



Investors' Valuation of Assurance on Sustainability Reporting

Master Thesis (MSc Accounting and Auditing), Erasmus University Rotterdam

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Abstract:

This thesis investigates whether investors value an assurance statement in a sustainability report and whether the quality of assurance matters from an investor's point of view. For the total sample of companies operating in a stakeholder-oriented environment, investors do not seem to value the assurance on sustainability reports, even when the quality of assurance is increased. The results imply that the assurance in this field is still in need for new developments from standard setters and assurance providers for the desired effects of assurance in the form of enhanced stakeholders trust are not yet accomplished.

Key words: Sustainability Reporting, Sustainability Assurance, Assurance Quality.

June 21, 2016

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1. Introduction

1.1. Motivation

Sustainability reporting has experienced a substantial growth in the past two decades and is considered a 'hot topic' in many large firms around the world. The global community has created a demand for more transparent reporting on a firm's social, economic and environmental performance. Companies answered these calls by voluntarily providing sustainability disclosures in their financial statements, other disclosures such as conference calls or separate sustainability reports. KPMG's International Survey on Environmental Reporting, produced approximately every three years from 1993 till 2015, shows that the frequency of sustainability reporting at the hundred largest companies of the countries contained in the survey has increased substantially. Where only 12% of all observed companies produced a separate sustainability reports in 1993, the report rate increased to 28% in 2002 and in 2015 almost three quarters (73%) of all observed companies produced sustainability reports (KPMG, 2015). The global increase in reporting on sustainability performance is often being attributed to the growing recognition by companies and their stakeholders to take social, economic and environmental issues into account. Where in the past financial numbers were the sole factor that determined a company's performance, it is now judged on matters of sustainability as well (Gray, 2006).

In addition to producing these separate reports of sustainability performance, companies can decide to hire an assurance provider to verify their sustainability reports. Just as the decision to produce sustainability reports, assurance on these reports remains voluntary. KPMG (2015) reports that the hundred largest companies of the 41 countries in their survey increasingly hire assurance providers: companies seeking independent assurance increased with 9 percent-point from 2005 till 2015 and report an even higher increase of 33 percent-point for the world's biggest 250 companies. This indicates that assurance on sustainability reports is becoming a common practice, especially for the large companies with extensive stakeholder groups.

Although assurance on sustainability reports is increasingly embraced, the practice has been largely criticized in prior research. Early critique mainly focused on a lack of reporting standards on sustainability reports and later focused on assurance of these reports as well (Gray, 1992; Gray, 2000; Wallage, 2000; Dando and Swift, 2003; Adams and Evans, 2004), which was answered by several standard setters by providing reporting and assurance standards. Global Reporting Initiative launched its first guidelines on sustainability reporting in 2000 and improved it several times to the widely used G4 Guidelines issued in 2013

(Global Reporting Initiative, 2013). Regarding assurance, AccountAbility issued the AA1000AS standards in 2003 and the IAASB launched its own version of standards, ISAE3000, on sustainability assurance in 2004, the standards have been updated several times with their latest versions dating from 2008 and 2013 respectively. Although AA1000AS and ISAE3000 improved assurance quality to some extent, the practice still remained vulnerable in the eyes of the academic world. For example, inherent to this relatively new service is the trial and error process by which it is subjected (O'Dwyer, 2011). This process is required in order to achieve a high quality service, but at the same time causes quality distortions in its practice, causing doubts to whether the assurance providers are capable of executing this important task. In addition, Gray (2010) argues that standard financial auditing procedures are often copied in the field of sustainability assurance. While it is easy to build upon such skills, developed over decades of experience and improvements, especially in the post-Enron era, conventional auditing practices are no longer appropriate when auditing for sustainability performance since it involves a multiple of disciplines. These developments raise a question to "whether assurance of non-financial information adds value" (DeFond and Zhang, 2014, p. 278).

1.2. Research Question

The purpose of this thesis is to provide evidence on whether assurance of non-financial information adds value from an investors' point of view. Investors are among the most frequent users of reports issued by corporate management and are owners of the companies. Therefore, investors are an important party in addressing the value-relevance of sustainability reporting. Prior literature provides mixed evidence on the value-relevance of sustainability assurance, by addressing investors' valuation of companies that make use of sustainability assurance, this thesis provides evidence to this discussion. The research question is stated as follows:

Do stock market investors value the presence of an assurance statement in sustainability reports?

