Master's Thesis 'Overconfident CEOs, Innovative Organizations and Corporate Social Responsibility'

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Date: 12th July 2018

Abstract

This master's thesis investigates the effect of CEO overconfidence in combination with innovation in organizations on the level of CSR. CSR is a growing concept. More organizations engage in CSR since the 1950s and it keeps being important in the future. As CEOs and their personal profiles have a significant influence on organizational outcomes, it is thus important to investigate their characteristics in relation to CSR. Another growing concept is innovation. It is related to CEO overconfidence and CSR and therefore, I also investigate innovation in relation to the other two concepts. From previous empirical literature follows a negative association between CEO overconfidence and CSR, a positive association between innovation and CSR and a positive association between CEO overconfidence and innovation. The main result from this thesis is that overconfident CEOs have a negative influence on the level of CSR in organizations. I find a positive influence of innovation on the strengths of CSR, but do not find a significant influence on the CSR concerns. Furthermore, I find mixed evidence for the influence of innovation on the total CSR score. At last, I do not find significant evidence for the moderating effect of innovation on the relation between CEO overconfidence on CSR. However, the robustness test shows mixed evidence. The negative effect of CEO overconfidence on CSR decreases through innovation.

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Chapter 1. Introduction

The theme of this thesis is CEO overconfidence, innovation and Corporate Social Responsibility. Organizations' level of Corporate Social Responsibility is influenced by different factors. Two of those factors are innovation and CEO characteristics, among which overconfidence. In this thesis I investigate the influence of CEO overconfidence on Corporate Social Responsibility. Moreover, I investigate if the relation between CEO overconfidence and Corporate Social Responsibility differs when organizations are innovative. In this chapter I introduce the three concepts and their growing importance. This follows the research question and the relevance. At last the methods of investigating, the associated findings and the contribution are described.

§ 1.1 Introduction to the theme

Since the 1950s organizations became more aware of their responsibility and involvement in society (Carroll, 1999). This started with the first definition of Corporate Social Responsibility (hereafter CSR) provided by Howard Bowen in 1953, quoted in Perrini (2006). Bowen describes CSR in his book 'Social Responsibilities of the Businessman' as: "The obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society". Lee (2008) describes that in the years thereafter responsibility was even more growing because of the advantages of CSR. Researchers focused more on the organizational level of CSR, coupled CSR with research on strategies and investigated performance effects. The perspective of organizations regarding CSR changed therefore. Instead of the view that CSR has no tangible benefits, empirical evidence for long term benefits from CSR increased the adoption.

On top of the research, governmental interference in the responsibility of organizations requires organizations to take account of stakeholders with reference to the environment, employees and consumers. The US government has set in 1965 the 'Equal Employment Opportunity Commission'. In 1970 the federal agency 'Environmental Protection Agency', and the 'Occupational Safety and Health Administration' and in 1972 the 'Consumer Product Safety Commission' (Carroll, 1991). These commissions protect stakeholders from discrimination in employment, unhealthy (work) environment and injury and death associated with consumer products (EEOC, nd; EPA, 2017; OSHA, nd; CPSC, nd).

Around the 1990s stakeholders like employees, customers and NGOs also emphasized the importance of CSR. This pressure of stakeholders is reflected in the 90 percent of Fortune 500 firms in 1990 whereby CSR is an essential element of their goal, while two decades earlier half of the Fortune 500 firms only mentioned CSR in their annual reports (Lee, 2008). Organizations cannot ignore the pressure and therefore create programs and new strategies which contribute to higher levels of CSR, like Starbucks, Ben and Jerry's and Dell do (Vilas, 2017).

Innovation is another growing concept in the last decades. Around 1900 innovation became a term associated with science and industry. Until 1970 innovation is seen as newness in the economy. But in the years thereafter the element of 'technology' is added, innovation is now mostly seen as technological progress (Green, 2013). Innovation and its technological aspect can occur in six ways; new products, new services, new methods of producing, opening new markets, new sources of supply and new ways of organizing (Johannessen, Olsen, & Lumpkin, 2001). Given the fact that innovations keep growing in the field of technology and organizations, the economy keeps growing at the same time. Organizations like Google, Amazon, Apple, Facebook and Microsoft are known for their innovations and control the most important tech platforms (Manjoo, 2017). Therefore, innovation is seen as a fundamental component of entrepreneurship and a method to maintain sustainable competitive advantages (Johannessen et al., 2001). Innovative organizations furthermore demonstrate high levels of CSR (Mishra, 2017).

The last related concept to the theme is CEO overconfidence. CEOs are important to organizations, because they have to execute the strategy. CEOs' personal profiles influence the processes of organizations' strategies, including CSR (Godos-díez, Fernández-gago, & Martínez-campillo, 2011). Therefore, selecting the right CEO who fits the organizations' strategy is important to boards of directors. Characteristics of CEOs are investigated by different researchers and eventually used by the board of directors during the selection process of a CEO. One characteristic CEOs might have is overconfidence. This characteristic is negatively influencing CSR, found by previous literature (McCarthy et al., 2017). Therefore, CEO overconfidence is the third important concept in this thesis. Furthermore, CEO overconfidence increases innovation and innovation increases CSR (Galasso & Simcoe, 2011; Hirshleifer, Low, & Teoh, 2012; Mishra, 2017). Therefore, innovation might change the relation between CEO overconfidence and CSR.

§ 1.2 Research questions and relevance

The main relation in this thesis is between CEO overconfidence and CSR in innovative and non-innovative organizations. This relation is not previously examined. Previous literature focused on more external drivers for CSR, like stakeholder pressures (Petrenko, Aime, Ridge, & Hill, 2016). When CEO characteristics are investigated in relation to CSR, most researchers focus on observable CEO characteristics. Age, gender, tenure and education are all investigated in relation to CSR (Huang, 2013). Unobservable, psychological characteristics of CEOs are understudied. However, this is interesting to organizations. Following the upper echelons theory, CEOs and their personal profiles have a significant influence on organizational outcomes, including CSR (Hambrick & Mason, 1984). Psychological characteristics of CEOs are therefore important to investigate. To determine psychological characteristics and thus an individual's personality, the five-factor model is developed. This model consists of five basic dimensions of personal characteristics, which together describe someone's personality. Extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience are the five personality factors in this model. Those five dimensions are related to more detailed personal characteristics like creativeness, honesty, or assertiveness. Characteristics which are correlated with the dimension extraversion, are overconfidence and narcissism (Schaefer, Williams, Goodie, & Campbell, 2004). The characteristic overconfidence is not only related to CSR, but also to innovation. Therefore, it is interesting to investigate the three concepts, CEO overconfidence, innovation and CSR together. I investigate the relations between the three concepts to fill in the gap in the literature. These relations are especially interesting for board of directors from organizations that want to contribute to CSR. Nowadays regulators focus more on CSR and protect corporate activities with among others a 'Clean Air', 'Clean Water' and 'Toxic Substances Control' acts (US Law and CSR Implementation, 2015). Following a chief responsibility officer, commitments to CSR will keep being important in the future: "Completely regardless of the global political environment, corporations will continue the march toward sustainable production because it makes sense and is a business necessity" (McPherson, 2017). Therefore, boards of directors are more likely to engage in CSR. As CEOs are important factors of organizations' strategy, board of directors need a CEO profile that fits. More insight in CEO factors related to CSR strategy is therefore important. When the influence of overconfidence on CSR is determined, board of directors can be more specific on which characteristics they focus while hiring CEOs. Due to this remaining growth in attention and actions for CSR, empirical research about this topic in combination with CEO overconfidence

is relevant. Furthermore, more organizations are innovative in the present time, what is related to CEO overconfidence and CSR (Galasso & Simcoe, 2011; Mishra, 2017). Therefore, it is important to take innovation into account when investigating the relation between CEO overconfidence and CSR. Innovation might moderate the relationship. This is the reason why I investigate CEO overconfidence and innovation in relation to CSR.

The research question from this thesis combines the three concepts explained in the main introduction. Given the gap in the literature and increased emphasis to the concepts, I investigate the following research question:

"*Does CEO overconfidence affect the level of Corporate Social Responsibility ?*"

The sub-question I investigate refers to the possible moderating effect of innovation. The sub-question is the following:

"Does innovation have an influence on the relation between CEO overconfidence and Corporate Social Responsibility?"

§ 1.3 Methods

In this section I explain how I investigate the research question. First I use previous literature to describe and explain the concepts and their interrelations. Based on previous empirical literature I develop hypotheses, which support the investigation of the research question. I use empirical archival research and different databases in my research to test the hypotheses. The databases I use contain observations from North American organizations from 1992 to 2006. Eventually I can answer the research question.

The first database I use is the MSCI database via WRDS. From this database I extract data about the CSR performance levels from the organizations in my sample. I use the database ExecuComp to gather data about CEOs' option packages and exercises to determine if the CEO is overconfident. The intuition behind this method is when the in-the-money value of an option package is high, but unexercised, the CEO is very confident (overconfident) that his in-the-money value increases even more because of high future firm performance. The third database I use is the NBER patent citations database. With this database I can calculate the number of patent citations per organization per year. The number of patent citations is an outcome of innovation. Therefore, I use this number as a proxy for innovation. With this proxy I can determine to what extent an organization is innovative. Control variables I include in this thesis are CEO gender, CEO tenure, firm size, performance, leverage and industry. I use the database

CompuStat to gather data about the control variables firm size, performance, leverage and industry. Data about the control variables CEO gender and tenure are available through the database ExecuComp. In the end I use the statistical software program STATA to merge the data, execute statistical analyses, examine the hypotheses and answer the research question.

§ 1.4 Main results

The main result from this thesis is that overconfident CEOs have a negative influence on the level of CSR in organizations. This indicates that if an organization has an overconfident CEO, their level of CSR is lower than organizations without an overconfident CEO. I find a positive influence of innovation on the strengths of CSR, but do not find a significant influence on the CSR concerns. Furthermore, I find mixed evidence for the influence of innovation on CSR. When innovation is measured with patent counts instead of adjusted patent citations, it has a positive influence on the total CSR score. CEO overconfidence does have a positive influence on innovation in the sample of this thesis, but is insignificant. At last, I do not find significant evidence for the moderating effect of innovation on the relation between CEO overconfidence on CSR. However, the robustness test shows mixed evidence. The less negative influence of CEO overconfidence combined with innovation is significant when innovation is measured based on patent counts. This indicates that if a CEO is overconfident in an innovative organization, the negative influence of the CEO on CSR decreases.

§ 1.5 Contribution

The contribution of this thesis to the empirical literature is that overconfident CEOs have a negative influence on the total level of CSR. Furthermore, the negative effect of overconfident CEOs on CSR may decrease when it is combined with innovation in an organization. I find mixed evidence for this relationship. The relation between the three concepts, CEO overconfidence, innovation and CSR, together has not been investigated till now. Therefore, this mixed evidence sheds some light on the relationship and is new to the academic literature. The practical implication of this new insight is especially interesting to the board of directors. In selecting a new CEO for their organization, they can take the characteristic overconfidence into account in personality tests. As overconfident CEOs have a negative influence on CSR, boards of directors might avoid CEOs with this characteristic.

§ 1.6 Structure

This thesis consists of six chapters. The first chapter introduces the concepts and their relevance. The second chapter explains the concepts, their measurement methods and their interrelations. Thereafter, chapter three presents previous empirical literature about the interrelations and bases hypotheses on the literature. In chapter four the methods of measuring the variables in this thesis are explained. Chapter five presents thereafter the results of testing the hypotheses with the explained variables. In chapter six conclusion are drawn from the results and the contribution and limitations of this thesis are discussed.

Chapter 2. Theory

§ 2.1 Introduction

In this chapter I explain the main concepts, CSR, innovation and CEO overconfidence. The concepts are part of the research question and form the theme of this thesis. In this chapter I define the concepts and their context, explain their measurement methods and explain their interrelations.

§ 2.2.1 Corporate social responsibility

As mentioned in the introduction, Howard Bowen's definition of CSR, as quoted in Perrini (2006) is "The obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society". CSR is a concept with a lot of different explanations, besides Bowen's definition. To explain the concept Carroll (1991) divides it into four components that are built up to a pyramid. The first component is the bottom of the pyramid; economic responsibility. This is the primary incentive for organizations and means in practice "be profitable". The second component is the legal responsibility of an organization. This is a social contract between the organization and society, which means that organizations must obey the law while doing their business. The third component is the ethical responsibility. This component is a step above the legal component and embraces the fairness, justice and moral behavior that stakeholders expect from organizations. It is a component which states that organizations must be ethical. At last the fourth component and the top of the pyramid is the philanthropic responsibility. This states that organizations must be a good corporate citizen. These components are steps in the Pyramid of Corporate Social Responsibility from Carroll (1991).

Garriga and Melé (2004) provide an overview with different theories regarding CSR and divide them also in four groups. Those groups are instrumental, political, integrative and value theories, which all overlap with the Pyramid from Carroll (1991). Following the instrumental theories, CSR is a strategic tool to maximize firm values. The second group, political theories, focus on political considerations in interactions between organizations and society. The third group, integrative theories, state that organizations depend on society. Social demands of society are the interaction with the organization. The last group, value theories, focus on ethical values as an interaction between business and society. Organizations following this theory base their strategy on ethical principles. In this last group the 'stakeholder

management theory' fits. This theory is from Freeman (1984). In contrast to Carroll's organizational components, it focuses on stakeholders' perceptions of the organization's CSR practices (Pérez & del Bosque, 2016).

On top of the motive "be a good corporate citizen", the motives for organizations to engage in CSR are different. CSR can be used as a method to reduce agency problems. This is because it increases transparency. CSR engagement shows an organization's commitment to stakeholder engagement and a responsible reputation. When the organization is more transparent to its stakeholders, agency problems decrease because external stakeholders are more aware of organizations' performance and the information gap decreases. Organizations also engage in CSR to enhance their reputation and mitigate negative stakeholder reports (Babiak & Trendafilova, 2011). CSR signals stakeholders that the organization is considering others and the social good during their practices. This creates a better reputation and thus goodwill for the organization. When organizations experience negative events, the decrease in firm value is lower through the generated goodwill from CSR practices. In this case CSR is used as a hedging method, as is part of an organizations' risk management strategy (McCarthy et al. 2017).

From these theories it appears that CSR consists of different concepts, perspectives and perceptions. I explain the measurement methods of this concept in section 2.3.1.

§ 2.2 Explanation of concepts

In this section I explain the different definitions and contexts of the concepts CSR, innovation and CEO overconfidence.

§ 2.2.2 Innovation

The second concept I explain is innovation. It is a concept with again a lot of different explanations. Thompson (1965) defines innovation as first, he describes it as "the generation, acceptance and implementation of new ideas, processes, products or services".

As already described in the introduction, innovation is investing in sources that generate new products, new services, new methods of producing, new sources of supply, new ways of organizing and open new markets (Johannessen et al., 2001). These ways in which innovation expresses itself can be radical or incremental. A radical innovation is an innovation that is completely new, breaks the status quo or requires change in the process as well as the production

or service. An incremental innovation only changes parts of products or services (Ettlie, Bridges, & O'Keefe, 1984). In section 2.3.2 I explain the methods of measuring innovation.

§ 2.2.3 CEO overconfidence

Overconfidence is a characteristic which influences the strategic choices from CEOs and eventually influences organizational outcomes. It is a characteristic whereby an individual is too confident and it occurs in three ways. The first way in which individuals are overconfident is when they overestimate their ability. The second way in which overconfidence expresses itself is when an individual thinks he is better than others. And the last way in which overconfidence occurs is when individuals are excessively certain regarding the accuracy of their beliefs (Moore & Healy, 2008). These biases are called in the psychology respectively miscalibration, the above-average effect and the illusion of control (Ben-David, Graham, & Harvey, 2013). Overconfidence results often in overinvestments, because CEOs believe they can control the outcome and underestimate the risk of failure (Malmendier & Tate, 2005). This overestimation of oneself, an expression of overconfidence, is similar to narcissism. Narcissists have higher perceptions of themselves, compared to objective measures. They have a strong need for attention, praise and admiration (Schaefer et al., 2004). Furthermore, they overestimate themselves, as overconfident CEOs do. Therefore, the two concepts correlate with each other and are narcissists considered overconfident (Shipman & Mumford, 2011). However, the main difference between overconfidence and narcissism is that narcissists have a constant need for recognition and attention, and are willing to follow their needs at the expense of others (Ham, Seybert, & Wang, 2018). In section 2.3.3 I explain the measurement methods of overconfidence.

§ 2.3 Measurement of concepts

In this section I explain the different measurement methods for the concepts CSR, innovation and CEO overconfidence.

§ 2.3.1 Corporate social responsibility

Because of the increasing interest in CSR, not only by organizations and stakeholders, but also by researchers, different definitions of CSR are developed. Most of these definitions refer to interaction with stakeholders. Therefore, the perception of stakeholders on corporate responses to social concerns plays a role in the measurement of CSR (Perez & del Bosque, 2013). This subjectivity makes it difficult to gather actual measures of CSR. Nevertheless,

different methods of measuring CSR exist, including surveys, behavioral measures, reputation indices and databases. I focus on the last two methods, reputation indices and databases. The most used measurements of this method are the ones from the MSCI, formerly Kinder, Lydenberg, and Domini (KLD) database, the Fortune Index, the Dow Jones Sustainability Index (DJSI) and the Canadian Social Investment Database (Turker, 2009).

The first database is the MSCI database. MSCI is an independent institution that measures the level of CSR by various indicators in seven dimensions: corporate governance, diversity, products, community, environment, employee relations and humanity. Since 2003 the database has data available from the 3,100 largest firms in the United States based on market capitalization (Mattingly & Berman, 2006; Wang & Berens, 2015). The indicators in the dimensions are strengths and concerns. When a strength or concern exists it is assigned the number 1. When it does not exist it is assigned the number 0. Those numbers are summed up as a total strengths and total concerns per dimension. Eventually the CSR score is calculated as total strengths minus total concerns (Kim, Park, & Wier, 2012). The CSR score can be divided in only strengths or only concerns, and in technical and institutional CSR (McCarthy et al., 2017). Technical CSR consists of the dimensions corporate governance, products and employee relations, while institutional CSR consists of the dimensions diversity, community, environment and humanity.

The second measurement is the Fortune reputation index. This is an index of organizations that are rated by other companies' executives on a scale, relative to their competitors. Executives estimate to what extent other companies in their industry behave towards the eight characteristics: long term investment value, financial soundness, wise use of assets, management quality, product or service quality, innovativeness, talented people and community and environmental responsibility (Fryxell & Wang, 1994; Turker, 2009).

