```

```
CorPV <- data.frame(corralation$P)
CorRV <- data.frame(corralation$r)
write.csv(CorPV, "CorPV.csv")
write.csv(CorRV, "CorRV.csv")
```

```
#This exports the final dataset
write.csv(FinalNetwork, "FinalNetwork.csv")
```

```
#This last bit, is the regression on betweenness, with betweenneess being in log
FinalNetwork$Betweeness2 <- log(FinalNetwork$Betweeness)
FinalNetwork$Betweeness2 == "-Inf"] <- 0</pre>
```

```
Betweennessfit2 <- Im(FinalNetwork$Betweeness2 ~ as.numeric(FinalNetwork$ReeltDemokratisk) +
FinalNetwork$BrancheStor + FinalNetwork$Aarsvaerk2 +
FinalNetwork$AntalRoller + FinalNetwork$Alder, data=FinalNetwork)
write.csv(confint(Betweennessfit2), "BetweennessConf2.csv")
sink("Betweeness2.txt")
print(summary(Betweennessfit2))
sink()
```

plot(Betweennessfit2)

Appendix 4 Democratic and Non-democratic Core



Appendix 5 Democratic Core



85

Appendix 6 Industry Core



Engroshandel og detailhandel: reparation a	(18,19%)
Pengeinstitut- og finansvirksomhed: forsikring	(15,38%)
Fast ejendom	(15,08%)
Liberale: videnskabelige og tekniske tjenes	(11,44%)
Fremstillingsvirksomhed	(7,89%)
Information og kommunikation	(7,62%)
Bygge- og anløgsvirksomhed	(6,7%)
Administrative tjenesteydelser og hj�lpetj	(4,88%)
Transport og godsh@ndtering	(2,85%)
Overnatningsfaciliteter og restaurationsvir	(1,91%)
Landbrug: jagt: skovbrug og fiskeri	(1,81%)
Sundhedsvøsen og sociale foranstaltninger	(1,33%)
Kultur: forlystelser og sport	(1,27%)
El-: gas- og fjernvarmeforsyning	(1,23%)
Andre serviceydelser	(0,85%)
Vandforsyning: kloakv@sen: affaldsh@ndt	(0,72%)
Undervisning	(0,56%)
R�stofindvinding	(0,19%)
Uoplyst	(0,06%)
Offentlig forvaltning: forsvar og socialsikring	(0,02%)

Appendix 7 Sparekassen Thy's Network



Appendix 8 Arla's Network



Appendix 9 Coop's Network



Appendix 10 RAH's Network



Appendix 11 Regression on Degree

Regression on Degrees

Residuals:

M	in 1Q	Median	3Q	Max
-6,2	26 -1,15	-0,43	0,2	26,12
Coefficients:				
	Estimate	Std, Error	t value	Pr(> t)
(Intercept)	-0,70	0,135695	-5,187	2,19E-07
Democratic Company	0,33	0,189145	1,777	0,075569
Log of Employees	0,17	0,020387	8,415	0
Number of roles	0,64	0,020157	31,952	0
Age	-0,00	0,002872	-2,01	0,044424
Other services	-0,54	0,274573	-1,977	0,048098
Construction	-0,04	0,147355	-0,328	0,74267
Electricity, gas, and heat distribution	0,94	0,393213	2,402	0,016309
Dealership of cars and motorcycles	-0,05	0,12875	-0,396	0,69228
Property	0,78	0,152767	5,129	2,98E-07
Production enterprises	0,09	0,142751	0,654	0,512841
Information and communication	0,11	0,14487	0,795	0,426887
Culture, amusements and sport	-0,25	0,258708	-0,993	0,32075
Agriculture, hunting, forestry and fisheries	0,03	0,221409	0,168	0,866204
Liberal, scientific and technical services,	0,08	0,137899	0,582	0,560704
Hotel and restaurant businesses	0,14	0,207709	0,698	0,485095
Banking, Finance and insurance	0,53	0,156044	3,418	0,000633