An answer to this question provides more evidence in the discussion on the added value of assurance on sustainability reports. The research question consists of three sub-questions, the first being:

(1) Do investors value sustainability reports that have been assured over sustainability reports that have not been assured?

This question gives a straight answer to whether investors' decision making is influenced by assurance. Next, it is interesting to see whether investors' decisions are affected by the quality of assurance. Prior research (e.g. Gray 2010) indicates that the quality of assurance is mixed and differences in quality could therefore lead to differences in investors' decision-making. Based on prior literature the following two proxies for sustainability assurance quality are formed: 1) type of assurance provider and 2) the usage of assurance standards. Generally, audit firms are considered superior over non-accounting firms such as environmental consultants in providing assurance on sustainability reports, due to factors as their long time experience in the assurance industry, economies of scale, code of ethics and quality control mechanisms (Mock et al., 2007; Simnet et al., 2009). Therefore, sub-question (2), including the first quality proxy, is as follows:

(2) Do investors value sustainability assurance provided by a member of the audit profession over non-accountant firms?

The second proxy for quality is the use of standards for sustainability assurance. AA1000AS and ISAE3000 are standards used most frequent in the field of sustainability assurance. Both standards have shown to improve the quality of sustainability assurance, providing accounting firms and other assurance providers with guidelines to improve their services (Manetti and Becatti, 2009). Sub-question (3) is therefore stated in the following way:

(3) Do investors value sustainability assurance conducted following AA1000 AS or ISAE 3000 over sustainability assurance conducted without standards?

The answers to the sub-questions give more detailed evidence on to what factors are critical in investors' decision-making related to sustainability reporting.

1.3. Academic and Practical Relevance

This thesis contributes to existing research in two ways. First, it examines the effect of voluntary sustainability assurance on the market to discover whether the assurance decision

holds implications for companies' investors. The implications that the assurance decision has on the market is an important factor companies have to take into account. Where prior research has looked at the markets' reaction of sustainability reporting and related disclosures on its own (e.g. Murray et al., 2006; Guidry and Patten, 2010; Berthelot et al., 2012; Krüger, 2015), this thesis contributes by specifically addressing the assurance of the reports. Although some researchers have looked at the opinion of users of sustainability reports on the assurance of the report (Hodge et al., 2009; Pfugrath et al., 2001; Cheng et al., 2015), none has taken into account the actual buy-and-sell decision-making behavior of investors, which is one of the most relevant consequences of corporate management's actions. Second, the thesis contributes to existing literature by addressing the valuation of the market regarding the quality of sustainability assurance. Prior literature is mainly looking at the concept of quality of assurance on sustainability reporting itself, describing influential factors (Smith et al., 2011), variability of content (Deegan et al., 2006), characteristics of assurance providers (Power, 1997; Gray, 2010; O'Dwyer, 2011) and institutional aspects (Manetti and Becatti, 2009). This research takes another point of view, namely the valuation of quality of stock market investors, to shed some extra light on this discussion,

The results of this thesis will be valuable for companies in their decision to hire costly assurance on their sustainability reports. It helps corporate management address the consequences on investors' decision-making of hiring assurance providers. This could be a critical factor for a company. In addition, it helps the company to evaluate which factors it has to take into account when considering hiring an assurance provider. Type of assurance provider and the usage of standards both could have an impact on quality of assurance. Although companies form the major party that benefits from this study, the results could be interesting for assurance providers and standard-issuing organizations as IAASB and AccountAbility as well. It provides evidence as to whether their practices add value to an important audience in the financial markets: stock market investors.