The third measurement of CSR is the DJSI. This is an index which ranks organizations based on their economic, social and environmental performance. The index is only focusing on organizations' CSR strengths. When organizations from the index are performing worse, they receive a lower ranking or are excluded from the index. The organizations are continuously monitored through questionnaires, interviews and publicly available information (Knoepfel, 2001).

The last measurement is from the Canadian Social Investment Database. This database measures CSR, as the MSCI database, through strengths and weaknesses of organizations on

seven dimensions. Those dimensions are community, diversity, employee relations, environment, international operations, product and business practices and corporate governance (Turker, 2009). The sum of the average score of strengths and weaknesses per dimension is eventually the CSR score. The disadvantage of this database is that it only covers companies which are traded on the Canadian stock market.

§ 2.3.2 Innovation

Innovation is as CSR, measurable through different methods. The first measure of the concept innovation is Research and Development (R&D) intensity. R&D intensity is calculated through dividing the R&D expenditures by total revenue. This measure focuses on the input of innovation, which are the R&D expenditures. Despite the popularity, the relationship between R&D intensity and innovation performance is called into question. R&D intensity is not useful for small and medium-sized organizations and is not necessarily related with innovation (Adams, Bessant, & Phelps, 2006).

A second method that is widely used to measure innovation are patent counts. This measure focuses on the output of innovation. In the last decades the use of patent data increased. It is a direct indicator of innovation compared to the measure of R&D expenditures (Acs, Anselin, & Varga, 2002). However, critic on this patent measure is that innovation in an organization grows harder than the observed growth in the number of patents over time. In addition, the innovation that is protected by a patent can increase over time. The value of the innovation is therefore understated. These critics indicate that patent counts do not capture the value of the innovation, but have a lower value (Lanjouw & Schankerman, 2004).

Another proxy to measure innovation which is related to patents, are patent citations. They are used when an organization has a patent and the content of others' work is related to it. Patent citations are a representation of innovation and therefore an appropriate measure (Trajtenberg, 1990). A more detailed measure of innovation related to patents and their citations is from Lanjouw and Schankerman (2004). They focus on the quality of patents to emphasize not only the technological dimension of an innovation, but also the value of it. They examine four indicators of a patent's quality: the number of claims, forward citations to the patent, backward citations in the patent application, and family size. The first indicator, claims of a patent, are about features of the innovation that the organization wants to protect by the patent. The second and third indicators are about the citations. The authors assign backward citations to a patent when prior patents are cited in the application of it. Forward citations are assigned

when a given patent is cited. At last the authors take family size into account when measuring the patent's value. This is the number of jurisdictions for which patent protection was granted (Harhoff, Scherer, & Vopel, 2003).

§ 2.3.3 CEO overconfidence

The last concept, overconfidence, can be measured by different methods. The first method is from Cesarini, Johannesson, Lichtenstein and Wallace (2009). They measure overconfidence as the difference between individuals' perceived ranking of a cognitive test and the actual ranking of the cognitive test.

Malmendier and Tate (2005) have another method of measuring CEO overconfidence, which is called "Holder 67". This measure focuses on the timing of exercising options from compensation packages of CEOs, which have a direct impact on their personal wealth. CEOs with stock and option compensation packages cannot trade their options and are thus likely to exercise their options when the stock price is high. The first measure, Holder 67, therefore considers at first the status of each individual option package at the end of the vesting period. Then the percentage in-the-money value for each package is computed. This should be lower than the 'overconfidence benchmark' of 67 percent. This benchmark takes CEO wealth, risk aversion and diversification into account. It corresponds to a risk aversion of three, which indicates that two-third of the CEOs wealth is hold in the organizations stock. If an option is more than 67 per cent in the money and the CEO did not exercise at least some portion of the package during or before the fifth year, the CEO is considered to be overconfident. This is because the CEO is then overestimating his ability to keep the stock price increasing. Campbell, Gallmeyer, Johnson, Rutherford and Stanley (2011) create an adapted version of the "Holder 67" measure. They use the average realizable value and strike price of all options to calculate the in-the-money value, instead of the value for each option on its own.

The second measure from Malmendier and Tate (2005) is the "Longholder" measure. It also focuses on the timing of exercising options from CEOs' compensation packages and considers a CEO to be overconfident when he holds an option until the last year of its duration.

A third method from Malmendier and Tate (2005) is "Net Buyer". This measure classifies a CEO as overconfident when he purchases additional stock of the organization in his first five years. In this case a CEO is overconfident because he is, despite the risk of keeping equity, overestimating the organization's performance.

Malmendier and Tate (2005) have published a second paper with a new method to measure overconfidence. This method focuses on the perception of outsiders. Press data about CEOs need to be hand collected and the number of words as 'confident', 'overconfident', 'optimistic' or on the other hand 'conservative' and 'steady' need to be counted. When a CEO is more described as confident than conservative and steady, he is considered overconfident.

§ 2.4 Interrelations between concepts

In this section I explain the interrelations between the three concepts. At first I explain the relation between CEO overconfidence and CSR. Then I explain the relation between innovation and CSR. At last I explain the relation between CEO overconfidence and innovation.

§ 2.4.1 CEO overconfidence and CSR

Following the upper echelons theory from Hambrick and Mason (1984), CEOs have a significant influence on organizational outcomes. Furthermore, CEOs personal profiles have a direct effect on CSR (Godos-díez et al., 2011). The CEO's values and cognitive base partially explain the strategic choices and performance levels. As one of the characteristics of CEOs personal profiles is overconfidence, the relation between overconfidence and CSR can be investigated.

The relation between the two concepts can be described in different ways. The first way in which there is a relation, is through the CSR hedging view. In section 2.2.1 it becomes clear that CSR can be used as a hedging method. However, overconfident CEOs overestimate their ability and the probability of good outcomes. They underestimate the risk of projects or investments (Ben-David et al., 2013). Therefore, overconfident CEOs are less likely to hedge and do not have the motivation to use CSR as a hedging method. As a result overconfident CEOs are less likely to engage in CSR (McCarthy et al., 2017).

On top of that, overconfident CEOs underinvest in gathering information about projects, which leads to project selection errors and value-destroying investments (Goel & Thakor, 2008). In more extreme cases overconfidence increases the chance of financial misstating and fraud, but even then CEOs stay optimistic about future firm performance (Schranda & Zechman, 2012). Thus, overconfident CEOs do not believe they need to increase transparency or have to reduce the organization's negative impact on the social good, what CEOs normally do when participating in CSR (Cai, Jo, & Pan, 2012). Through this view, overconfident CEOs

will not use CSR because they do not reduce organizations' negative impact on the environment or social good. The relation between CEO overconfidence and CSR will again be negative.

The last relationship between overconfident CEOs and CSR exists through narcissism. As narcissist are overconfident, the direct relation between narcissism and overconfidence can be investigated. In section 2.1.3 it becomes clear that narcissistic CEOs have a strong need for admiration and seek social praise for their actions. CSR actions bring that social praise to organizations and their CEO, because it creates social good. Those CSR actions get external attention from stakeholders, among which the media. Narcissistic CEOs are therefore more willing to engage in CSR, as it enhances their self-image (Petrenko et al., 2016). From this point of view, CEO overconfidence and CSR will have a positive relation.

§ 2.4.2 Innovation and CSR

Most of the previous literature has focused on the effect of CSR on innovation, in contrast to the effect of innovation on CSR. Besides the direction of the relation between the two concepts, they are at least correlated. The main difference between the effect of innovation on CSR and CSR on innovation is the aim of CSR. When CSR is focused on innovation, mainly products and services are changed. While innovation focused on CSR, it mainly creates whole processes designed for CSR engagement (Gallego-Álvarez, Prado-Lorenzo, & García-Sánchez, 2011).

The theory behind the effect of CSR on innovation is that organizations which want to engage in CSR practices, must comply with laws and regulations. Those laws and regulations are about product standards, process standards or environmental standards. CSR engagement thus requires investments to change products, processes and services into new and responsible products, processes and services. Eventually those investments express themselves in R&D costs. Therefore, CSR practices provide opportunities for, and create innovation (Gallego-Álvarez et al., 2011). Literature that focused on the effect of CSR on innovation thus finds a positive effect.

When the effect in reverse is investigated, the effect of innovation on CSR, it is again positive. When organizations are highly innovative they generate positive market value from engaging in CSR (Bocquet, Le Bas, Mothe, & Poussing, 2017). Innovative organizations thus demonstrate high levels of CSR. Two reasons for the high levels of CSR in innovative organizations exist, found by Mishra (2017). First, innovative organizations which are introducing new products or services have a greater probability to fail with their new products

or services. Organizations with only existing products and services do not have that probability anymore. The products and services that exist are already accepted by the market. Because the higher probability for innovative organizations to fail, they need to assure the market of their commitment to social responsible behavior. CSR engagement shows this commitment to external stakeholders of the organization. The second reason for innovative organizations to engage in CSR practices is transparency, which reduces agency costs and mitigates opportunistic behavior as described in section 2.2.1. Transparency is especially for innovative organizations important, because of the reduction in information-asymmetry. This attracts investors as they can better predict and thus invest in transparent organizations. When organizations attract investors, more capital for innovations is gained and external financing can be reduced. However, Dhaliwal, Li, Tsang and Yang (2011) find that organizations starting with disclosures of CSR observe greater industry competition. But the increase in transparency reduces also the cost of equity capital, and this outweighs the costs of competition.

On top of the reasons for innovative organizations to engage in CSR, engagement appears automatically. Resources generated by R&D investment, which can be seen as innovations, make organizations' technology more flexible. Through this flexibility customer preferences can be taken into account during the design of products or services. This improves customer satisfaction, the quality of products and services and therefore organizations' engagement in CSR (Prior, Surroca, & Tribó, 2008).

§ 2.4.3 CEO overconfidence and innovation

When organizations in innovative industries have overconfident CEOs, their level of innovation increases (Galasso & Simcoe, 2011; Hirshleifer, Low, & Teoh, 2012). Several explanations exist for this relation. The first explanation exists through the overestimating of CEOs' ability and their certainty regarding the accuracy of their beliefs. Above the overestimating of own ability and beliefs, they overestimate returns of projects they invest in. Therefore, overconfident CEOs invest more (Malmendier & Tate, 2005). The specific investment returns which overconfident CEOs overestimate are the returns from risky and challenging projects. As innovative projects apply new products, services or processes, they are risky and challenging. Hence overconfident CEOs are likely to invest in innovative projects. They are on top of that better innovators regarding patent generations (Hirshleifer et al., 2012).

The second explanation for high innovation through overconfident CEOs exists because of narcissism. Ham et al. (2018) find that overinvestments, especially in R&D and Mergers and

Acquisition (M&A), are associated with narcissism. Investing in innovative projects is viewed as an indicator of superior management. Narcissistic CEOs are therefore likely to invest in innovative projects, as it enhances their admiration and praise. On top of that, narcissistic CEOs seek recognition and prefer investments that increase their self-enhancement. Therefore, narcissistic CEOs have the tendency to engage in "empire building" and invest more in M&A. However, mixed evidence is found when narcissism is compared to overconfidence. Overconfident CEOs are more likely to invest in capital, than in R&D and M&A. This indicates a difference between narcissistic and overconfident CEOs.

§ 2.5 Summary

In this chapter the concepts, their measurement methods and their interrelations are explained. The first described concept is CSR, which is "The obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society" (Perrini, 2006). Several reasons exist for organizations to engage in CSR. A reason for engagement could be to resolve agency problems and create transparency for stakeholders, or to set strategic choices, for example CSR as a hedging method. Different methods of measuring CSR exist including surveys, behavioral measures, reputation indices and databases like the MSCI database.

The second concept explained in this chapter is innovation. It is "the generation, acceptance and implementation of new ideas, processes, products or services" and can express itself in six ways: new products, new services, new methods of producing, opening new markets, new sources of supply and new ways of organizing (Johannessen et al., 2001). To measure innovation, different proxies can be used. A proxy of the input side of innovation is R&D expenditures, and proxies for the output side of innovation are patent counts and patent citations. Innovative organizations demonstrate high levels of CSR. This is because innovative organizations have a greater probability to fail and therefore compensate with commitment to social responsible behavior (Mishra, 2017). Innovating in new products or services also improves quality, customer satisfaction and organizations' engagement in CSR (Prior et al., 2008).

The last explained concept is CEO overconfidence. Overconfidence is a characteristic whereby an individual is too confident. This express itself in CEOs overestimating their ability, thinking they are better than others and having an excessive certainty regarding the accuracy of their beliefs (Moore & Healy, 2008). It can be measured by determining the difference between

individuals' perceived ability and actual ability (Cesarini et al., 2009). Measuring if a CEO is overconfident can also be determined by options. If a CEO did not exercise some portion of an option which is more than 67 percent in the money, he is considered overconfident. A third measure is focussing on the percepion of outsiders and press data, who call a CEO overconfident (Malmendier & Tate, 2005). CEO overconfidence is negatively related to CSR. This is because overconfident CEOs underestimate the risk of projects or investments. They are less likely to hedge and do not use CSR as hedging method. Furthermore, overconfident CEOs do not believe they have to reduce their negative impact or need to increase their transparency by CSR. However, the relation between CEO overconfidence and innovation is positive. Overconfident CEOs overestimate returns of projects they invest in and are thus likely to invest more (Malmendier & Tate, 2005). As innovative projects are risky and challenging, what attracts overconfident CEOs, they are likely to invest especially in those projects.

Chapter 3. Empirical literature

§ 3.1 Introduction

In this chapter I present the key related empirical literature about the relations between overconfidence and innovation on CSR. Thereafter I include previous empirical literature about the relation between overconfidence and innovation. Furthermore, I present a research overview with the key related empirical literature about the interrelations. At last I explain the theory and literature on which the hypotheses are based.

§ 3.2 Determinants of CSR

In this section I describe key related empirical literature regarding the two variables, overconfidence and innovation, that influence CSR.

§ 3.2.1 Overconfidence

The first determinant of CSR is CEO overconfidence. Previous empirical literature studied the relationship between the two factors. McCarthy et al. (2017) investigate the relation between CEO confidence and CSR. They expect following the CSR hedging theory, that confident CEOs are less likely to hedge and therefore, do not engage in CSR. To proxy for CSR they use the KLD, now MSCI, database. The proxy for CEO confidence is determined based on option exercise behavior. Their sample period is from 1992 to 2012 and contains 15,379 firm-year observations with 3,478 different CEOs. From this sample follows that the increasing level of CEO confidence decreases the level of CSR. In the institutional aspects of CSR, diversity, community, environment and humanity, the negative influence is stronger. This is because CSR has a greater hedging effect in those dimensions. Furthermore, McCarthy et al. find a positive relation between CEO confidence and the CSR dimension product quality. This is because overconfident CEOs are better innovators, as Hirshleifer et al. (2012) find.

Petrenko et al. (2016) investigate the relation between narcissistic CEOs and CSR. Following the theory that narcissistic CEOs have a strong need for admiration and seek social praise for their actions, they are more willing to engage in CSR. Hence Petrenko et al. (2016) expect a positive relationship between narcissism and CSR. They use as McCarthy et al. (2017) the KLD database to determine the level of CSR. Narcissism is proxied as the Narcissistic Personality Inventory (NPI), collected through third-party ratings of video samples from CEOs. Their sample includes all S&P 500 firms between the years 1997 and 2012, with a number of

different CEOs between 911 and 1,051. This research shows a positive relation between narcissism and CSR. The attention-seek behavior of narcissists expresses itself in higher CSR engagement. However, narcissism weakens the positive relation between CSR and firm performance. Narcissistic CEOs only engage in CSR for the attention, not for simple responses to external pressures. This decreases the positive firm performance after CSR.

§ 3.2.2 Innovation

The relation between innovation and CSR is investigated by Mishra (2017). The theory behind innovative organizations is that they have a greater probability to fail and therefore compensate with CSR. Innovating in new products or services also improves quality, customer satisfaction and organizations' engagement in CSR. To examine if the theory holds in practice, 3,004 US organizations are investigated, resulting in 13,917 firm–year observations from 1991 to 2006. Again, the KLD database is used to determine the level of CSR. The proxies for innovation are the number and citations of patents. Mishra (2017) creates a weighted factor for the time lag between the application of a patent and the granting to determine the patents in a specific year. These proxies and sample show a positive relation between innovative organizations and the level of CSR. When innovations are more successful, the level of CSR in the years thereafter is higher. Innovative organizations have high potential growth opportunities because of the patents. They benefit from CSR engagement as it increases their valuation and reputation, and decreases capital constraints from investors.

Gallego-Álvarez et al. (2011) investigate on top of the relation between innovation and CSR, also the relation between CSR and innovation. Following the theory, a bidirectional relation must exist. This is because innovative organizations prevent negative reaction from the market and therefore, engage in CSR practices. On the other hand, engagement in CSR requires creating new, socially responsible products and services. This expresses itself in innovation. Gallego-Álvarez et al. (2011) investigate the theory with a sample of 500 European and 500 non-European organizations from 2003 to 2007. In contrast to McCarthy et al. (2017), Petrenko et al. (2016) and Mishra (2017), these researchers determine if a firm engages in CSR through the Dow Jones Sustainability Index (DJSI). Innovation is measured with R&D intensity, obtained by the R&D expenditures to revenue ratio. Eventually the findings are adverse compared with Mishra (2017). Innovation has a negative impact on CSR and CSR has a negative impact on innovation. This is because not all CSR projects create value for organizations. In contrast, many of them increase costs and organizations do not use innovation

in their CSR practices. Another explanation is that organizations invest more in innovation, and less in CSR practices, because the organizations attract customers with innovative products and not with CSR engagement. However, Gallego-Àlvarez et al. (2011) find that R&D investments take three years to positively influence CSR. Furthermore, in the energy and industry sectors a positive bidirectional effect exists.

§ 3.3 Overconfidence and innovation

Next to the determinants of CSR is the relation between overconfidence and innovation also important to investigate for the research question of this thesis. Galasso and Simcoe (2011) investigate this relation. They expect a positive relationship between overconfidence and innovation, following the theory that overconfident CEOs overestimate the return of especially risky projects and thus invest in them. To examine the theory they use a sample of 3,648 firm-year observations and 627 CEOs from 1980 to 1994. They measure innovation with patent citations and R&D expenditures. Overconfidence is measured by option exercise behavior as McCarthy et al. (2017) do. This research shows a positive relation between CEO overconfidence and innovation. Overconfident CEOs underestimate the likelihood of failures and therefore, encourage innovation. Furthermore, the effect of overconfidence on innovation will be greater when product markets are highly competitive. This is because successful innovations in competitive industries are a sign of a high-ability CEO, what leads to higher payoffs.