Raw material extraction	-0,31	0,701721	-0,447	0,655195
Medical and social services	-0,19	0,253647	-0,762	0,445818
Transport and handling of goods	-0,17	0,180759	-0,983	0,325625
Teaching Water supply capitation and cleaning of earth and	-0,28	0,339422	-0,848	0,396319
water supply, samuation, and cleaning of earth and water	0,50	0,429778	1,17	0,24214

Residual standard error: 2,294 on 7810 degrees of freedom

Multiple R-squared: 0,1574, Adjusted R-squared: 0,1551 F-statistic: 69,47 on 21 and 7810 DF p-value: < 2,2e- 16

Appendix 12 Regression on Betweenness

Regression on Betweenness

	Residuals:			
	Min	1Q	Median	3Q
	2,24E-04	-3,3E-05	-1,3E-05	1,08E-05
Coefficients:				
	Estimate	Std, Error	t value	Pr (> t)
(Intercept)	-6,01E-05	8,71E-06	-6,894	5,86E-12
Democratic Company	4,99E-05	1,22E-05	4,105	4,08E-05
Log of Employees	6,46E-06	1,31E-06	4,935	8,17E-07
Number of roles	2,18E-05	1,29E-06	16,866	0
Age	-5,09E-09	1,85E-07	-0,028	0,978
Industries				
Other services	-4,65E-06	1,76E-05	-0,264	0,79189
Construction	1,16E-06	9,46E-06	0,123	0,90217
Electricity, gas, and heat distribution	-2,44E-05	2,53E-05	-0,967	0,33348
Dealership of cars and motorcycles	3,38E-06	8,27E-06	0,409	0,68279
Property	3,16E-05	9,81E-06	3,224	0,00127
Production enterprises	1,11E-05	9,17E-06	1,209	0,22654
Information and communication	1,25E-05	9,30E-06	1,339	0,18055
Culture, amusements and sport	-8,89E-06	1,66E-05	-0,535	0,59282
Agriculture, hunting, forestry and fisheries	7,75E-06	1,42E-05	0,545	0,5856
Liberal, scientific and technical services,	2,46E-05	8,86E-06	2,783	0,0054
Hotel and restaurant businesses	8,77E-06	1,33E-05	0,658	0,51081
Banking, Finance and insurance	2,30E-05	1,00E-05	2,29	0,02204
Raw material extraction	-5,76E-06	4,51E-05	-0,128	0,89826
Medical and social services	2,23E-05	1,63E-05	1,369	0,17103
Transport and handling of goods	1,24E-05	1,16E-05	1,066	0,28662
Teaching	-8,53E-07	2,18E-05	-0,039	0,96877
Water supply, sanitation, and cleaning of earth and water Residual standard error: 0.0001473 on 7810 de-	-4,82E-06	2,76E-05	-0,174	0,86148

grees of freedom

Multiple R-squared 0,05619,

Adjusted R-squared: 0,05365

F-statistic: 22,14 on 21 and 7810 DF

p-value: < 2,2e-16

Appendix 13 Regression on Constraint

Min	1Q	Median	3Q	Max
-0,75668	-0,01879	0,04453	0,10761	0,56749
Estimate	Std, Error	T Value	P Value	
1,074	0,011118	96,636	0	
-0,066	0,015497	-4,302	1,71E-05	
-0,014	0,00167	-8,97	0	
-0,056	0,001652	-34,196	0	
0,000	0,000235	1,173	0,24088	
0,043	0,022497	1,916	0,05547	
0,015	0,012073	1,283	0,19949	
-0,086	0,032218	-2,688	0,0072	
0,008	0,010549	0,779	0,43599	
-0,055	0,012517	-4,425	9,77E-06	
0,003	0,011696	0,271	0,78623	
-0,009	0,01187	-0,789	0,43037	
-0,000	0,021197	-0,034	0,97258	
0,002	0,018141	0,148	0,88209	
-0,005	0,011299	-0,486	0,62718	
-0,009	0,017018	-0,543	0,5872	
-0,036	0,012785	-2,84	0,00452	
-0,007	0,057495	-0,126	0,89958	