1.4. Methodology

This thesis uses the research methodology of an event study in order to obtain an answer to the research question. An event study measures the impact that a particular event has in the market. The markets' valuation is measured by the cumulative abnormal return of the seven days surrounding the event, the event being the publication of a sustainability report. After the cumulative abnormal return has been calculated, a Spearman correlation checks for an association between the independent and dependent variables. An OLS-regression tests for the

significance, direction and magnitude of the effect of this association. All sub-questions follow this research design, although different dependent variables are being used. The first sub-question uses a dummy variable for sustainability assurance, the second sub-question uses a dummy variable for type of assurance provider and the third sub-question uses a dummy variable for assurance standards as dependent variable. The research includes companies from Austria, Germany, Japan, South-Korea and Switzerland in the period 2012-2015, since they operate using German civil law and therefore their corporate culture focusses on stakeholders instead of shareholders (La Porta et al., 1997). Companies operating in stakeholder oriented countries tend to have a higher demand for sustainability assurance (Simnet et al., 2009; Kolk and Perego, 2010; Manetti, 2011). This underlines the relative importance of assurance sustainability performance in stakeholder oriented corporate cultures, thereby indicating that investors of companies operating in such an environment may attach more value to an assurance statement in a sustainability report than investors residing in shareholder oriented countries.

1.5. Structure of the Thesis

The remainder of the thesis proceeds in the following way. Section II describes the theoretical concepts that are relevant for this thesis. In order to develop a solid argument on the expectations inherent in this thesis, one needs to develop a theoretical base that starts with broadly adopted theories in accounting research and, through a discussion of relevant prior research, ends with specific expectations or hypotheses. Section III explains what prior research has found regarding the assurance on sustainability reports and the market's reaction to sustainability performance; to complete the reasoning of this thesis, the hypotheses are developed in Section IV. Section V describes the research design and data sample used in detail and this section is followed by Section VI which contains the results of this thesis. Finally, Section VII discusses the main results, connects them to findings of prior research, discusses the limitations and provides directions for further research.

2. Theoretical Framework

The following section describes the theoretical roots of this thesis in order to provide a better understanding of its relevance in academic literature. To make a connection with broadly adopted theories in accounting research, the underlying grounds of this thesis' subject need to be identified. First, this thesis addresses agency theory by providing a summarized documentation of the theory and how assurance on sustainability reports can be placed within this framework. Second, an overview on positive accounting theory is presented, together with an explanation on how it relates to investors' decision-making. This section also provides formal definitions of the concepts used in this research to develop a clear understanding on terminology.

2.1. Sustainability Terminology

The audit of financial statements is mandatory for every listed company around the globe. However, not every report a company issues is subjected to a mandatory audit. For most reports, companies can decide on their own to have the information that is contained in the report assured by third parties, a process which is termed voluntary assurance. A sustainability report is such a report on which corporate management often decides to hire third parties to have the content verified (KPMG, 2015). In the remainder of this thesis sustainability reports refer to stand-alone reports concerning the non-financial performance of a company. A document is considered a sustainability report if it contains non-financial information in one or more of the following six categories: economic, environmental, social, human rights, society and/or product responsibility (Global Reporting Initiative, 2013). Excluded from this thesis are other forms of sustainability reporting: disclosures of sustainability in financial statements (integrated reports) and special purpose reports (following Simnet et al., 2009), since the object of this research is to address the voluntary assurance given on stand-alone reports.

O'Dwyer (2011, p. 1231) defines sustainability assurance very broadly as a "practice promising to provide assurance regarding the reliability and completeness of (...) sustainability reports". Sustainability assurance, as used in this thesis, is the inclusion of an assurance statement in a sustainability report that indicates that a third party has validated the reliability and completeness of the document. The third parties are typically called 'assurance providers' and are divided in two categories: audit firms (e.g. the Big4) and non-accountant firms (e.g. environmental consultants, engineering firms). To this date, however, it is not mandatory to hire an assurance provider to verify the reported information. Therefore, one

question presents itself: since assurance on sustainability reports is voluntary, why would managers hire costly assurance providers? The answer to this question explains the existence of assurance and has its roots in agency theory.