Hirshleifer et al. (2012) also investigate the relation between overconfidence and innovation. They use the same measurement methods as Galasso and Simcoe (2011) to measure innovation. To measure overconfidence, they include an extra proxy. On top of the option exercise behavior they use press based data to determine overconfidence. The sample of Hirshleifer et al. (2012) is larger than Galasso and Simcoe's (2011). It contains 9,807 firm-year observations with 2,577 CEOs from 1993 to 2003. From this sample and measurements follows that CEO overconfidence is associated with riskier projects, greater investment in innovation and more successful innovations.

The last related paper to this thesis is from Ham et al. (2018). They investigate the relation between CEO narcissism and investments, among which in R&D. They measure narcissism with the size of CEOs' signature, which is a new method. Investments are measured by the R&D, M&A and capital expenditures. Their sample includes 6,361 firm-year observations with 741 CEOs from 1992 to 2015. The results show that narcissistic CEOs invest

more in R&D and M&A. However, narcissists dominate the decision process without taking feedback into account. This leads to less productiveness of the CEO and lower firm profitability in terms of return on assets and operating cash flows. Ham et al. (2018) compare narcissism with overconfidence and find that overconfident CEOs invest more in capital instead of R&D and M&A. Overconfident CEOs have a lesser need for admiration, praise and recognition and thus have less investments in R&D and M&A than narcissistic CEOs. Furthermore, overconfident CEOs increase firm's profitability in contrast to narcissistic CEOs. This indicates that narcissistic and overconfident CEOs have different influences on firm practices and outcomes.

Table 1. Research overview

Research question	Paper	Sample	Operationalization dependent and independent variables	Control Variables	Results
Do CEO confidence and CSR have a relationship?	(McCarthy, Oliver, & Song, 2017)	15,379 firm-year observations with 3,478 CEOs from US firms from 1992-2012.	KLD database to determine the CSR level and option exercise behavior to determine overconfidence.	CEO age, gender and tenure. ROA, book value of assets, leverage. Advertising-, R&D- and capital expenditures. Outside monitoring and managerial entrenchment.	The higher the confidence level of CEOs, the lower the level of CSR. CEO confidence and CSR have a negative relation.
How may CEO narcissism affect organizational CSR?	(Petrenko, Aime, Ridge, & Hill, 2016)	Between 911 and 1,051 CEO-year observations from S&P 500 firms from 1997-2012.	KLD database and third-party ratings of video samples from CEOs to measure narcissism.	CEO duality, age, ownership, tenure and political ideology. Independence of the firm, size of the firm, slack of resources, ROA, previous year CSR, industry.	Narcissistic CEOs positively influence the level of CSR.
Do innovative firms demonstrate higher CSR post-innovation?	(Mishra, 2017)	13,917 firm–year observations from 1991 to 2006.	KLD database and weighted time-lag factors combined with the number and citations of patents to measure innovation.	Firm size, age, ROA, CAPEX, leverage, market-to-book value, R&D intensity, inside ownership, Tobin's Q in the initial sample year and location.	Innovative firms invest more in CSR. Furthermore, the more successful an innovation, the higher CSR thereafter.
Do innovation and CSR have a bidirectional relationship?	(Gallego-Álvarez, Prado-Lorenzo, & García-Sánchez, 2011)	1,000 organizations from 2003 to 2007.	DJSI to determine if an organization engages in CSR and R&D intensity to measure the level of innovation.	Industry sector, firm size and risk (sales variation).	Innovation and CSR have a negative bidirectional relation, besides two sectors. Furthermore, R&D investments positively influence CSR after three years.
Is overconfidence associated with an increased propensity to innovate?	(Galasso & Simcoe, 2011)	3,648 firm-year observations with 627 CEOs from 1980 to 1994.	R&D intensity and patent citation counts to measure innovation and option exercise behavior to determine overconfidence.	CEO age, tenure, educational background, option holdings and stock ownership. Sales, book value of assets, number of employees, R&D stock	CEO overconfidence and innovation have a positive relation. This effect is stronger when product markets are highly competitive.
Are overconfident CEOs better innovators?	(Hirshleifer, Low, & Teoh, 2012)	9,807 firm-year observations with 2,577 CEOs from 1993 to 2003.	R&D intensity and patent citation counts to measure innovation and option exercise and press based behavior to determine overconfidence.	Firm size, capital intensity, percentage of institutional investors, Tobin's Q, sales growth, ROA, stock return, market-to-book ratio, leverage, cash holdings, industry and CEO tenure and stock incentives.	CEO overconfidence is associated with riskier projects, greater investment in innovation and more successful innovations.
What is the effect of CEO narcissism on firm investment and performance?	(Ham, Seybert, & Wang, 2018)	6,361 firm-year observations with 741 CEOs from 1992 to 2015.	CEOs' signature size to measure narcissism and R&D, M&A and capital expenditures to measure firm investment.	Total assets, ROA, market-to-book ratio, leverage, monthly return, std of ROA and investments (over the past five years), earnings persistence and operating cash flow divided by lagged assets. CEO age, tenure and gender.	Narcissism is positively related to R&D and M&A investments, but negatively to firm performance.

§ 3.4 Hypotheses development

The most important concept in this thesis is CSR. It is the obligation of organizations to act socially responsible. Several reasons exist for organizations and their CEO to engage in CSR. However, for overconfident CEOs less reasons exist. When CEOs are overconfident they overestimate their ability and think they are better than others (Moore & Healy, 2008). Furthermore, they underestimate risks and stay optimistic about future firm performance even when they misbehaved (Malmendier & Tate, 2005; Schranda & Zechman, 2012). Therefore, overconfident CEOs do not think it is necessary to participate in CSR to reduce their negative impact on CSR nor do they think it is necessary to increase transparency (Cai et al., 2012). On the other hand, the relation between narcissism and CSR shows mixed results. Narcissism and overconfidence correlate with each other, for the reason that narcissistic CEOs overestimate themselves and thus are overconfident (Shipman & Mumford, 2011). Narcissistic CEOs have a strong need for admiration, seek social praise for their actions and therefore, are more willing to engage in CSR. From this point of view and evidence from the empirical literature, narcissistic CEOs have a positive influence on CSR (Petrenko et al., 2016). However, Ham et al. (2018) find that narcissistic and overconfident CEOs show different firm practices and outcomes. This is because the main difference between narcissism and overconfidence is the need for attention and praise. The positive relation between narcissistic CEOs and CSR is built on the need for attention and praise, what overconfident CEOs do not have. Therefore, I follow McCarthy et al. (2017) and expect that CEO overconfidence is negatively related to CSR. Based on the investigations of overconfident CEOs my first hypothesis is:

Hypothesis 1a: Overconfident CEOs have a negative effect on CSR

The second concept I investigate in relation to CSR is innovation. Innovation is the generation, acceptance and implementation of new ideas, processes, products or services (Thompson, 1965). Innovative organizations which are introducing new products or services have a greater probability to fail and therefore, need to assure the market through CSR of their commitment to social responsible behavior. Innovative organizations also use CSR to create transparency. Then information-asymmetry is reduced and investors are attracted, who bring more capital to the organization. At last innovative organizations engage in CSR because they create new resources with their R&D investments. These resources create the possibility to take customer preferences into account. This improves customer satisfaction and the quality of products, and thus increases engagement in CSR (Mishra, 2017; Prior et al., 2008). Previous

empirical literature by Mishra (2017) and Gallego-Álvarez et al. (2011) shows that innovative organizations invest more in CSR and R&D investments positively influence CSR after three years. Furthermore, the more successful an innovation, the higher CSR thereafter. Therefore, my expectation about innovative organizations is the following:

Hypothesis 1b: Innovative organizations have a positive effect on CSR

Overconfidence can also be investigated in relation to innovation. As overconfident CEOs overestimate their ability, they also overestimate returns of projects they invest in. This increases the likelihood of overconfident CEOs to invest more (Malmendier & Tate, 2005). As innovative projects are risky and challenging, what attracts overconfident CEOs, they are likely to invest especially in innovative projects. Furthermore, a second connection between overconfidence and innovation exists again through narcissism. Investing in innovative projects is viewed as an indicator of superior management. Narcissistic CEOs are thus likely to invest in innovative project, as it enhances their admiration and praise. On top of the theory, Galasso and Simcoe (2011) and Hirshleifer et al. (2012) find empirical evidence for the positive influence of overconfidence on innovation. The underlying theory behind the relation between overconfidence and innovation, and previous empirical research lead to the second hypothesis:

Hypothesis 1c: Overconfident CEOs have a positive effect on innovation

In the last hypothesis I expect a moderating effect of innovative organizations on the relation between overconfident CEOs and CSR. The first relationship is between overconfident CEOs and the level of CSR in an organization. I expect this relationship to be negative, as described in hypothesis 1a. However, overconfident CEOs increase organizations' innovative performance (Galasso & Simcoe, 2011; Hirshleifer et al., 2012). The level of innovation is thereafter positively related to CSR (Mishra, 2017; Gallego-Álvarez et al., 2011). Eventually, overconfident CEOs in innovative organizations will have a less negative effect on CSR than overconfident CEOs in non-innovative organizations, because the positive effect of innovation on CSR. The last hypothesis regarding to this expectation is:

Hypothesis 2: Innovative organizations decrease the negative effect of overconfident CEOs on CSR

§ 3.5 Summary

In this chapter the key related literature regarding the research question is described. The first two papers are from McCarthy et al. (2017) and Petrenko et al. (2016). They investigate the relation of CEO overconfidence and narcissism on CSR. Overconfident CEOs decrease the level of CSR in an organization, but mixed evidence is found when investigating the relation between narcissistic CEOs and CSR. The second two papers are from Mishra (2017) and Gallego-Álvarez et al. (2011). They investigate the relation between innovation and CSR. Mishra finds a positive relationship between innovation and CSR, while Gallego-Álvarez et al. (2011) find a negative bidirectional relationship. However, the relationship is positive in energy and industry sectors, and R&D investments positively influence CSR performance after three years. Furthermore, the more successful an innovation, the higher CSR levels in the years thereafter. At last three papers about the relation between overconfident and narcissistic CEOs and innovation are described. Galasso and Simcoe (2011), Hirshleifer et al. (2012) and Ham et al. (2018) investigate this relation. From these papers follows that CEO overconfidence and innovation have a positive relationship. CEO overconfidence is associated with riskier projects, greater investment in innovation and more successful innovations. Narcissism is also positively related to R&D investments.

Chapter 4. Methods

§ 4.1 Introduction

In this chapter I describe the methods of measuring the dependent, independent and control variables. In table 2 the variables and their descriptions are presented. Then I describe the sample of this thesis and the data collection process. At last I present the predictive validity framework.

§ 4.2 Operationalization

In this section I explain how I measure the variables CSR, CEO overconfidence and innovation.

§ 4.2.1 CSR

The dependent variable in this thesis is CSR. I measure this variable through the social ratings of the MSCI database. McCarthy et al. (2017), Mishra (2017) and Petrenko et al. (2016) also use the MSCI database to measure CSR. As explained in section 2.3.1, the MSCI database consists of several indicators in seven dimensions. The indicators are strengths and concerns and are assigned the number 1 when they exist and are assigned the number 0 when they do not exist. Those indicator numbers are summed up and eventually every dimension has its own total strengths and total concerns score. To calculate the total CSR score I sum up the strengths of the seven dimensions and subtract the concerns of the dimensions.

§ 4.2.2 CEO overconfidence

The independent variable is CEO overconfidence. I use the Holder 67 measure from Malmendier and Tate (2005) to determine if CEOs are overconfident. Galasso and Simcoe (2011), Hirshleifer et al. (2012) and McCarthy et al. (2017) also base their measures of overconfidence on Malmendier and Tate (2005). Hirshleifer et al. (2012) use the adapted measure of Campbell et al. (2011). They use the average in-the-money value of options instead of the value for each option on its own, because of data limitations. I follow this method to determine overconfidence.

The method from Campbell et al. (2011) consists of three calculations. At first the realizable value per option needs to be calculated. The total realizable value of the exercisable, but unexercised options is divided by the total number of exercisable, but also unexercised options. Then the realizable value per option is subtracted from the stock price at the end of the

year, to determine the average strike price of an option. Eventually the stock price is divided by the strike price and one is subtracted. The percentage following this calculation is the average in-the-money value of the option package. Using Malmendier and Tate's (2005) benchmark, the average in-the-money value of the unexercised option package should be lower than 67%. If not, the CEO is considered overconfident. The variable overconfidence (*OVC)* is a dummy variable. Dummy variables are binary variables and either have the value 1, or 0. If the CEO is overconfident, *OVC* is 1 and if not, *OVC* is 0.

§ 4.2.3 Innovation

Innovation is a moderating variable. It influences CSR, but is also influenced by the independent variable CEO overconfidence and therefore changes the relationship between CEO overconfidence and CSR. To measure innovation I follow Mishra (2017), Galasso and Simcoe (2011) and Hirshleifer et al. (2012) and use patent data. More specific, I use patent citations data, because only patent counts do not capture the total value of the innovation (Lanjouw & Schankerman, 2004). Patent citations are a better representation of innovation and therefore an appropriate measure (Trajtenberg, 1990). In my sample I use the application year of the patents, instead of the year in which the patent is granted. This is because innovators apply as soon as possible for a patent, to protect their innovation. The timing of the innovation is therefore closer to the application year than the grant year (Hall, Jaffe, & Trajtenberg, 2011). However, Hall et al. (2011) adress a problem regarding the patent citations. The citations are received for many years after the grant year of the patent. Patents in the last year of the sample have less time to receive citations. Therefore, I multiply the citation counts by the citation weighting index from Hall, Jaffe and Trajtenberg, as Galasso and Simcoe (2011) and Hirshleifer et al. (2012) do. This index takes the possible future patent citations into account. The total number of adjusted patents citations in one year is the proxy for innovation (*INV*) in this thesis.

§ 4.3 Control variables

On top of overconfidence and innovation, other variables also influence the level of CSR in an organization. In table 1 different control variables from the key related literature are included. Control variables are variables other than the independent variables, which also influence the dependent variable and therefore change the outcome. In this section I describe the control variables and their measurement methods.

§ 4.3.1 CEO gender

The first control variable is CEO gender. Manner (2010) investigates different CEO characteristics which influence CSR. Gender is one characteristic that influences the level of CSR. It has an influence, because women are more socially oriented, empathic, caring and have a greater concern for others (Boulouta, 2013). Huang (2013) also finds gender influencing the level of CSR, while using a different sample and measurement method of CSR. Manner (2010) uses the KLD database to determine the level of CSR and Huang (2013) uses ratings from agencies. Therefore, female CEOs having a positive influence on CSR is important to this thesis. I include CEO gender (*FEMALE)* as a dummy variable. If the CEO is a female, *FEMALE* is 1 and if the CEO is a man, *FEMALE* is 0.

§ 4.3.2 CEO tenure

Other characteristics of CEOs are age and tenure. Tenure is the number of years a CEO works for a specific organization, measured by subtracting the starting year of the CEO from the end year of the CEO. Mixed evidence is found about age influencing the level of CSR. Godos-díez et al. (2011) find mixed evidence that CEO age influences the level of CSR and Huang (2013) finds no evidence. However, CEO tenure is influencing the level of CSR in organizations found by Manner (2010) and Huang (2013). The longer a CEO works for the same organization, the higher the level of CSR. I thus include CEO tenure (*TENURE*) as control variable in this thesis.

§ 4.3.3 Firm size

Larger firms have more resources and an extended business, and are therefore more likely to engage in CSR practices. Firm size is in CSR studies mostly measured as the natural log of total sales or total assets. Mishra (2017) measures firm size as the natural log of total assets and Manner (2010) and Petrenko et al. (2016) measure firm size as the natural log of total sales. The researchers find evidence for this underlying theory, firm size positively influences the level of CSR. Therefore, I include firm size (*SIZE*), measured by the natural log of total sales, as a control variable in this thesis.

§ 4.3.4 Firm financial performance

The return on assets (ROA) is used by McCarthy et al. (2017), Mishra (2017) and Petrenko et al. (2016) as a proxy for firm financial performance. ROA is calculated by dividing earnings with total assets. Organizations with high financial performance are more likely to

engage in CSR because they have the opportunity to invest in CSR. This theory is reflected in the result from the three papers. ROA is strongly positive related to CSR. I thus include firm financial performance, measured as ROA, as a control variable in this thesis.

§ 4.3.5 Firm leverage

Firm leverage is the value of debt divided by the value of total assets of an organization. It is the percentage of debt in a company and is associated with firm risk. From section 2.2.1 follows that CSR can be used as a hedging method to reduce risk. Therefore, organizations with a high leverage percentage can use CSR as a hedging method. McCarthy et al. (2017) find a positive relationship between leverage and the level of CSR. However, Mishra (2017) finds mixed evidence. Leverage has a negative influence on the level of CSR in contrast to the results from McCarthy et al. (2017). The reason for this is organizations with high debt do not prefer investing in CSR. Firm leverage has thus an influence on the level of CSR, but evidence on the direction of the relationship is mixed. Nevertheless, I include firm leverage (*LEV*) as control variable but the direction of the relationship is not clear.

§ 4.3.6 Industry

The last control variable I include is industry. CSR practices differ among different industries. Stakeholders have other expectations about CSR engagement in different industries. Organizations meet the expectations of stakeholders, and therefore, differences in CSR reporting practices are found by Sweeney and Coughlan (2008). I create dummy variables for two digit sic codes. The dummy variables are the industries agriculture, forestry and fishing (*SIC01-09*), mining (*SIC10-14*), construction (*SIC15-17*), manufacturing (*SIC20-39*), transportation and public utilities (*SIC40-49*), wholesale (*SIC50-51*), retail (*SIC52-59*), finance, insurance and real estate (*SIC60-69*), services (*SIC70-89*) and public administration (*SIC91-99*) (SICCODE.COM, 2018). Following Petrenko et al. (2016) I exclude the utilities (*SIC40-49*) and financial (*SIC60*-69) industries from the sample, because those industries are highly regulated and therefore, limit the CEO's discretion over strategies as CSR. The industry manufacturing (*SIC20-39*) is the reference group of the dummy variables, as I expect the most observations in this industry. Therefore, I exclude this variable in the regression.