0,008	0,020782	0,428	0,66898	
0,016	0,01481	1,119	0,26307	
0,031	0,02781	1,121	0,26236	
-0,040	0,035213	-1,142	0,25357	
0,1803				
0,1781				
	Min -0,75668 Estimate 1,074 -0,066 -0,014 -0,056 0,000 0,043 0,015 -0,086 0,003 -0,005 0,003 -0,009 -0,000 0,002 -0,000 0,002 -0,000 0,003 0,003 -0,007 0,008 0,003 -0,007 0,008 0,016 0,016 0,031 -0,040 0,1803 0,1781	МіпIQ-0,75668-0,01879EstimateSd, Error1,0740,011118-0,0660,015497-0,0140,001652-0,0560,0016520,0140,002350,0150,0120730,0150,012073-0,0360,012073-0,0360,012073-0,0370,01187-0,0300,01187-0,0300,011814-0,0300,012197-0,0310,012193-0,0320,01231-0,0350,01231-0,0360,01231-0,0360,01231-0,0360,01231-0,0360,01231-0,0370,01231-0,0360,01231-0,0370,01231-0,0380,023213-0,0390,035213-0,13030,035213-0,13030,035213-0,13030,035213	Min1QMedian-0,75668-0,018790,04453-0,75668Std, ErrorT.Value1,0740,01111896,636-0,0660,015497-0,302-0,01400,001670-3,4196-0,01400,00102051,01300,0120,0120701,02130-0,03600,012070-0,2630-0,03010,011207-0,2630-0,03020,011207-0,2630-0,03030,011207-0,2630-0,03040,011207-0,2630-0,03050,011207-0,2630-0,03040,012781-0,2630-0,03040,012781-0,2630-0,03040,012781-0,2630-0,03040,012781-0,2630-0,03040,012781-0,1261-0,03040,012781-1,121-0,03040,027811,121-0,04040,035213-1,142-0,1435-1,142-1,142-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,1431-1,143-1,143-0,	Min1QMedian3Q-0,75668-0,018790,044530,10761-0,75668Std, ErrorTValuePValue1,0740,01111896,6360-0,0660,015497-4,3021,71E-05-0,0140,00167-8,9700-0,0500,001652-34,1060,024070,0430,0120731,21300,024070,0430,0120731,21300,012710,0450,0120731,24300,012710,0150,0120741,21300,012710,0030,0116700,27140,78623-0,0040,011207-0,42450,78724-0,0050,011870-0,74300,38204-0,0050,011207-0,14300,38204-0,0050,011209-0,14300,36204-0,0050,012785-2,8440,00452-0,0070,02784-0,14200,26307-0,0160,017841,1140,26307-0,0170,027841,1140,26307-0,0160,017841,1140,26307-0,0160,017841,1140,26307-0,0170,0372131,1140,26307-0,0180,017841,1140,26307-0,0140,017841,1140,26307-0,0150,017841,1140,26307-0,0140,017841,1140,26307-0,0140,017841,1140,26307-0,0140,017841,1140,26307 </td

F-statistic: 81,79 on 21 and 7810 DF,

p-value: < 2,2e-16

Appendix 14 Regression on Profits

Regression on Profit

Residuals:				
Min	1Q	Median	3Q	Max
-508029931	-12977233	-93730	10594612	5,07E+08

Coefficients:

		Std. Er-		
	Estimate	ror	t value	Pr(> t)
(Intercept)	1,15E+07	1,96E+07	0,589	0,556
Age	-1,37E+07	2,33E+05	-0,109	0,913
Assets	2,99E-02	1,43E-03	21,004	0
Constraint	-1,39E+07	1,24E+07	-1,12	0,263
Other services	1,35E+06	2,65E+07	0,051	0,959
Contruction	-6,85E+05	2,52E+07	-0,027	0,978
Eltricticity, gas, and heat distribution	-2,15E+07	2,00E+07	-1,074	0,283
Dealership of cars and motorcycles	8,31E+06	1,94E+07	0,429	0,668
Property	1,63E+07	1,91E+07	0,853	0,394
Produktion enterprises	1,37E+07	2,25E+07	0,608	0,544
Information and communication	-8,68E+06	2,57E+07	-0,337	0,736