2.2. A Theoretical Approach to the Existence of Assurance

Generally speaking, people and organizations try to reduce the uncertainty in their environment to a minimum level. Uncertainty regarding the many different actors that make up a person's or organization's environment generates a feeling of being out of control, which may lead to unexpected actions and unexpected outcomes. Uncertainty in outcomes of actions is the basis for agency theory. Agency theory addresses agency problems between a principal and an agent. In the field of accounting, agency problems manifest themselves in separation of ownership and control. The principals (owners of the company) have other incentives than the agents (corporate management). As the owners of the company, principals have the right to direct the company in its actions, but since they often do not have the knowledge to manage the company, they hire agents to do this work for them. However, the agent does not always act in the best interest of the company. For example, managers tend to focus on short-term profits in order to maximize their compensation. The short-term profits often have implications for profit maximization in the long run, which is the primary objective of shareholders. These conflicts of interests manifest themselves in agency costs, which arise when there is a conflict of interest between corporate management and the shareholders of a company (Jensen and Meckling, 1976).

The separation of ownership and control results in asymmetric information between corporate management and the shareholders: shareholders do not know whether the performance of the company is in their best interest, while corporate management does possess this knowledge since they operate the business on a day-to-day basis. To level the knowledge of both parties, agents report on the financial performance of the company in annual or quarterly reports. These reports, however, could still contain biased information on performance that favors corporate management. Third party assurance is used to verify the information content of annual and quarterly reports to ensure the correctness of information towards the shareholders and limit the asymmetric information between the principal and the agent. When an independent third party judges the information to be correct, reliable and complete, shareholders can rely on management reports and focus on directing corporate management based on these numbers. Assurance allows for a reduction in information

asymmetry and serves as a bridge between the interests of the principal and the agent, reducing agency problems and the associated agency costs.

The same line of reasoning applies to assurance on sustainability reporting. The conflict of interest between the principal and agent exists in a non-financial setting as well. Information asymmetry is even more evident, since most shareholders do not have the specific knowledge of sustainability issues, while most shareholders, especially the sophisticated institutional investors, can grasp a company's financial performance to some extent. Management's reporting on the social, economic and environmental performance of the company is the first step in addressing the information asymmetry that is inherent to the conflict of interest. The second step is third party assurance of these reports to add credibility to the information content. Together they can limit the information asymmetry in the field of sustainability performance to a reasonable level.

2.3. Consequences of the Assurance-Decision: a Theoretical Note

Agency theory helps explain the demand for assurance services and the added value of an assurance statement to the principal-agent relationship. Assurance is used to bridge the information gap between corporate management and shareholders and to resolve any existing information asymmetry. It therefore gives new information on the quality of the reported content to the shareholders. This is where the field of Positive Accounting Theory (PAT) comes in. In general, PAT addresses actual outcomes of accounting practices whereas normative theory describes the theoretical 'what should be'. The theory tries to explain why certain accounting choices are made by looking at consequences, the actual outcomes, of those decisions. Taking PAT into the context of assurance on sustainability reports, the theory predicts that the accounting choice to adopt assurance holds real implications for investors' decision-making behavior. Managers tend to choose accounting policies for their economic consequences, that is, they choose the policy that maximizes the outcomes of decisions made by all relevant stakeholders in favor of the company (Watts and Zimmerman, 1978). Following PAT, the decision to hire an assurance provider could influence the outcomes of decisions made by relevant stakeholders, including investors. Although it is not clear how investors' decision-making is affected, PAT predicts that the assurance-decision could affect this process. Companies report on their sustainability performance to all stakeholders concerned and all stakeholders' decisions could therefore be affected by the assurance-decision. This thesis, however, focusses specifically on stock market investors, which means that all relevant concerns to other stakeholders are objected from this research.

2.4. Summary

Agency theory in a business setting addresses the problems associated with the separation of ownership and control. When ownership and control are separated, corporate management acts on behalf of the shareholders, often resulting in conflicts of interests between both parties. In these conflicts, the asymmetric information is omnipresent. To reduce this gap, corporate management reports on the performance of the company and, subsequently, hires assurance providers in order to ensure that the information content is reliable and complete. This way, corporate management tries to supply financial and non-financial information to answer the demand of the shareholders. When corporate management hires assurance providers to verify their reports, they provide new information to the market. PAT predicts that this information has effects on the decision-making of investors. Combined, the theories conclude that investors value the verification of sustainability performance by third parties to reduce information asymmetry and real economic consequences proceed from this practice.