Table 2. Variables description

Variable		Description
CSR	=	Total strengths minus total concerns
OVC	=	1 = overconfident CEO, 0 = non-overconfident CEO
INV	=	Number of adjusted patent citations per year
FEMALE	=	1 = female, 0 = male
TENURE	=	The number of years a CEO works for one organization
SIZE	=	Natural log of total sales
ROA	=	Earnings / Total assets
LEV	=	Total debt / Total assets
SIC01-09	=	1 = agriculture, forestry and fishing industry, 0 = otherwise
SIC10-14	=	1 = mining industry, 0 = otherwise
SIC15-17	=	1 = construction industry, 0 = otherwise
SIC20-39	=	1 = manufacturing industry, 0 = otherwise
SIC50-51	=	1 = wholesale industry, 0 = otherwise
SIC52-59	=	1 = retail industry, 0 = otherwise
SIC70-89	=	1 = services industry, 0 = otherwise
SIC91-99	=	1 = public administration industry, 0 = otherwise

§ 4.4 Regression equations

To test the hypotheses I use three regression equations, which I describe in this section. The first regression equation tests hypotheses 1a and 1b, the influence of overconfidence and innovation on the level of CSR. The regression equation to test this is presented in equation 1. Beta 1 *OVC* and beta 2 *INV* are the variables of interest in this equation. I expect a positive influence of both variables. Thereafter I test hypothesis 1c, the influence of overconfident CEOs on innovation. The regression equation to test this is equation 2. In this equation is beta 1 *OVC* the variable of interest, from which I expect a positive influence on the dependent variable *INV*. Equation 3, the last equation, tests hypotheses 2. I add in this equation an interaction term between overconfidence and innovation, to investigate the effect of innovation as a moderating variable. This interaction term is beta 3 *OVC*INV* and is the variable of interest. I expect that this variable has a less negative effect than beta 1 *OVC*.

Equation 1. Regression hypotheses 1a and 1b

$$CSR = \beta_0 + \beta_1 OVC + \beta_2 INV + \beta_3 FEMALE + \beta_4 TENURE + \beta_5 SIZE + \beta_6 ROA \\ + \beta_7 LEV + \beta_8 SIC0109 + \beta_9 SIC1014 + \beta_{10} SIC1517 + \beta_{11} SIC5051 \\ + \beta_{12} SIC5259 + \beta_{13} SIC7089 + \beta_{14} SIC9199 + \varepsilon$$

Equation 2. Regression hypothesis 1c

$$INV = \beta_0 + \beta_1 OVC + \beta_2 FEMALE + \beta_3 TENURE + \beta_4 SIZE + \beta_5 ROA + \beta_6 LEV \\ + \beta_7 SIC0109 + \beta_8 SIC1014 + \beta_9 SIC1517 + \beta_{10} SIC5051 + \beta_{11} SIC5259 \\ + \beta_{12} SIC7089 + \beta_{13} SIC9199 + \varepsilon$$

Equation 3. Regression hypothesis 2

$$CSR = \beta_0 + \beta_1 OVC + \beta_2 INV + \beta_3 OVC * INV + \beta_4 FEMALE + \beta_5 TENURE + \beta_6 SIZE \\ + \beta_7 ROA + \beta_8 LEV + \beta_9 SIC0109 + \beta_{10} SIC1014 + \beta_{11} SIC1517 \\ + \beta_{12} SIC5051 + \beta_{13} SIC5259 + \beta_{14} SIC7089 + \beta_{15} SIC9199 + \varepsilon$$

§ 4.5 Sample and data collection

The sample of this thesis contains public North American organizations between 1992 and 2006. I start the sample in 1992, because since that decade stakeholders emphasize the importance of CSR and in 90 percent of Fortune 500 firms is CSR an essential element of their goal (Lee, 2008). Furthermore, in that decade the element of 'technology' is added in the definition of innovation. Innovation is from that decade seen as technological progress (Green, 2013). I end the sample in 2006. Until then the data I use is available.

I merge different databases to collect the sample. At first I gather data from the ExecuComp database. This database contains data about executives. I extract the variables 'total realizable value of the exercisable, but unexercised options' and 'total number of exercisable, but unexercised options' which are needed to determine overconfidence. Furthermore, I generate the variables gender, 'date the executive started as CEO' and 'date the executive left as CEO'. The second database I use is CompuStat. From this database I extract data about the fiscal year close price of the shares, to determine overconfidence with the ExecuComp variables. Furthermore, I generate the variable total sales to determine firm size, net income (loss) and total assets to calculate the ROA, total liabilities to calculate firm leverage, and sic codes to identify industries. The third database I use is the MSCI database. From this database I generate the total strengths and concerns from the dimensions: corporate governance, diversity, products, community, environment, employee relations and humanity. At last, the

fourth database is the NBER database. To assign patents to a specific organization, three databases of NBER need to be merged. I merge at first the database with organizations and their identifier number to the database with the names and identifier numbers of the assignees of patents. Then I merge this database with the original patent database. Eventually I have patent data per organization.

After merging all four databases with each other, I have 301,488 observations. In table 3 I present the sample selection procedure. This includes the total number of observations after dropping observations because of sample requirements or missing values. At first I only need executives who are actual CEOs. Therefore, executives with missing values in the variable 'date the executives started as CEO' are deleted. Furthermore, I only need observations from CEOs in the years they are the CEO. Thus, I delete observations when the year the executive became CEO is after the observation's year. I also delete observations when the last year of the CEO is before the observation's year. Thereafter, I delete duplicates. The patent database adds for every patent a new observation, while the CEO-year observation is the same. As I am only interested in the number of patents and citations per CEO-year, I delete the duplicate observations. The fourth group of deleted observations are CEOs without a positive exercisable option value during the sample period. Overconfidence can only be determined if a CEO has at least once the chance to execute options. Thereafter I drop missing values in the sample and follow Petrenko et al. (2016) and drop observations in utility (sic codes 4000-4999) and financial (sic codes 6000-6999) industries. Eventually after dropping observations, the total CEO-year observations are 5,660 with 1,619 different CEOs.

Table 3. Sample selection procedure

301,488 observations	
Drop executives who are no CEO	- 212,088
Drop observations when the CEO is not CEO in the observation's year	- 33,523
Drop duplicate CEO-year observations because of patents	- 46,038
Drop CEOs without a positive exercisable option value	- 820
Drop missing values from assets, liabilities, net income, sales	- 607
Drop missing values from MSCI scores	- 1,372
Drop utility and financial industries	- 1,380
5.660 observations	

§ 4.6 Predictive validity framework

To give an overview of the relations that are tested in chapter 5, I include predictive validity frameworks in figure 1 in appendix A. The first framework pictures hypotheses 1a and 1b. The two boxes on the left side include the independent variables, CEO overconfidence and innovation on a conceptual level, and their measurement method on an operational level. The two boxes on the right side include the dependent variable, CSR, and its measurement method. In box 5 the control variables are presented.

The second predictive validity framework is presented in figure 2 in appendix A. It pictures the relation between CEO overconfidence and innovation, from hypothesis 1c. Again, the two boxes on the left include the independent variable CEO overconfidence and its measurement method. The two boxes on the right include the dependent variable innovation and its measurement method. The last box includes the control variables.

The last predictive validity framework pictures hypothesis 2. It is presented in figure 3 in appendix A and shows the variables again on a conceptual and operational level. Above the independent variable CEO overconfidence and dependent variable CSR is the moderating variable innovation presented. Innovation is influencing the relationship between CEO overconfidence and CSR. Therefore, innovation is the moderating variable in the predictive validity framework. The last box includes again the control variables.

Chapter 5. Empirical results

§ 5.1 Introduction

In this chapter I present the results from the empirical analysis. At first I prepare the data and drop outliers from the sample, then I present the descriptive statistics, the correlations and the conditions of a regression. At last I present the results from the regression analyses.

§ 5.2 Outliers

An outlier is an observation that deviates a lot from the other observations of a variable, and influences the data. To determine if the main variables, CSR, innovation and CEO overconfidence contain outliers, I analyze the boxplots and histograms from the variables. As CEO overconfidence is a dummy variable, it only contains the number 0 or 1 and thus no outliers are present. However, CSR and innovation do contain outliers. After analyzing the boxplot and histogram from CSR, which are included in figure 4 and 5 in appendix B, I exclude two observations which are below the CSR score -10 and exclude eight observations above the CSR score 10. After the exclusion, the histogram is normally distributed and the boxplot is smaller. This is presented in the figures 6 and 7 in appendix B. After analyzing the boxplot and histogram from innovation, figure 8 and 9 in appendix B, I decide to exclude observations with adjusted patent citation counts above 10,000. Seven observations are excluded. However, the histogram from innovation is not normally distributed after the outlier exclusion. This is because 5,009 observations do not have any patent citations. In figure 10 and 11 in appendix B the boxplots and histograms from innovation are presented after excluding the outliers.

§ 5.3 Descriptive statistics

In table 4 the descriptive statistics are presented after the exclusion of 17 outliers. This table shows the number of observations, the mean, standard deviation and the minimum and maximum value of the variables CSR, innovation, CEO overconfidence, gender, tenure, firm size, firm financial performance, leverage and the industries. From this table follows that CSR has a negative mean score of -0.331 with a minimum value of -10 and a maximum value of 10. The highest CSR score in this sample is 10 and the lowest CSR score is -10. The mean score of -0.331 indicates that the organizations in this sample have on average a total MSCI score of -0.331. The mean of innovation is 33.459 adjusted patent citations per year, with a minimum of 0 and a maximum of 9005.23. This indicates that the organizations from this sample generate on average 33.459 patent citations per year. The highest generated patent citations per year are

9005.23 and the lowest generated patent citations are 0. The mean of the dummy variable CEO overconfidence is 0.388. This indicates that in 2,190 from the 5,643 CEO-year observations the CEO is overconfident. Furthermore, CEOs work on average 13.872 year as CEO for one organization and in only 95 from the 5,643 CEO-year observations the CEO is female. The average natural logarithm of sales is 7.589, the average ROA is 5.4% and the average leverage of the firms in the sample equals 50.3%. The industry with the highest number of observations is the manufacturing industry. 3,440 observations are organizations in that industry. Therefore, as explained in section 4.3.6, I use the manufacturing industry as reference group. In contrast, only 12 observations are firms in the agriculture, forestry and fishing industry, and only 19 observations are firms in the public administration industry. The other industries are more evenly distributed, with 108 observations in the construction industry, 223 observations in the wholesale industry, 356 observations in the mining industry, 588 observations in the retail industry and 897 observations in the services industry.

Table 4. Descriptive statistics

Variable	Observations	Mean	Std. Deviation	Min	Max
CSR	5,643	-0.331	2.373	-10	10
INV	5,643	33.459	329.548	0	9005.23
OVC	5,643	0.388	0.487	0	1
FEMALE	5,643	0.017	0.129	0	1
TENURE	5,643	13.872	9.119	0	69
SIZE	5,643	7.589	1.545	2.06	12.75
ROA	5,643	0.054	0.131	-4.75	2.17
LEVERAGE	5,643	0.503	0.211	0.02	1.97
SIC01-09	5,643	0.002	0.046	0	1
SIC10-14	5,643	0.063	0.243	0	1
SIC15-17	5,643	0.019	0.137	0	1
SIC20-39	5,643	0.610	0.488	0	1
SIC50-51	5,643	0.040	0.195	0	1
SIC52-59	5,643	0.104	0.306	0	1
SIC70-89	5,643	0.159	0.366	0	1
SIC91-99	5,643	0.003	0.058	0	1

This table presents the number of observations, mean, standard deviation, the minimum observation value and the maximum observation value from the defined variables in table 2.

§ 5.4 Correlations

After the descriptive statistics per variable, I analyze the correlations between the variables. To see if the variables are correlated with each other I use a correlation matrix. The matrix is presented in table 5. Correlation coefficients are values between -1 and 1. When the coefficient is exactly -1 or 1, it indicates perfect multicollinearity. A coefficient of 0 indicates no correlation at all. The p-value is presented in parenthesis under the correlation coefficients. This value indicates on which level the correlation is significant and not due to chance. In the correlation matrix I present two correlation tests, the Pearson correlation and the Spearman correlation. The Pearson correlation checks for a linear correlation between the variables and the Spearman correlation checks for a monotonic correlation. The Pearson correlation coefficients are presented on the left side in the table and the Spearman correlation coefficients are presented on the right side of the table.

The two variables with the highest significant correlation are size and leverage, with a coefficient of 0.519 (p = 0.000) in the Spearman correlation and a coefficient of 0.478 (p = 0.000) in the Pearson correlation. This indicates a moderate positive relation between the two variables. When one of the two variables increases or decreases, the other follows the same direction. Another interesting relation is between ROA and CEO overconfidence. The two variables have significant correlation coefficients of 0.284 (p = 0.000) in the Spearman correlation and 0.163 (p = 0.000) in the Pearson correlation, and therefore follow the same direction when one of the two variables changes. The other variables all have a low correlation with each other, or no significant correlation at all. High correlations or perfect multicollinearity are not present between the variables.

Table 5. Pearson/Spearman correlation

	INV	OVC	FEMALE	TENURE	SIZE	ROA	LEV	SIC0109	SIC1014	SIC1517	SIC5051	SIC5259	SIC7089	SIC9199
INV	1	-0.025* *(0.060)*	-0.034** *(0.011)*	-0.086*** *(0.000)*	0.168*** *(0.000)*	-0.035*** *(0.009)*	0.083*** *(0.000)*	-0.009 *(0.506)*	-0.036*** *(0.007)*	-0.039*** *(0.003)*	-0.078*** *(0.000)*	-0.139*** *(0.000)*	-0.100*** *(0.000)*	0.050*** *(0.000)*
OVC	0.003 *(0.832)*	1	0.009 *(0.506)*	0.125*** *(0.000)*	-0.070*** *(0.000)*	0.284*** *(0.000)*	-0.115*** *(0.000)*	-0.005 *(0.697)*	0.012 *(0.379)*	0.093*** *(0.000)*	-0.009 *(0.524)*	0.043*** *(0.001)*	0.069*** *(0.000)*	-0.021 *(0.112)*
FEMALE	-0.011 *(0.430)*	0.009 *(0.506)*	1	-0.029** *(0.031)*	-0.048*** *(0.000)*	0.038*** *(0.004)*	-0.050*** *(0.000)*	-0.006 *(0.650)*	-0.034** *(0.011)*	-0.018 *(0.170)*	-0.027** *(0.046)*	0.122*** *(0.000)*	0.067*** *(0.000)*	-0.008 *(0.568)*
TENURE	-0.021 *(0.124)*	0.105*** *(0.000)*	0.004 *(0.749)*	1	-0.177*** *(0.000)*	0.047*** *(0.001)*	-0.146*** *(0.000)*	0.010 *(0.467)*	0.054*** *(0.000)*	0.051*** *(0.000)*	0.000 *(0.997)*	-0.026* *(0.056)*	0.012 *(0.365)*	0.002 *(0.892)*
SIZE	0.092*** *(0.000)*	-0.071*** *(0.000)*	-0.040*** *(0.002)*	-0.182*** *(0.000)*	1	0.023* *(0.087)*	0.519*** *(0.000)*	-0.023* *(0.079)*	-0.007 *(0.624)*	0.083*** *(0.000)*	0.132*** *(0.000)*	0.136*** *(0.000)*	-0.168*** *(0.000)*	0.094*** *(0.000)*
ROA	-0.005 *(0.732)*	0.163*** *(0.000)*	0.019 *(0.157)*	0.021 *(0.121)*	0.087*** *(0.000)*	1	-0.268*** *(0.000)*	-0.007 *(0.581)*	-0.029** *(0.031)*	0.037*** *(0.005)*	-0.032** *(0.018)*	0.086*** *(0.000)*	0.008 *(0.571)*	-0.042*** *(0.002)*
LEV	0.027** *(0.047)*	-0.104*** *(0.000)*	-0.035*** *(0.010)*	-0.163*** *(0.000)*	0.478*** *(0.000)*	-0.108*** *(0.000)*	1	0.018 *(0.182)*	0.016 *(0.244)*	0.066*** *(0.000)*	0.053*** *(0.000)*	-0.024* *(0.076)*	-0.018 *(0.188)*	0.072*** *(0.000)*
SIC01-09	-0.003 *(0.835)*	-0.005 *(0.697)*	-0.006 *(0.650)*	0.017 *(0.210)*	-0.021 *(0.114)*	-0.005 *(0.693)*	0.014 *(0.291)*	1	-0.012 *(0.368)*	-0.006 *(0.628)*	-0.009 *(0.482)*	-0.016 *(0.237)*	-0.020 *(0.132)*	-0.003 *(0.840)*
SIC10-14	-0.002 *(0.869)*	0.012 *(0.379)*	-0.034** *(0.011)*	0.045*** *(0.001)*	-0.004 *(0.757)*	-0.002 *(0.878)*	0.018 *(0.189)*	-0.012 *(0.368)*	1	-0.036*** *(0.007)*	-0.053*** *(0.000)*	-0.089*** *(0.000)*	-0.113*** *(0.000)*	-0.015 *(0.257)*
SIC15-17	-0.014 *(0.295)*	0.093*** *(0.000)*	-0.018 *(0.170)*	0.038*** *(0.005)*	0.067*** *(0.000)*	0.028** *(0.038)*	0.050*** *(0.000)*	-0.006 *(0.628)*	-0.036*** *(0.007)*	1	-0.028** *(0.033)*	-0.048*** *(0.000)*	-0.061*** *(0.000)*	-0.008 *(0.542)*
SIC50-51	-0.020 *(0.127)*	-0.009 *(0.524)*	-0.027** *(0.046)*	-0.001 *(0.956)*	0.130*** *(0.000)*	-0.002 *(0.910)*	0.037*** *(0.006)*	-0.009 *(0.482)*	-0.053*** *(0.000)*	-0.028** *(0.033)*	1	-0.069*** *(0.000)*	-0.088*** *(0.000)*	-0.012 *(0.376)*
SIC52-59	-0.035*** *(0.010)*	0.043*** *(0.001)*	0.122*** *(0.000)*	-0.005 *(0.693)*	0.140*** *(0.000)*	0.052*** *(0.000)*	-0.008 *(0.434)*	-0.016 *(0.237)*	-0.089*** *(0.000)*	-0.048*** *(0.000)*	-0.069*** *(0.000)*	1	-0.148*** *(0.000)*	-0.020 *(0.137)*
SIC70-89	-0.030** *(0.025)*	0.069*** *(0.000)*	0.067*** *(0.000)*	0.030** *(0.023)*	-0.168*** *(0.000)*	-0.027** *(0.043)*	-0.002 *(0.868)*	-0.020 *(0.132)*	-0.113*** *(0.000)*	-0.061*** *(0.000)*	-0.088*** *(0.000)*	-0.148*** *(0.000)*	1	-0.025* *(0.058)*
SIC91-99	0.027** *(0.043)*	-0.021 *(0.112)*	-0.008 *(0.568)*	-0.007 *(0.622)*	0.124*** *(0.000)*	-0.011 *(0.428)*	0.067*** *(0.000)*	-0.003 *(0.840)*	-0.015 *(0.257)*	-0.008 *(0.542)*	-0.012 *(0.376)*	-0.020 *(0.137)*	-0.025* *(0.057)*	1

This table presents the Pearson (left) and Spearman (right) correlations. *, **, *** indicate significance on the 10%, 5% and 1% significance levels. The variables are defined in table 2.