Culture, amusements and sport	1,58E+06	2,58E+07	0,061	0,951
Agriculture, hunting, forestry and fisheries	-1,66E+06	3,22E+07	-0,052	0,959
Liberal, scientific and technical services,	-8,29E+06	2,06E+07	-0,403	0,687
Hotel and resturant businesses	-1,06E+06	3,22E+07	-0,033	0,974
Banking, Finance and insurance	-8,41E+06	2,07E+07	-0,407	0,684
Raw material extraction	-7,08E+06	6,85E+07	-0,103	0,918
Medical and social services	-6,32E+06	5,00E+07	-0,126	0,9
Transport and handling of goods	3,93E+06	5,01E+07	0,079	0,937
Teaching	-2,93E+06	3,74E+07	-0,078	0,938
Watersupply, sanitation, and cleaning og earth and water	-1,37E+07	2,07E+07	-0,66	0,51

Multiple R-squared: 0,5938 Adjusted R-squared: 0,5706 F-statistic: 25,58 on 20 and 350 DF, p-value: 2,2E-16





Im(FinalNetwork\$Betweeness ~ as.numeric(FinalNetwork\$ReeltDemokratisk) + Fi ...

Im(FinalNetwork\$Betweeness ~ as.numeric(FinalNetwork\$ReeltDemokratisk) + Fi ...





Appendix 16 Regression on Log of Betweenness and Assumptions Test

Regression on Log Betweenneess

Residuals:

Min 1Q Median 3Q Max -19.0868 -0.2713 0.8438 1.8516 8.9116

Coefficients:

		Std, Er-		
	Estimate	ror	t value	Pr(> t)
(Intercept)	1,337469	0,229109	5,838	5,52E-09
Democratic Organization	-0,45337	0,328102	-1,382	0,167078
Log of Employees	-0,17575	0,034559	-5,08	3,76E-07
Number of roles	-1,00297	0,034346	-29,202	< 2e-16
Age	0,00488	0,005113	0,954	0,339918
Other services	0,353542	0,45176	0,783	0,433893
Construction	0,388832	0,247069	1,574	0,115581
Electricity, gas, and heat distribution	-2,37864	0,658088	-3,614	0,000303
Dealership of cars and motorcycles	0,151307	0,215923	0,701	0,483484
Property	-0,81344	0,256753	-3,168	0,00154
Production enterprises	0,034287	0,239191	0,143	0,886022
Information and communication	-0,18864	0,242539	-0,778	0,436739
Culture, amusements and sport	-0,73385	0,423118	-1,734	0,082892
Agriculture, hunting, forestry and fisheries	-0,33464	0,367493	-0,911	0,362542
Liberal, scientific and technical services,	-0,01725	0,230883	-0,075	0,940456
Hotel and restaurant businesses	0,113435	0,341793	0,332	0,739987
Banking, Finance and insurance	-0,18706	0,3309	-0,565	0,571889
Raw material extraction	-3,6937	1,281977	-2,881	0,003972
Medical and social services	-0,10534	0,412577	-0,255	0,798485
Transport and handling of goods	0,236703	0,302599	0,782	0,434102
Teaching	0,59326	0,572939	1,035	0,300484
Water supply, sanitation, and cleaning of earth and water	-0,65816	0,760157	-0,866	0,386618

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.799 on 7400 degrees of freedom(14563 observations deleted due to missingness)Multiple R-squared: 0.1356,F-statistic: 55.29 on 21 and 7400 DF, p-value: < 2.2e-16</td>



Fitted values
Fitted values
Fitted values
Im(FinalNetwork\$Betweeness2 ~ as.numeric(FinalNetwork\$ReeltDemokratisk) + F Im(FinalNetwork\$Betweeness2 ~ as.numeric(FinalNetwork\$ReeltDemokratisk) + F