3. Prior Research

Agency theory describes the main reason of existence of assurance on sustainability reports, whereas PAT explains that the presence of such an assurance statement affects investors' decision-making. Following the discussion of the previous section, the thesis moves from this broad perspective of assurance on sustainability reports to a more detailed approach by describing prior research in this field. The theories that are outlined in the previous section are omnipresent in these articles, however, a more detailed view on related topics is necessary in order to understand the specific hypotheses generated in this thesis. First, in order to understand what makes investors value assurance on sustainability reporting, this section describes research regarding factors that help explain the demand for assurance on sustainability reporting. Second, it moves to prior research in the field of voluntary sustainability reporting and assurance and their effects on investors' decision making to provide a background on markets' valuation of sustainability performance. Last, this section addresses relevant literature in the field of the quality of assurance including quality implications of different types of assurance providers, inherent quality deficiencies and the effect of assurance standards.

3.1. Demand for Assurance

First of all, it should be noted that - just as with the decision of reporting sustainability performance (Cormier et al., 2005) - the decision to hire an assurance provider is to some extent determined by country-, industry- and firm characteristics (Simnet et al., 2009; Perego and Kolk, 2012; Peters and Romi, 2015). Companies differ in preferences regarding the value they put to the benefits of assurance on sustainability reporting. For example, research shows that preferences are dependent of country-specific characteristics: companies operating in a stakeholder-oriented environment are more eager to hire an assurance provider (Simnet et al., 2009). Although these studies help explain under which circumstances one can expect companies to take assurance on their reports, they do not relate to any direct motivations.

The main factor of motivation prior research has found is the added credibility and reliability the assurance provider gives, which leads to increased user confidence and stakeholder trust in the provided information (Choi and Wong, 2007; Simnet et al., 2009; Zorio et al., 2013). Just as companies' annual reports, sustainability reports could potentially contain a lot of errors and biased content that are either included on purpose or on accident. In addition, the content of sustainability reports varies across countries, firms and industries (Ingram, 1978), the quality of content remaining uncertain. Stakeholders do not have the

means to separate the reports of good quality from the reports that contain errors and biases. For example, some authors have suggested that managers use sustainability reporting out of self-serving behavior (Barnea and Rubin, 2010; Cho et al., 2010). Cho et al. (2010) found that language in sustainability reports is used to manage stakeholder impressions to improve the company's reputation as being a responsible actor in society, emphasizing management's commitment to sustainable performance, while actual performance is not backed up by these claims. In addition, Barnea and Rubin (2010) state that managers increase spending on corporate social responsibility projects for the same reasons. Assurance on this information can address investors' concerns on these matters by either verifying whether the language is backed up by performance or whether the increased spending is done for valid reasons (Cheng et al., 2015). Essentially, assurance providers sell a degree of certainty regarding the correctness and completeness of a sustainability report. Both articles are examples of agency problems, where managers act out of self-interest instead of the interests of the owners of the company. Information asymmetry and agency costs in this regard could be reduced by an appropriate verification of the content, so that managements' interests align with the interests of the owners.

The assurance that no errors or management bias exists in the reported content adds extra credibility to corporate management's reporting on sustainability performance, helping investors in judging whether the reported actions are truly legitimate. The decision to disclose and assure this performance reduces information asymmetry, which results in a more precise market valuation of the firm (Schadewitz and Niskala, 2010). For investors this could be critical information in their buy-and-sell decision-making.

3.2. Sustainability Reporting and the Market

PAT predicts that the provision of sustainability assurance holds real implications for investors' decision-making. Managers tend to choose accounting policies for their economic consequences, that is, they choose the policy that maximizes the outcomes of decisions made by all relevant stakeholders in favor of the company (Watts and Zimmerman, 1978). The effect on investors' decision-making may hold yet another incentive for managers to hire assurance providers: if investors positively react on assurance on sustainability reports, it may be beneficial for corporate management to hire an assurance provider. However, in order for investors to take interest in sustainability assurance, they first have to show interest in sustainability performance.