§ 5.5 Conditions of a linear regression

I test the hypotheses from this thesis with regression analyses. To use linear regression analyses, several assumptions need to be tested. At first, the independent variables must have a linear relationship with the dependent variable. Second, the sample must contain random observations and there must be no multicollinearity between the independent variables. The last conditions are related to the residuals of the regression. At first, the mean of the residuals must be zero. Second, the residuals must have a normal distribution. And at last, the residuals must be homoscedastic.

At first to determine linearity, I analyze the scatterplots between the dependent and independent variables. The scatterplot of CSR and innovation is presented in figure 12 in appendix C. The red line in the scatterplot indicates linearity between the two variables. Therefore, the first condition is met. CEO overconfidence is a dummy variable, it has thus no linear relationship with CSR.

The second condition is also met. The observations are randomly gathered through the database. They were not specifically selected. To test for multicollinearity, the correlation matrix from section 5.4 can be analyzed. From this table follows that the variables do not have high correlations. However, to test especially for multicollinearity, the Variance Inflation Factor (VIF) can be used. This factor shows what percentage of the variable's variance is inflated through multicollinearity. In table 6 the VIF per variable is shown. As expected from the correlation matrix, no multicollinearity is present. The factors are all below the boundary of 4, which indicates multicollinearity. Therefore, the condition of no multicollinearity is met.

The last conditions to use a linear regression analysis are related to the residuals of the regression. At first I calculate the mean of the residuals. This is 0.000 and therefore, the first condition related to the residuals is met. I analyze the distribution of the residuals through a histogram. This is presented in figure 13 in appendix C. The histogram of the residuals has a normal distribution. Thus, the second condition is also met. At last I test for homoscedasticity. This means that the variance of the residuals is constant. In figure 14 in appendix C the plot between the residuals from the regression and the predicted values is presented. The residuals are circular on the right side of the plot. Therefore, I conclude that the residuals are homoscedastic and that the last condition is met. In section 5.5 I execute the regression tests.

Table 6. VIF's

Variable	VIF
INV	1.01
OVC	1.07
FEMALE	1.03
TENURE	1.06
SIZE	1.49
ROA	1.07
LEV	1.37
SIC01-09	1.00
SIC10-14	1.04
SIC15-17	1.03
SIC50-51	1.05
SIC52-59	1.10
SIC70-89	1.10
SIC91-99	1.02

This table presents the Variance Inflation Factors of the defined variables in table 2. A VIF of 4 indicates multicollinearity.

§ 5.5 Regression analysis

The hypotheses of this thesis are tested with regression analyses. At first hypotheses 1a *'Overconfident CEOs have a negative effect on CSR'* and 1b *'Innovative organizations have a positive effect on CSR'* are tested. The regression equation of these hypotheses is presented in section 4.4. The results of the regression model are presented in table 7. From this table follows that CEO overconfidence has a negative influence on CSR of -0.1267. This influence is significant on a confidence level of 10% ($p = 0.05$). Therefore, I can conclude that if the CEO is overconfident, the level of CSR drops with 0.1267. This finding supports hypothesis 1a. Overconfident CEOs decrease the level of CSR. Innovation only has a small positive influence of 0.0001 on the level of CSR. However, this influence is not significant ($p = 0.296$) and can be due to chance. Therefore, I do not find significant evidence to support hypothesis 1b and have to reject it. The control variables female, ROA and leverage have a strong significant influence on CSR ($p = 0.000$). As expected from the theory, a female CEO increases CSR with 1.9699 and when the ROA increases with 1%, CSR increases with 1.2993. The percentage leverage decreases the level of CSR. When leverage increases with 1%, CSR decreases with 0.9127. The significant industry control variables are the industries agriculture, forestry and fishing ($p = 0.025$), construction ($p = 0.000$), mining ($p = 0.000$) and retail ($p = 0.005$). Their

influence on CSR is respectively -1.486, -1.8378, -0.8938 and -0.2925. These coefficients indicate that if an organization is in the agriculture, forestry and fishing industry their CSR score is decreased by 1.486, if an organization is in the construction industry their CSR score decreases with 1.8378, if an organization is in the mining industry their CSR score decreases with 0.8938 and if an organization is in the retail industry their CSR score decreases with 0.2925. The adjusted R-squared from the model is 0.065. This indicates that 6.5% of the dependent variable *CSR* is explained by the independent and control variables. I use the adjusted R-squared instead of the non-adjusted R-squared, because the non-adjusted R-squared becomes higher by adding random control variables. The adjusted R-squared controls for the number of control variables.

Table 7. Regression hypotheses 1a, 1b and 2

Dependent variable *CSR*					
		Hypotheses 1a and 1b		Hypothesis 2	
Variable	**Prediction**	**Coefficient**	**P-value**	**Coefficient**	**P-value**
Intercept		0.2546	*0.157*	0.2546	*0.157*
INV	+	0.0001	*0.296*	0.0001	*0.260*
OVC	-	-0.1267*	*0.050*	-0.1233*	*0.058*
*INV*OVC*	?			-0.0001	*0.601*
FEMALE	+	1.9699***	*0.000*	1.9696***	*0.000*
TENURE	+	0.0041	*0.240*	0.0040	*0.241*
SIZE	+	-0.0117	*0.629*	-0.0117	*0.629*
ROA	+	1.2993***	*0.000*	1.2973***	*0.000*
LEV	?	-0.9127***	*0.000*	-0.9141***	*0.000*
SIC01-09	?	-1.4860**	*0.025*	-1.4865**	*0.025*
SIC10-14	?	-1.8387***	*0.000*	-1.8401***	*0.000*
SIC15-17	?	-0.8938***	*0.000*	-0.8948***	*0.000*
SIC50-51	?	0.0413	*0.797*	0.0413	*0.797*
SIC52-59	?	-0.2925***	*0.005*	-0.2927***	*0.005*
SIC70-89	?	0.0817	*0.352*	0.0810	*0.356*
SIC91-99	?	-0.0024	*0.157*	-0.0097	*0.985*
Adjusted R-squared		0.065		0.065	
Observations		5,643		5,643	

This table presents the results from the regression equation of hypotheses 1a and 1b on the left side of the table, and the results from the regression equation of hypothesis 2 on the right side of the table. *, **, *** indicate significance on the 10%, 5% and 1% significance levels. The variables are defined in table 2.

To test hypothesis 1c '*Overconfident CEOs have a positive effect on innovation*', a second regression is presented in table 8. From this table follows that overconfident CEOs have

a high positive influence on innovation of 12.4809. This indicates that if the CEO is overconfident, their organization has 12.4809 adjusted patent citations more per year. However, this influence is not significant (p = 0.176). Therefore I have to reject hypothesis 1c. The variables that do have a significant influence on innovation are firm size (p = 0.000), leverage (p = 0.068), and the industries mining (p = 0.040), wholesale (p = 0.002), retail (p = 0.000) and services (p = 0.049). When the logarithm of total sales increases with 1, the number of adjusted patent citations increases with 25.0402. Size thus has a high positive influence on innovation. In contrast, when leverage increases with 1%, it decreases the number of adjusted patent citations by 44.0335. Furthermore, the industries mining, wholesale, retail and services decrease the number of adjusted patent citations by respectively 66.4818, 71.5973, 65.1238 and 24.6394. The level of innovation is those industries is therefore lower. The adjusted R-squared in this model is 0.012. 1.2% from the value of innovation is explained by the variables in this model.

Table 8. Regression hypothesis 1c

Dependent variable *INV*

Variable	Prediction	Hypotheses 1c	
		Coefficient	P-value
Intercept		0.2546	0.157
OVC	+	12.4809	0.176
FEMALE	+	1.7156	0.960
TENURE	+	-0.1115	0.821
SIZE	+	25.0402***	0.000
ROA	+	-44.1980	0.198
LEV	?	-44.0335*	0.068
SIC01-09	?	-14.6293	0.877
SIC10-14	?	-17.3715	0.342
SIC15-17	?	-66.4818**	0.040
SIC50-51	?	-71.5973***	0.002
SIC52-59	?	-65.1238***	0.000
SIC70-89	?	-24.6394**	0.049
SIC91-99	?	66.5147	0.382
Adjusted R-squared		0.012	
Observations		5,643	

This table presents the results from the regression equation of hypothesis 1c. *, **, *** indicate significance on the 10%, 5% and 1% significance levels. The variables are defined in table 2.

Hypothesis 2 '*Innovative organizations decrease the negative effect of overconfident CEOs on CSR*' is at last tested with a regression analysis. The results are presented on the right side in table 7. The only significant independent variable is again CEO overconfidence (p = 0.058). The coefficient is almost the same as in the regression from hypothesis 1a and 1b, namely -0.1233 instead of -0.1267. The coefficient of the interaction term *INV*OVC* is -0.0001. The effect of CEO overconfidence on CSR increases from -0.1233 to -0.001 through innovation. However, this effect is not significant (p = 0.601). Therefore, I also reject hypothesis 2. I do not find significant evidence for the moderating effect of innovation. The control variables in this model present the same significance levels and approximately the same coefficients as the first model. A female CEO increases the CSR score with 1.9696 (p = 0.000), ROA increase the CSR score with 1.2973 (p = 0.000) and leverage decreases the score with 0.9141 (p = 0.000). The coefficients of the significant industries are -1.4865 from agriculture, forestry and fishing (p = 0.025), -1.8401 from construction (p = 0.000), -0.8948 from mining (p = 0.000) and -0.2927 from retail (p = 0.005). The R-squared in this model is again 0.065.

From the regression analysis in table 7 follows an insignificant moderating effect of innovation on the relation between CEO overconfidence and CSR. However, innovation might mediate the relationship. To test if the influence of CEO overconfidence on CSR is present through innovation, I execute the additional Structural Equation Modeling (SEM) analysis. SEM shows the direct, indirect and total effect of an independent variable on the dependent variable. The results from this analysis are presented in table 13 in appendix D. The results indicate an indirect influence of CEO overconfidence on CSR through innovation. 0.0002 from CEO overconfidence's total effect of -0.0502 on CSR is present through innovation. However, this indirect effect is not significant. This indicates that CEO overconfidence does not influence CSR through innovation. Therefore, innovation does not mediate the relationship.

§ 5.6 Robustness tests

In this section I execute additional regressions to test for the robustness of the results. I test if the results from section 5.5 are the same if I measure the variables with different proxies. At first I execute the same regression equation for hypothesis 2, but I divide CSR in strengths (*CSR_S*) and concerns (*CSR_C*). The results from this test are presented in table 9. Innovation is in this model positively influencing the strengths of CSR with 0.0002 (p = 0.063). This differs from the regression models in table 7, because innovation does not have a significant influence in those models. However, innovation has no relation with the concerns of CSR. CEO overconfidence has a negative influence of -0.2887 on the CSR strengths (p = 0.000) as

expected, but surprisingly, has a negative influence of -0.1654 on the concerns of CSR (p = 0.001). When CEOs are overconfident, they perform worse on the strengths of CSR, but they perform better on the CSR concerns. Overconfident CEOs have less CSR concerns. The interaction term *INV*OVC* is again not significant after dividing CSR in strengths and concerns. The adjusted R-square's from the two models are the highest from all regressions. The adjusted R-squared from the CSR strengths is 29.75% and the adjusted R-squared from the CSR concerns is 36.27%.

Table 9. Robustness test CSR

Dependent variables *CSR_S and CSR_C*				
	CSR_S		*CSR_C*	
Variable	**Coefficient**	**P-value**	**Coefficient**	**P-value**
Intercept	-3.2239***	*0.000*	-3.4784***	*0.000*
INV	0.0002*	*0.063*	0.0000	*0.600*
OVC	-0.2887***	*0.000*	-0.1654***	*0.001*
*INV*OVC*	-0.0001	*0.350*	-0.0000	*0.747*
FEMALE	2.3473***	*0.000*	0.3777**	*0.036*
TENURE	-0.0047*	*0.094*	-0.0088***	*0.001*
SIZE	0.7658	*0.000*	0.7775***	*0.000*
ROA	0.3032	*0.123*	-0.9941***	*0.000*
LEV	-1.0108***	*0.000*	-0.0966***	*0.445*
SIC01-09	0.0206	*0.970*	1.5070***	*0.002*
SIC10-14	-07587***	*0.000*	1.0810***	*0.000*
SIC15-17	-1.7958***	*0.000*	-0.9010***	*0.000*
SIC50-51	-1.5578***	*0.000*	-1.5991***	*0.000*
SIC52-59	-0.9365***	*0.000*	-0.6438***	*0.000*
SIC70-89	-0.1494**	*0.037*	-0.2304***	*0.000*
SIC91-99	3.9815***	*0.000*	3.9912***	*0.000*
Adjusted R-squared	0.2975		0.3627	
Observations	5,643		5,643	

This table presents the robustness test of hypothesis 2, with CSR divided in strengths and concerns. *, **, *** indicate significance on the 10%, 5% and 1% significance levels. The variables are defined in table 2.

In the second robustness test I replace the dummy variable CEO overconfidence by a continuous variable. Instead of the overconfidence threshold of 67% in-the-money options, I use the percentage of in-the-money value of options as proxy for overconfidence. With this continuous variable I can control if the negative influence of overconfidence on CSR holds. The results from this robustness test are presented in table 10. From this table follows that the

effect of overconfidence on CSR is not present anymore (0.000, p = 0.000), after measuring CEO overconfidence on a continuous base. The distinction of overconfident and non-overconfident CEOs is necessary to measure the influence on CSR. The influence of innovation, the interaction term *OVC*INV* and the control variables do not change after measuring CEO overconfidence on a continuous base. The R-squared in this model is 0.1 percent point lower than the model in table 7.

Table 10. Robustness test CEO overconfidence

Dependent variable *CSR*		
Variable	**Coefficient**	**P-value**
Intercept	0.2014	*0.257*
INV	0.0001	*0.312*
OVC	-0.0000	*0.643*
OVC*INV	-0.0000	*0.509*
FEMALE	1.9751***	*0.000*
TENURE	0.0035	*0.303*
SIZE	-0.0100	*0.679*
ROA	1.2269***	*0.000*
LEV	-0.8791***	*0.000*
SIC01-09	-1.4836**	*0.026*
SIC10-14	-1.8462***	*0.000*
SIC15-17	-0.9396***	*0.000*
SIC50-51	0.0361	*0.822*
SIC52-59	-0.3095***	*0.003*
SIC70-89	0.0675	*0.440*
SIC91-99	0.0038	*0.994*
Adjusted R-squared		0.064
Observations		5,643

This table presents the results from robustness test of hypothesis 2, with the percentage of in-the-money value of options as proxy for overconfidence. *, **, *** indicate significance on the 10%, 5% and 1% significance levels. The variables are defined in table 2.

In the third robustness test I change the proxy for innovation. Instead of the adjusted patent citation count, I use the number of patents per organization per year. The effect of innovation on CSR changes with this measure. The coefficient is higher, 0.0049 instead of 0.0001 and significant (p = 0.000). The effect of the interaction term *OVC*INV* also changes. The coefficient is -0.0097 instead of -0.0001 and is also significant (p = 0.000). From this robustness test I can conclude that innovation does have a positive influence on CSR and that the negative effect of CEO overconfidence on CSR is smaller when it is combined with

innovation. However, the significant effect of CEO overconfidence on CSR is not present anymore after measuring innovation with patent counts. The adjusted R-squared in this model is 6.8%.

Table 11. Robustness test innovation

Dependent variable *CSR*		
Variable	**Coefficient**	**P-value**
Intercept	0.2665	*0.139*
INV	0.0049***	*0.000*
OVC	-0.0979	*0.132*
*OVC*INV*	-0.0097***	*0.000*
FEMALE	1.9472***	*0.000*
TENURE	0.0041	*0.239*
SIZE	-0.0150	*0.535*
ROA	1.2933***	*0.000*
LEV	-0.9115***	*0.000*
SIC01-09	-1.5217**	*0.022*
SIC10-14	-1.8457***	*0.000*
SIC15-17	-0.8988***	*0.000*
SIC50-51	0.0471	*0.769*
SIC52-59	-0.2885***	*0.006*
SIC70-89	0.0798	*0.362*
SIC91-99	-0.4075	*0.440*
Adjusted R-squared	0.068	
Observations	5,643	

This table presents the results from the robustness test of hypothesis 2, with the number of patents per year as a proxy for innovation. *, **, *** indicate significance on the 10%, 5% and 1% significance levels. The variables are defined in table 2.

In the last robustness test I test hypothesis 2 with additional control variables in the regression model. Those variables control for the influence of time in years on CSR. The variables and their coefficients are presented in table 12. The additional control variables are the years 1994, 1995, 1997, 2000, 2001, 2002, 2003, 2005 and 2006. 1998 and 1999 do not have any observations and 2004 is used as reference group. From table 12 follows that the results from hypothesis 2 are approximately the same when controlling for time. The significant influence of CEO overconfidence on CSR is -0.1146 instead of -0.1233. The insignificant effects of innovation and the interaction term *OVC*INV* are the same when controlling for time. The additional control variables 1994, 1995, 1997, 2000, 2001, 2002 and 2003 have a positive significant influence on CSR. Those years increase the CSR score of an organization with

respectively 0.4727, 0.9763, 1.0467, 1.102, 0.8092, 0.7113 and 0.3346. The year 2006 decreases the CSR score of organizations with 0.1771.

Table 12. Robustness test time in years

Dependent variable *CSR*		
Variable	**Coefficient**	**P-value**
Intercept	0.2938	*0.120*
INV	0.0000	*0.915*
OVC	-0.1146*	*0.075*
*OVC*INV*	-0.0001	*0.593*
FEMALE	2.0054***	*0.000*
TENURE	0.0028	*0.417*
SIZE	-0.0532**	*0.028*
ROA	1.5147***	*0.000*
LEV	-1.0429***	*0.000*
SIC01-09	-1.2963**	*0.048*
SIC10-14	-1.8517***	*0.000*
SIC15-17	-0.7983***	*0.000*
SIC50-51	0.1601	*0.312*
SIC52-59	-0.28875**	*0.027*
SIC70-89	0.1675*	*0.054*
SIC91-99	0.1146	*0.827*
1994	0.4727***	*0.008*
1995	0.9763***	*0.000*
1997	1.0467***	*0.000*
2000	1.1020***	*0.000*
2001	0.8092***	*0.000*
2002	0.7113***	*0.000*
2003	0.3346***	*0.003*
2005	0.0451	*0.667*
2006	-0.1771*	*0.091*
Adjusted R-squared	0.093	
Observations	5,643	

This table presents the results from the robustness test of hypothesis 2, with time in years as control variables. *, **, *** indicate significance on the 10%, 5% and 1% significance levels. The variables are defined in table 2.

§ 5.7 Summary

In chapter I execute regression analyses to test the hypotheses. From the results follows that hypothesis 1a can be accepted. CEO overconfidence has a negative influence on CSR. Hypothesis 1b is rejected. No significant influence of innovation on CSR is found. However, the robustness tests show mixed evidence for this influence. Innovation has a positive effect on the strengths of CSR, but does not have a significant influence on the CSR concerns. Furthermore, when innovation is measured with patent counts instead of adjusted patent citations, it has a positive influence on the total CSR score. The third hypothesis, 1c, is also rejected. CEO overconfidence does have a positive influence on innovation in the sample of this thesis, but is insignificant. At last, I do not find significant evidence for hypothesis 2 and therefore, reject it. However, the robustness test shows mixed evidence. The less negative influence of CEO overconfidence combined with innovation is significant when innovation is measured based on patent counts. But the influence of CEO overconfidence is not significant in the robustness test after measuring innovation with patent counts.

Chapter 6. Conclusions

§ 6.1 Findings

This thesis investigates the effect of overconfident CEOs in innovative organizations on the level of CSR. The main research question from this thesis is: "*Does CEO overconfidence affect the level of Corporate Social Responsibility?*" and the sub-question is *"Does innovation have an influence on the relation between CEO overconfidence and Corporate Social Responsibility?"* To answer these questions, four hypotheses are prepared. The first hypothesis expects a negative influence of CEO overconfidence on the level of CSR, as predicted from the literature. This is tested with a regression analysis. The main finding from this test is that overconfident CEOs reduce the strengths of CSR, but also reduce the concerns of CSR. However, the extent to which they reduce the strengths is larger than the extent to which they reduce the concerns. This makes overconfident CEOs decrease the total level of CSR in an organization. The second hypothesis expects a positive influence of innovation on the level of CSR, based on the literature. However, from the analysis follows no significant relationship. In the robustness test I do find that innovation has a positive influence on the strengths of CSR, but does not have an influence on the concerns of CSR. Furthermore, when innovation is measured by patent counts instead of the number of adjusted patent citations, I find mixed evidence. The effect of innovation on CSR is positive, when the proxy for innovation is the number of patents. The third hypothesis expects a positive influence of CEO overconfidence on innovation. I test this again with a regression analysis. In contrast to the literature I find insignificant evidence for a positive influence of CEO overconfidence on CSR. This might be because the overconfident CEOs in my sample are less narcissistic. Overconfidence and narcissism have a strong correlation with each other and may overlap, but Ham et al. (2018) show differences between the two characteristics. They find narcissistic CEOs invest more in R&D, what the input of innovation is, in contrast to overconfident CEOs. The overconfident CEOs in the sample from Galasso and Simcoe (2011) and Hirshleifer et al. (2012) may have more narcissistic tendencies in contrast to my sample, whereby a positive influence on innovation is found. The last hypothesis in this thesis expects that innovation decreases the negative effect of overconfident CEOs on CSR. I do not find significant evidence for this prediction, when measuring innovation with the adjusted patent citations. However, I find mixed evidence for this prediction when I measure innovation with the number of patents.

Eventually after the empirical research, my answer on the research question "*Does CEO overconfidence affect the level of Corporate Social Responsibility?*" is yes. CEO overconfidence decreases the level of CSR in organizations. My answer on the sub-question "*Does innovation have an influence on the relation between CEO overconfidence and Corporate Social Responsibility?*" is no. I only find mixed evidence that innovation decreases the effect of CEO overconfidence on CSR.

§ 6.2 Contribution and practical implication

The contribution of this thesis to the empirical literature is that overconfident CEOs have a negative influence on the total level of CSR. However, they do decrease the CSR concerns. Furthermore, the negative effect of overconfident CEOs on CSR may decrease when it is combined with innovation in an organization. I find mixed evidence for this relationship. More organizations are innovative in the present time, what is related to CEO overconfidence and CSR. The influence of overconfident CEOs and innovation on CSR, and the relation between overconfident CEOs and innovation have already been investigated. Till now the relationship between the three concepts together is not investigated. Therefore, this mixed evidence sheds some light on this relationship and is new to the academic literature.

The practical implication of this new insight is especially interesting to board of directors. In selecting a new CEO for their organization, they can take the characteristic overconfidence into account in personality tests. As overconfident CEOs have a negative influence on CSR, board of directors might avoid CEOs with this characteristic. This is because CSR will keep being important in the future and thus board of directors are more likely to engage in CSR (McPherson, 2017). However, the negative influence might decrease when the organization is innovative, based on the mixed evidence from this thesis. But future research is necessary to investigate this effect.

§ 6.3 Limitations

This thesis has some limitations regarding to the empirical research. At first, the sample only contains US organizations to 2006. This is because the time limitation of the patent database. As innovation and CSR keep growing, their relationship might be stronger in more recent years. Second, the sample only contains firms in the United States. The results cannot be generalized to other continents. Furthermore, the distribution of observations is especially in three variables skewed. Only 95 observations contain female CEOs, only 935 observations have

patent data and 3,440 observations are in the manufacturing industry. This under- and overrepresentation might bias the results.

A limitation regarding the measurement methods is the variable CSR. It is only measured through the data of one institution and is a subjective concept, as described in section 2.3.1. Other institutions might give other scores and base their score on different dimensions, like the Fortune reputation index and the Canadian Social Investment Database.

The adjusted R-squares from the regression models are 1.2 and 6.5 percent. Only 6.5 percent of the dependent variable CSR in equation 1 and 3 is explained by the variables in that model. From the dependent variable innovation in equation 2 is only 1.2 percent explained by the variables in that model. These percentages are low and indicate that the dependent variables are influenced by a lot of other determinants. The economic significance of these results is low.

Other limitations of this research are the different results in the robustness tests. When measuring innovation with adjusted patent citations I do not find a significant relation with CSR, but when using the number of patents as a proxy for innovation, I do find a significant relation. Therefore, it is hard to generalize the results as they differ a lot over the different proxies.

§ 6.4 Future research

A recommendation for future research is a more recent sample period to measure the influence of innovation on CSR. The sample from this thesis contains data to 2006, while we live already in a next decade. The results might differ from my sample and the relations between the concepts might be changed.

Second, as innovation has a lot of different proxies, there are also a lot of different results. Future research could focus on finding one general accepted measurement method of innovation. Research about the proxies of innovation could focus on whether it is better to measure the input or output of innovation, or a combination of both. Furthermore, I find mixed evidence for the prediction that innovation decreases the negative effect of overconfident CEOs on the level of CSR. More extended research with other proxies of innovation could clarify this relationship.

At last, I only measure CSR with the MSCI database. Future research could control the results while using different measures of CSR, as the Fortune reputation index and the Canadian Social Investment Database.

References

Acs, Z., Anselin, L., & Varga, A. (2002). Patents and innovation counts as measures of regional production of new knowledge. *Research Policy*, 31 (7): 1069-1085. doi:https://doi.org/10.1016/S0048-7333(01)00184-6

Adams, R., Bessant, J., & Phelps, R. (2006). Innovation management measurement: A review. *International Journal of Management Reviews*, 8 (1): 21-47, https://doi.org/10.1111/j.1468-2370.2006.00119.x

Babiak, K., & Trendafilova, S. (2011). CSR and Environmental Responsibility: Motives and Pressures to Adopt Green Management Practices. *Corporate Social Responsibility and Environmental Management*, 18: 11-24, https://doi.org/10.1002/csr.229

Ben-David, I., Graham, J., & Harvey, C. (2013). Managerial Miscalibration. *The Quarterly Journal of Economics*, 128 (4): 1547-1584, https://doi.org/10.1093/qje/qjt023

Bocquet, R., Le Bas, C., Mothe, C., & Poussing, N. (2017). CSR, Innovation, and Firm Performance in Sluggish Growth Contexts: A Firm-Level Empirical Analysis. *Journal of Business Ethics*, 146 (1): 241-254, https://doi.org/10.1007/s10551-015-2959-8

Boulouta, I. (2013). Hidden Connections: The Link Between Board Gender Diversity and Corporate Social Performance. *Journal of Business Ethics*, 113 (2): 185-197, https://doi.org/10.1007/s10551-012-1293-7

Cai, Y., Jo, H., & Pan, C. (2012). Doing Well While Doing Bad? CSR in Controversial Industry. *Journal of Business Ethics*, 108 (4): 467–480, https://doi.org/10.1007/s10551-011-1103-7

Campbell, T., Gallmeyer, M., Johnson, S., Rutherford, J., & Stanley, B. (2011). CEO optimism and forced turnover. *Journal of Financial Economics*, 101 (3): 695-713, https://doi.org/101016/j.jfineco.2011.03.004

Carroll, A. (1991). The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. *Business Horizons*, 34 (4): 39-48, https://doi.org/10.1016/0007-6813(91)90005-G

Carroll, A. (1999). Corporate Social Responsibility Evolution of a Definitional Construct. *Business & Society*, 38 (3): 268-295, https://doi.org/10.1177/000765039903800303

Cesarini, D., Johannesson, M., Lichtenstein, P., & Wallace, B. (2009). Heritability of Overconfidence. *Journal of the European Economic Association*, 7 (2-3): 617-627, https://doi.org/10.1162/JEEA.2009.7.2-3.617

CPSC. (n.d.). *Who We Are - What We Do for You*. Retrieved from United States Consumer Product Safety Commission: https://www.cpsc.gov/Safety-Education/Safety-Guides/General-Information/Who-We-Are---What-We-Do-for-You

Dhaliwal, D., Li, O., Tsang, A., & Yang, Y. (2011). Voluntary Nonfinancial Disclosure and the Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting. *The Accounting Review*, 86 (1): 59-100, https://doi.org/0.2308/accr.00000005

EEOC. (n.d.). *About EEOC*. Retrieved from U.S. Equal Employment Opportunity Commission: https://www.eeoc.gov/eeoc/

EPA. (2017, December 12). *About EPA*. Retrieved from United States Environmental Protection Agency: https://www.epa.gov/aboutepa

Ettlie, J., Bridges, W., & O'Keefe, R. (1984). Organization Strategy and Structural Differences for Radical versus Incremental Innovation. *Management Science*, 30 (6): 682-695, https://doi.org/10.1287/mnsc.30.6.682

Fryxell, G., & Wang, J. (1994). The Fortune corporate 'reputation' index: Reputation for what? *Journal of Management*, 20 (1): 1-14, https://doi.org/10.1177/014920639402000101

Galasso, A., & Simcoe, T. (2011). CEO Overconfidence and Innovation. *Management Science*, 57 (8): 1469-1484, https://doi.org/10.1287/mnsc.1110.1374

Gallego-Álvarez, I., Prado-Lorenzo, J., & García-Sánchez, I. (2011). Corporate social responsibility and innovation: a resource-based theory. *Management Decision*, 49 (10): 1709-1727, https://doi.org/10.1108/00251741111183843

Garriga, E., & Melé, D. (2004). Corporate Social Responsibility Theories: Mapping the Territory. *Journal of Business Ethics*, 53 (1-2): 51-71, https://doi.org/10.1023/B:BUSI.0000039399.90587.34

Godos-díez, J., Fernández-gago, F., & Martínez-campillo, A. (2011). How Important Are CEOs to CSR Practices? An Analysis of the Mediating Effect of the Perceived Role of Ethics and Social Responsibility. *Journal of Business Ethics*, 98 (4): 531-548, https://doi.org/10.1007/s10551-010-0609-8

Goel, A., & Thakor, A. (2008). Overconfidence, CEO Selection, and Corporate Governance. *The Journal of Finance*, 63 (6): 2737–2784, https://doi.org/10.1111/j.1540-6261.2008.01412.x

Green, E. (2013, June 20). *Innovation: The History of a Buzzword*. Retrieved from The Atlantic: https://www.theatlantic.com/business/archive/2013/06/innovation-the-history-of-a-buzzword/277067/

Hall, B., Jaffe, A., & Trajtenberg, M. (2011). The NBER patent citations data file: Lessons, Insights and Methodological Tools. *NBER Working Paper*, No. 8498, https://doi.org/10.3386/w8498

Ham, C., Seybert, N., & Wang, S. (2018). Narcissism is a bad sign: CEO signature size, investment, and performance. *Review of Accounting Studies*, 23 (1): 234-264, https://doi.org/ 10.1007/s11142-017-9427-x

Hambrick, D., & Mason, P. (1984). Upper Echelons: The Organization as a Reflection of Its Top Managers. *The Academy of Management Review*, 9 (2): 193-206, https://doi.org/10.2307/258434

Harhoff, D., Scherer, F., & Vopel, K. (2003). Citations, family size, opposition and the value of patent rights. *Research Policy*, 32 (8): 1343-1363, https://doi.org/10.1016/S0048-7333(02)00124-5

Hirshleifer, D., Low, A., & Teoh, S. (2012). Are Overconfident CEOs Better Innovators? *The Journal of Finance*, 67 (4): 1457–1498, https://doi.org/10.1111/j.1540-6261.2012.01753.x

Huang, S. (2013). The Impact of CEO Characteristics on Corporate Sustainable Development. *Corporate Social Responsibility and Environmental Management*, 20 (4): 234-244, https://doi.org/10.1002/csr.1295

Johannessen, J., Olsen, B., & Lumpkin, G. (2001). Innovation as newness: what is new, how new, and new to whom? *European Journal of Innovation Management*, 4 (1): 20-31, https://doi.org/10.1108/14601060110365547

Kim, Y., Park, M., & Wier, B. (2012). Is Earnings Quality Associated with Corporate Social Responsibility? *The Accounting Review*, 87 (3): 761-796, https://doi.org/10.2308/accr-10209

Knoepfel, I. (2001). Dow Jones Sustainability Group Index: A Global Benchmark for Corporate Sustainability. *Corporate Environmental Strategy*, 8 (1): 6-15, https://doi.org/10.1016/S1066-7938(00)00089-0

Lanjouw, J., & Schankerman, M. (2004). Patent Quality and Research Productivity: Measuring Innovation with Multiple Indicators. *The Economic Journal*, 114 (495): 441-465, https://doi.org/10.111/j.1468-0297.2004.00216.x

Lee, M. (2008). A review of the theories of corporate social responsibility: Its evolutionary path and the road ahead. *International Journal of Management Reviews*, 10 (1): 53-73, https://doi.org/10.1111/j.1468-2370.2007.00226.x

Malmendier, U., & Tate, G. (2005). CEO Overconfidence and Corporate Investment. *The Journal of Finance*, 60 (6): 2661-2700, https://doi.org/10.1111/j.1540-6261.2005.00813.x

Malmendier, U., & Tate, G. (2005). Does Overconfidence Affect Corporate Investment? CEO Overconfidence Measures Revisited. *European Financial Management*, 11 (5): 649-659, https://doi.org/10.1111/j.1354-7798.2005.00302.x

Manjoo, F. (2017, November 1). *The Upside of Being Ruled by the Five Tech Giants.* Retrieved from The New York Times: https://www.nytimes.com/2017/11/01/technology/five-tech-giants-upside.html

Manner, M. (2010). The impact of CEO characteristics on corporate social performance. *Journal of Business Ethics*, 93 (1): 53-72, https://doi.org/10.1007/s10551-010-0626-7

Mattingly, J., & Berman, S. (2006). Measurement of Corporate Social Action: Discovering Taxonomy in the Kinder Lydenburg Domini Ratings Data. *Business & Society*, 45 (1): 20-46, https://doi.org/10.1177/0007650305281939

McCarthy, S., Oliver, B., & Song, S. (2017). Corporate social responsibility and CEO confidence. *Journal of Banking and Finance*, 75: 280-291, https://doi.org/10.1016/j.jbankfin.2016.11.024

McPherson, S. (2017, January 19). *6 CSR Trends To Watch In 2017.* Retrieved from Forbes: https://www.forbes.com/sites/susanmcpherson/2017/01/19/6-csr-trends-to-watch-in-2017/#41d9c5dbb1cc

Mishra, D. (2017). Post-innovation CSR Performance and Firm Value. *Journal of Business Ethics*, 140 (2): 285–306, https://doi.org/10.1007/s10551-015-2676-3

Moore, D., & Healy, P. (2008). The Trouble With Overconfidence. *Psychological Review*, 115 (2): 502-517, https://doi.org/10.1037/0033-295X.115.2.502

OSHA. (n.d.). *United States Department Of Labor*. Retrieved from About OSHA: https://www.osha.gov/about.html

Perez, A., & del Bosque, I. (2013). Measuring CSR Image: Three Studies to Develop and to Validate a Reliable Measurement Tool. *Journal of Business Ethics*, 118 (2): 265-286, https://doi.org/10.1007/s10551-012-1588-8

Pérez, A., & del Bosque, I. (2016). The stakeholder management theory of CSR: A multidimensional approach in understanding customer identification and satisfaction. *International Journal of Bank Marketing*, 34 (5): 731-751, doi.org/10.1108/IJBM-04-2015-0052

Perrini, F. (2006). SMEs and CSR Theory: Evidence and Implications from an Italian Perspective. *Journal of Business Ethics*, 67 (3): 305-316, https://doi.org/10.1007/s10551-006-9186-2

Petrenko, O., Aime, F., Ridge, J., & Hill, A. (2016). Corporate social responsibility or CEO narcissism? CSR motivations and organizational performance. *Strategic Management Journal*, 37 (2): 262-279, https://doi.org/10.1002/smj.2348

Prior, D., Surroca, J., & Tribó, J. (2008). Are Socially Responsible Managers Really Ethical? Exploring the Relationship Between Earnings Management and Corporate Social Responsibility. *Corporate Governance: An International Review*, 16 (3): 160-177, https://doi-org.eur.idm.oclc.org/10.1111/j.1467-8683.2008.00678.x

Schaefer, P., Williams, C., Goodie, A., & Campbell, W. (2004). Overconfidence and the Big Five. *Journal of Research in Personality*, 38 (5): 473-480, https://doi.org/10.1016/j.jrp.2003.09.010

Schranda, C. M., & Zechman, S. L. (2012). Executive overconfidence and the slippery slope to financial misreporting. *Journal of Accounting and Economics*, 53 (1-2): 311-329, https://doi.org/10.1016/j.jacceco.2011.09.001

Shipman, A., & Mumford, M. (2011). When confidence is detrimental: Influence of overconfidence on leadership effectiveness. *The Leadership Quarterly*, 22 (4): 649-665, https://doi.org/10.1016/j.leaqua.2011.05.006

SICCODE.COM. (2018). *SIC Directory*. Retrieved from SICCODE.COM: https://siccode.com/en/siccode/list/directory

Sweeney, L., & Coughlan, J. (2008). Do different industries report Corporate Social Responsibility differently? An investigation through the lens of stakeholder theory. *Journal of Marketing Communications*, 14 (2): 113-124, https://doi.org/10.1080/13527260701856657

Thompson, V. (1965). Bureaucracy and Innovation. *Administrative Science Quarterly*, 10 (1): 1-20, https://doi.org/10.2307/2391646

Trajtenberg, M. (1990). A Penny for Your Quotes: Patent Citations and the Value of Innovations. *The Rand Journal of Economics*, 21 (1): 172-187, https://doi.org/10.2307/2555502

Turker, D. (2009). Measuring Corporate Social Responsibility: A Scale Development Study. *Journal of Business Ethics*, 85 (4): 411-427, https://doi.org/10.1007/s10551-008-9780-6

US Law and CSR Implementation. (2015, November 9). Retrieved from Law Explorer: https://lawexplores.com/us-law-and-csr-implementation

Vilas, N. (2017, July 7). *Top 20 Corporate Social Responsibility Initiatives for 2017.* Retrieved from Smart Recruiters: https://www.smartrecruiters.com/blog/top-20-corporate-social-responsibility-initiatives-for-2017/

Wang, Y., & Berens, G. (2015). The Impact of Four Types of Corporate Social Performance on Reputation and Financial Performance. *Journal of Business Ethics*, 131 (2): 337-359, https://doi.org/10.1007/s10551-014-2280-y
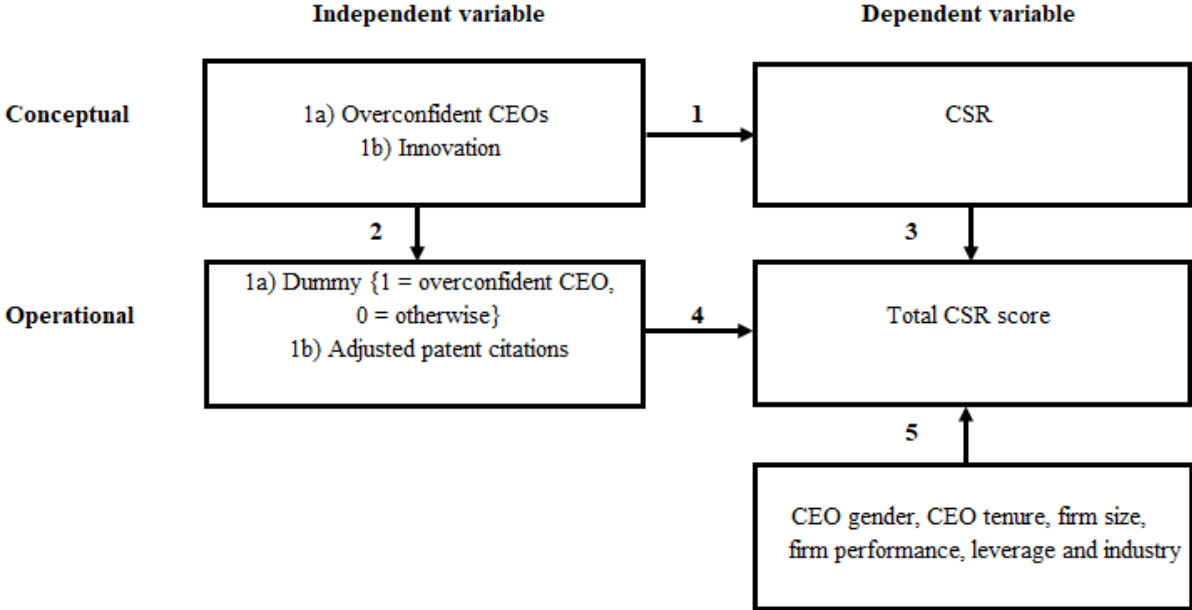
Appendix A

Figure 1. Predictive validity framework hypotheses 1a and 1b
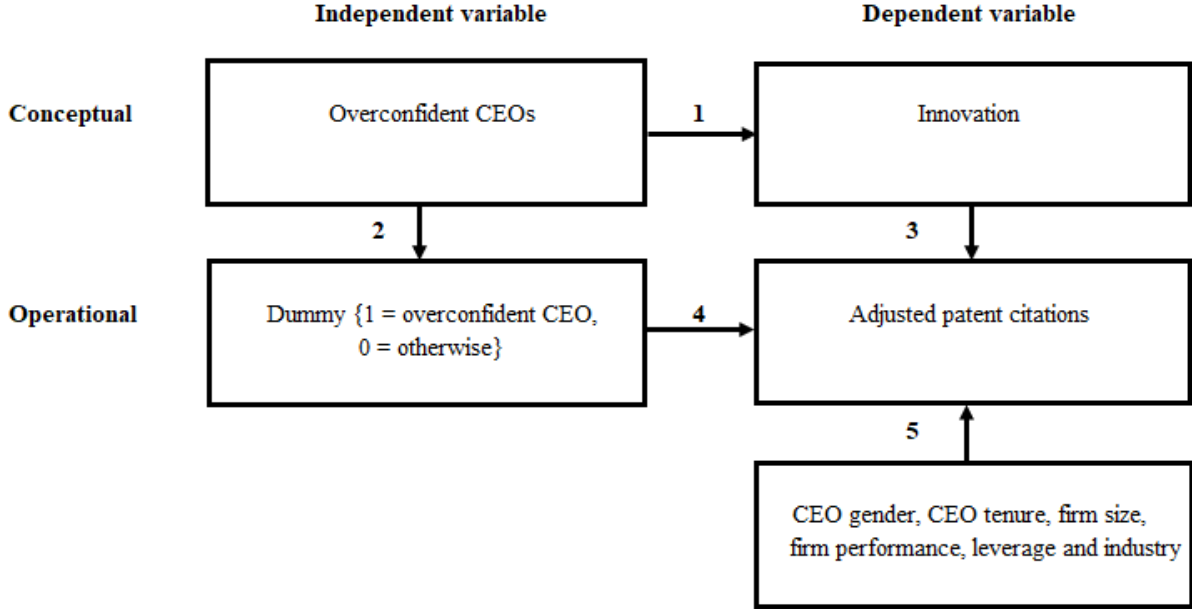
Figure 2. Predictive validity framework hypothesis 1c
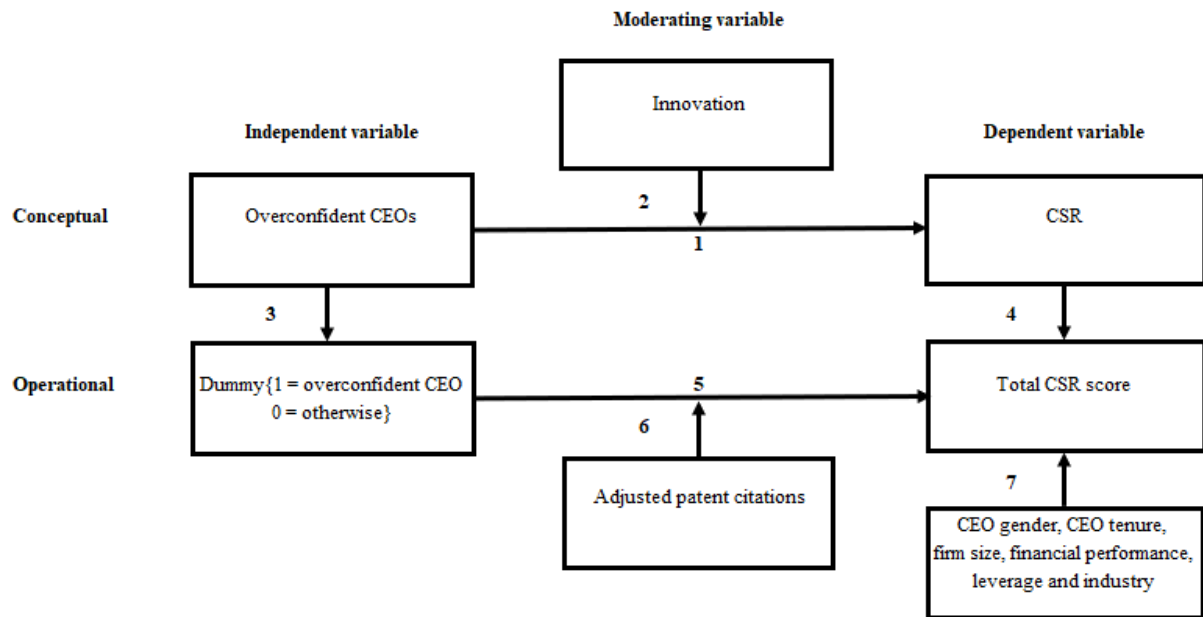
Figure 3. Predictive validity framework hypothesis 2

Appendix B
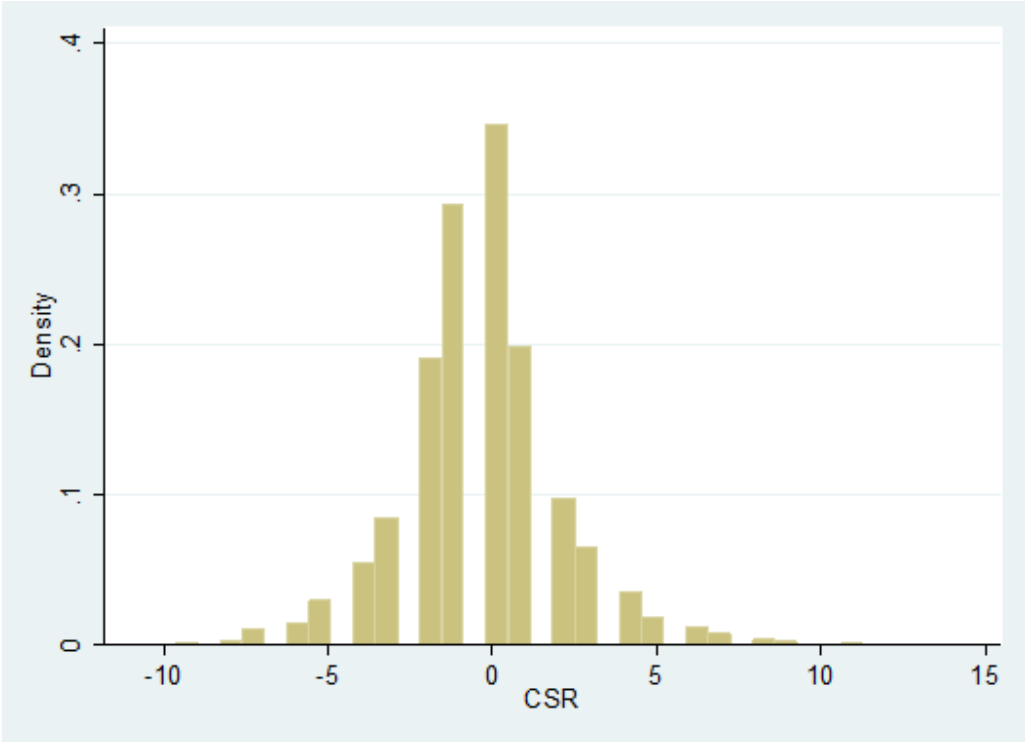
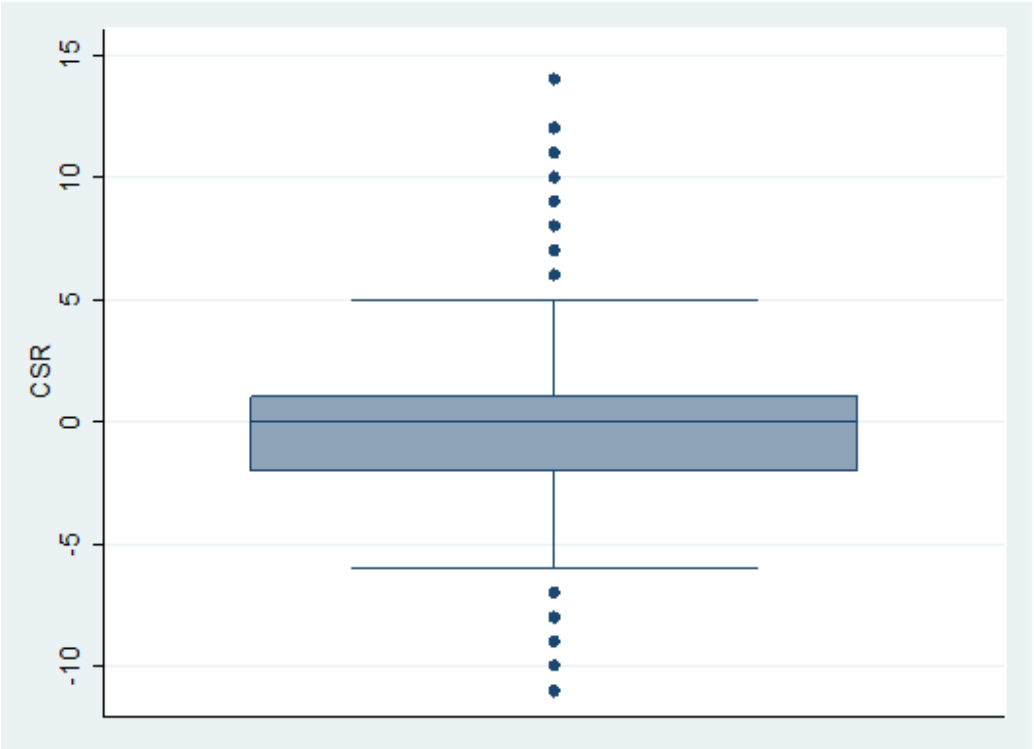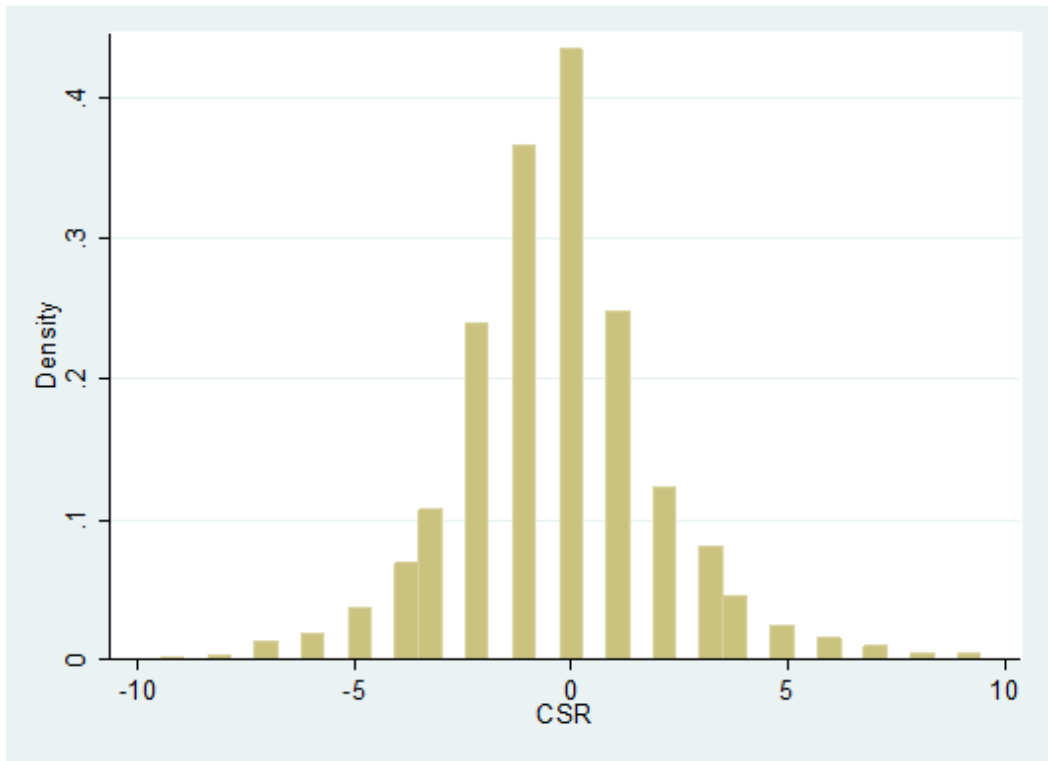**Figure 4.** Histogram CSR before outlier exclusion
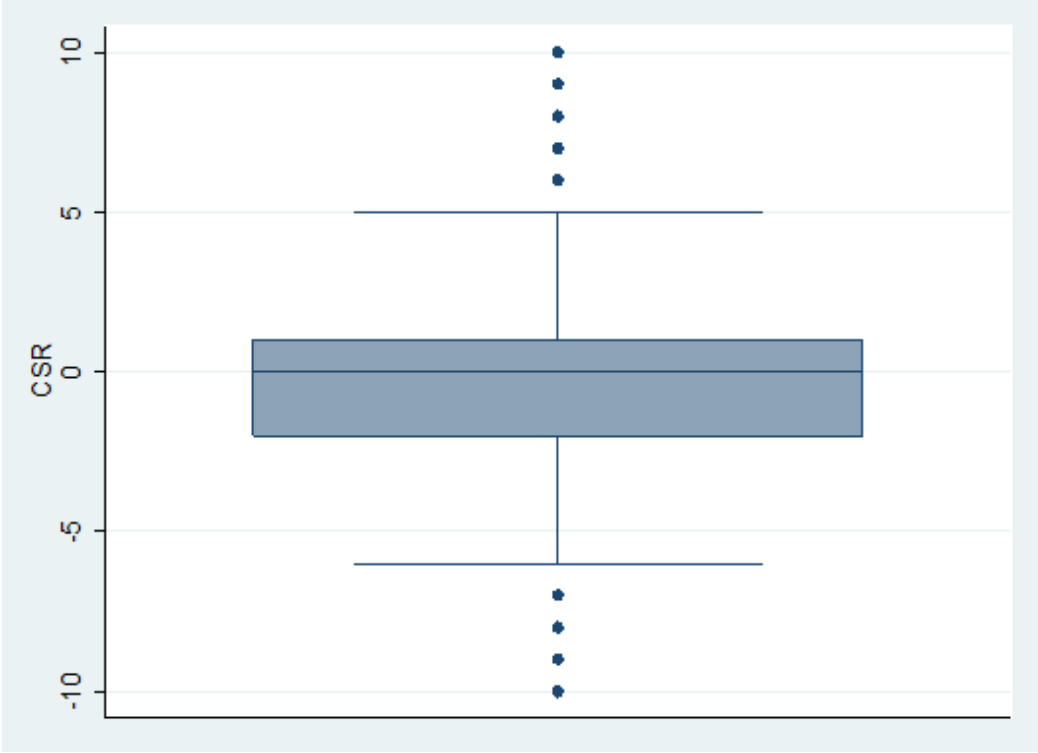

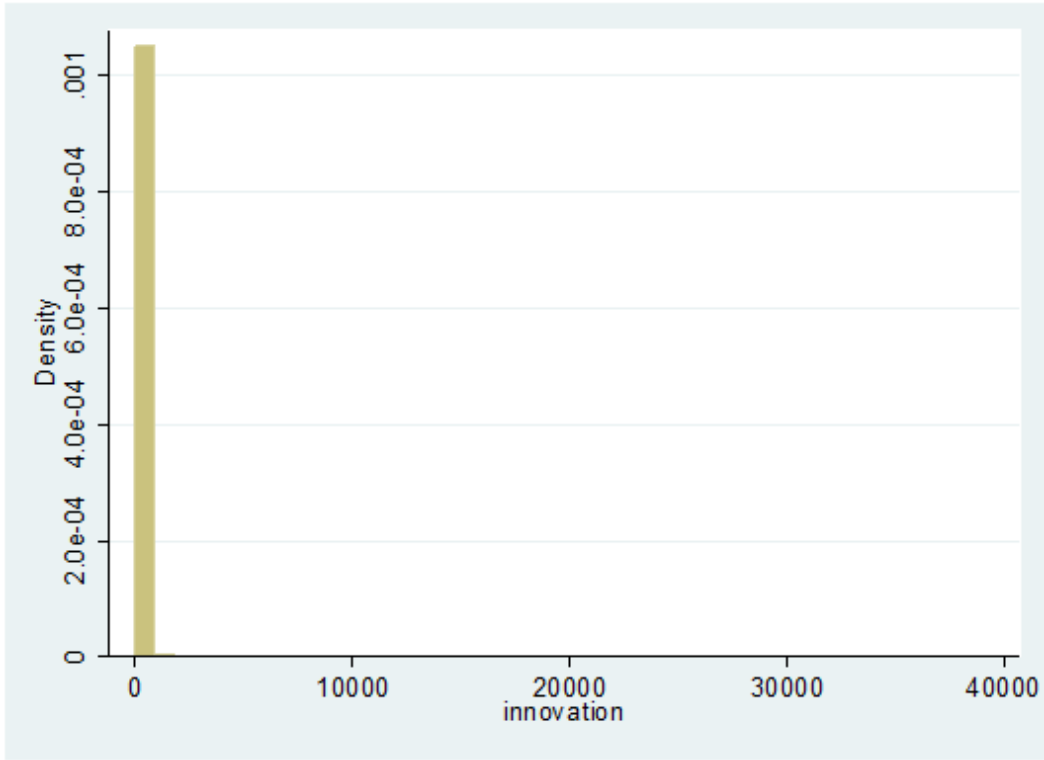**Figure 5.** Boxplot CSR before outlier exclusion

Figure 6. Histogram CSR after outlier exclusion

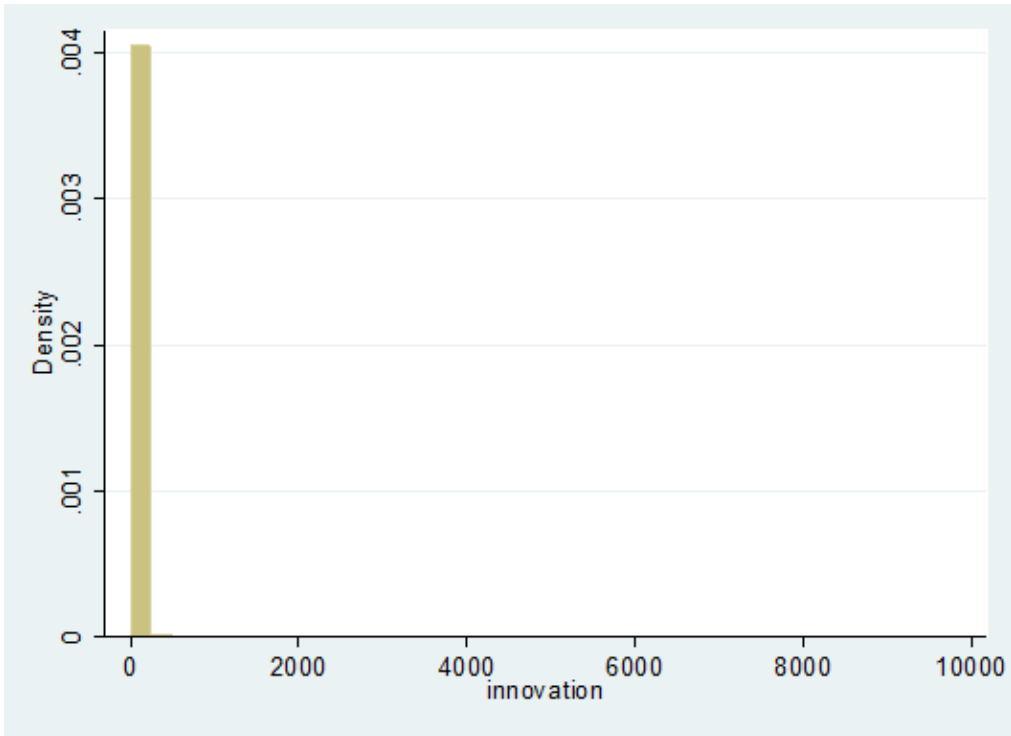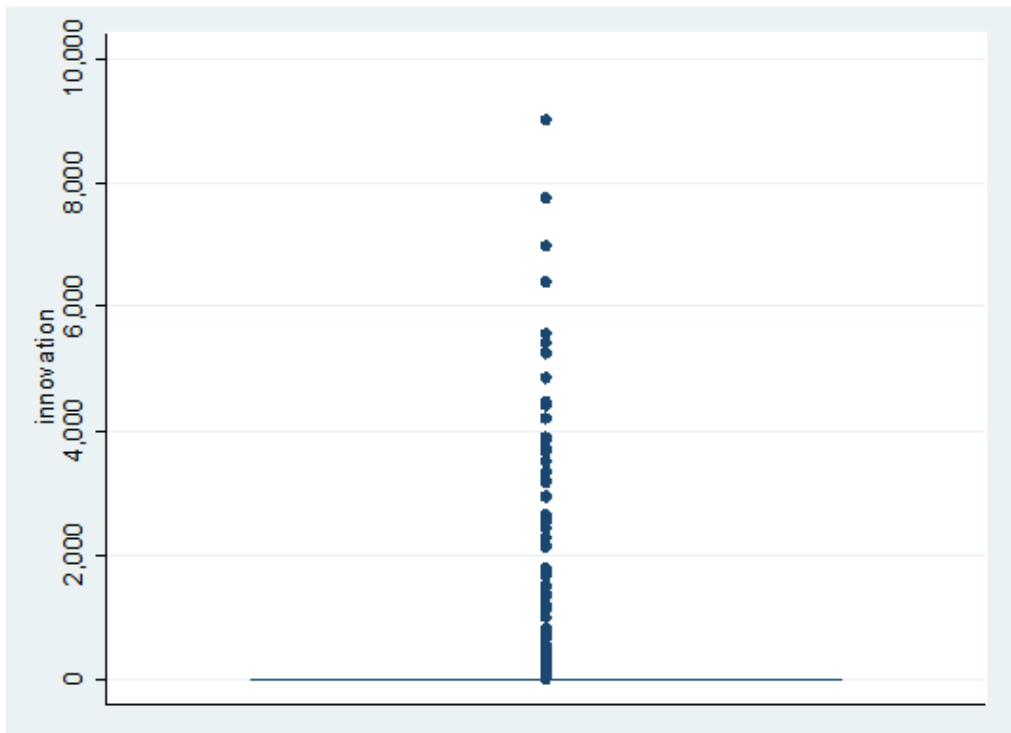**Figure 7.** Boxplot CSR after outlier exclusion

Figure 8. Histogram innovation before outlier exclusion
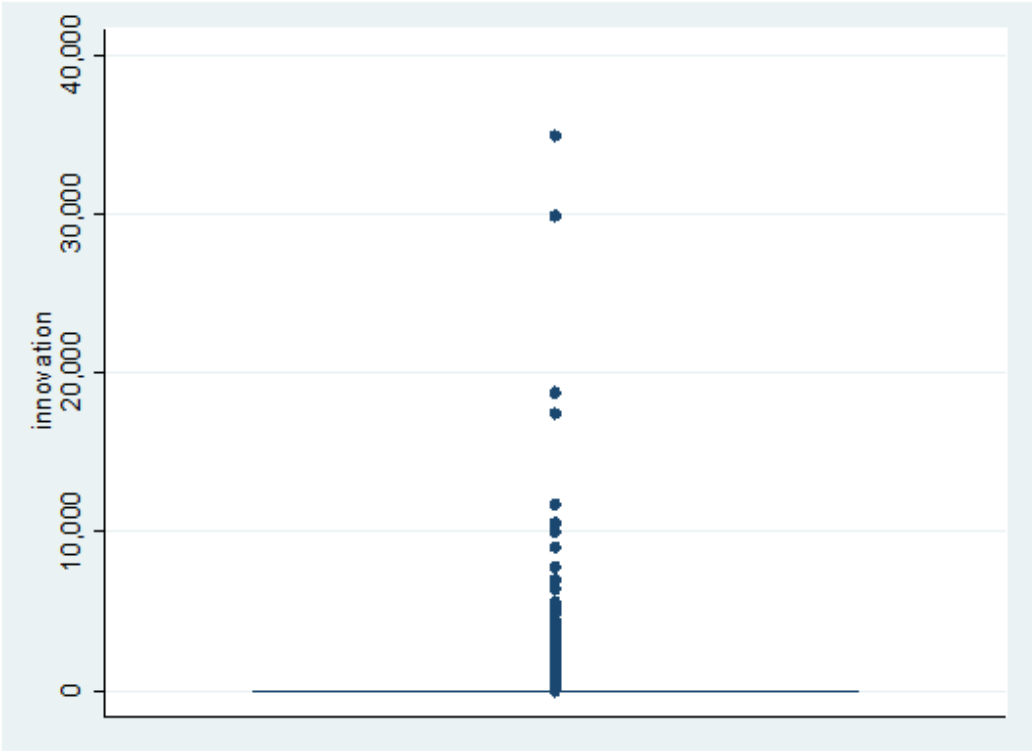
Figure 9. Boxplot innovation before outlier exclusion

Figure 10. Histogram innovation after outlier exclusion

Figure 11. Boxplot innovation after outlier exclusion

Appendix C
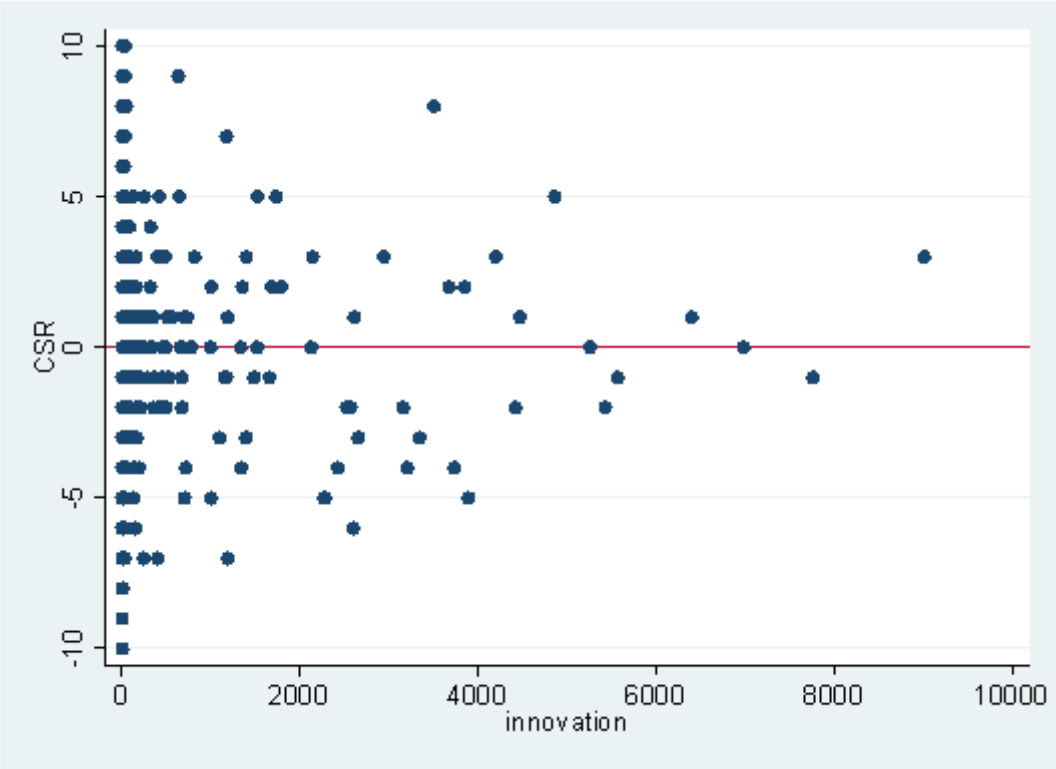
Figure 12. Scatterplot CSR and innovation
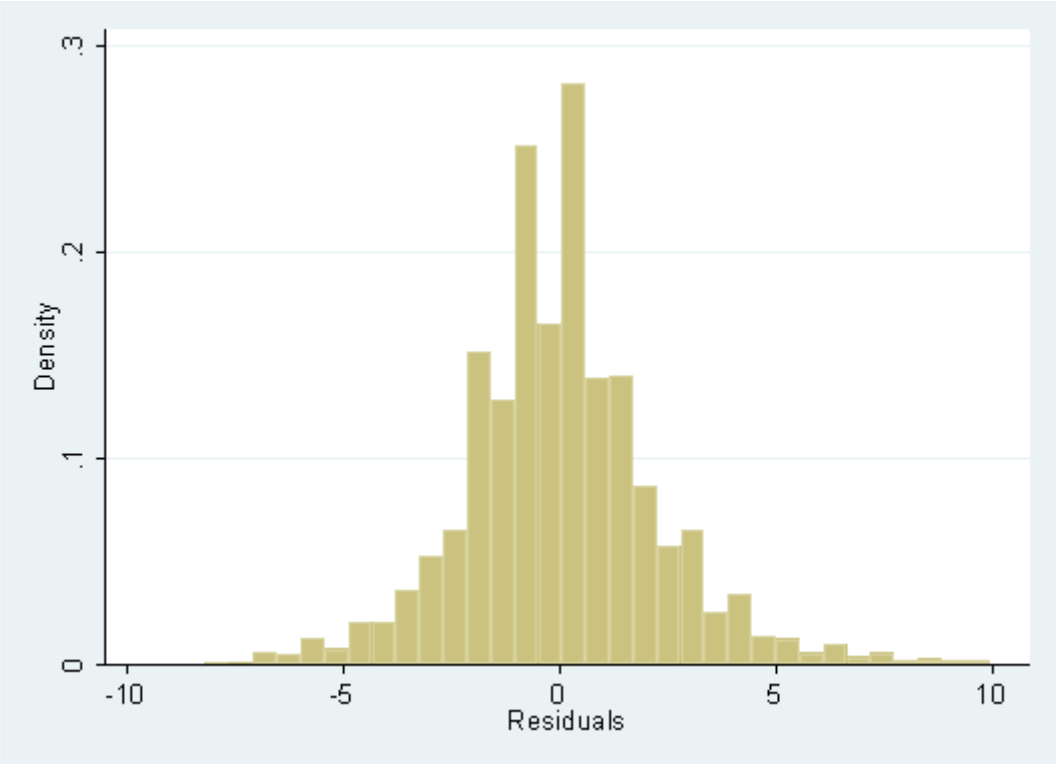
Figure 23. Histogram residuals
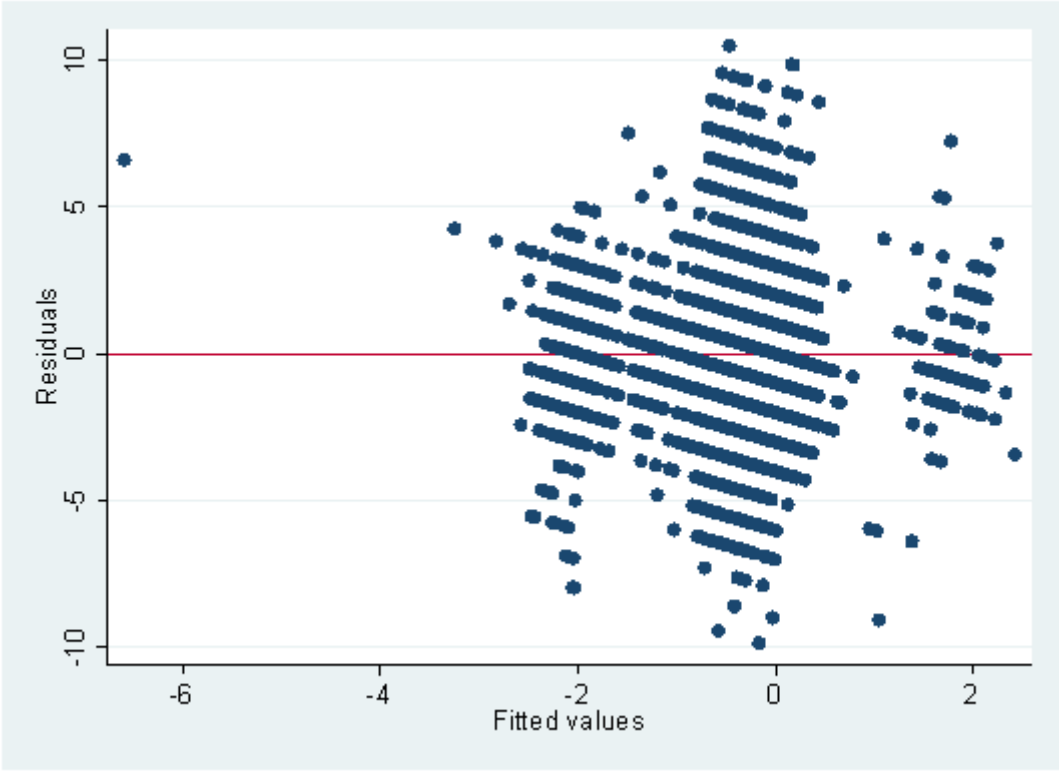
Figure 14. Plot between residuals and predicted values

Appendix D

Table 13. Structural Equation Modeling

Dependent variable *CSR*		
Variable	**Coefficient**	**P-value**
Direct effect		
INV	0.0001	0.410
OVC	-0.0503	0.437
Indirect effect		
INV		
OVC	0.0002	0.837
Total effect		
INV	0.0001	0.410
OVC	-0.0502	0.439

This table presents the results from the Structural Equation Modeling analysis. The variables are defined in table 2.