Ever since the research of Ball and Brown (1968), traditional accounting research focused on financial statement information as the sole factor of interest to investors. However, during the 1980s a growing number of researchers discovered a trend of investors concentrating on firms that showed superior social and environmental performance and this trend kept on going in the years after (Herremans et al., 1993). Companies disclosing non-financial information in their annual reports experienced increasing stock-market performance and saw their market values positively affected. Researchers mainly focused on the disclosure of pollution numbers (Belkaoui, 1976; Jaggi and Freedman, 1982; Hughes, 2000; Matsumura et al., 2014), but environmental capital expenditures (Clarkson et al., 2004), social disclosures (Anderson and Frankle, 1980) and sustainability disclosures in general (Murray et al., 2006), received attention as well as all were found to have a significant effect on market value. Investors seem to take into account companies' sustainability performance in their buy-and-sell decision-making. While it is not mandatory to include this information in disclosures, companies benefit from doing so. For example, when a firm discloses the emissions it pollutes in the environment, investors take this as a positive signal when the emissions are superior (fewer) compared to other firms. Of course, disclosing bad performance on emissions holds negative consequences for investor decision-making, but research shows that investors penalty companies even more when they do not disclose such information (Matsumura et al., 2014).

Why would investors take sustainability related information into account? Why would their decision-making be influenced by social, environmental and economic performance, seemingly unrelated to their primary interest of financial performance? Clarkson et al. (2011) found that companies who choose to improve sustainability performance tend to improve their financial resources and corporate managements' capabilities as well, improvements on these internal factors lead to real economic benefits as becomes evident in improved return on assets and cash flows. In general, therefore, sustainability performance is positively associated with firm performance.

Besides sustainability disclosures in annual reports and other disclosures such as conference calls, companies can disclose sustainability performance in separate sustainability reports. Just as to the other types of sustainability disclosures, investors attach a positive value to the publication of separate sustainability reports (Berthelot et al., 2012). However, not every publication of a sustainability report has consequences for investors' behavior. Guidry and Patten (2010), found no significant market reaction to the publication of separate sustainability reports for their total sample. However, after they controlled for quality, using a

measure of compliance with GRI guidelines, a significant positive market reaction was found for companies producing sustainability reporting with high reporting quality. This underlines the relative importance of reporting quality and provides an extra motivation for hiring assurance providers to verify the quality of sustainability reports. Indeed, prior research has found that investors and other report-users perceive assured reports to have more credibility and reliability (Hodge et al., 2009; Pflugrath et al., 2011). Cheng et al. (2015) and Brown-Liburd and Zamora (2015) add that investors are more willing to invest in a company when their sustainability reports are assured by third-parties. However, these three studies on investors' perception of assurance quality all had an experimental research design, with a sample consisting of MBA students, measuring only the perception of investors. Such a research design does not measure any real implications on investors' decision-making, nor can real financial consequences be drawn from these studies.

3.3. The Quality of Assurance on Sustainability Reports

The previous section highlights the importance of sustainability performance to investors. Companies with superior performance can expect a reward in the form of enhanced investors' valuation of the company, while bad performance decreases it. It should be noted though, that when bad performance is not disclosed, investors' valuation of the company decreases even more (Matsumura et al., 2014). In this degree companies are always better off disclosing their sustainability performance. However, when companies do report on their sustainability performance, the reports should be of sufficient quality, or else investors do not take the information content as useful (Guidry and Patten, 2010). This is quite sensible since low quality is associated with a high uncertainty of the accuracy and completeness of the report. To ensure the quality of their reports is sufficient, companies are embracing assurance providers to verify the quality of their reports.

Companies that have hired assurance providers were generally positive of the provided service. However, some companies decided not to take sustainability assurance and they had varying reasons for not taking in the service. They either thought the service too costly or they did not see the added credibility and reliability the assurance provides (Park and Brorson, 2005). This is an important fact, since the main reason of existence of the service is the added credibility and reliability it provides. Without it, assurance on sustainability reports may cease to exist or become just a meaningless trend in management consulting (Owen et al., 2000). It is agreed by many academic researchers that the quality of assurance on sustainability reports is doubtful, although they address different causes.

3.3.1. Quality Differences in Assurance Providers

Gray (1992) was among the first to advocate the abilities of auditors in the field of sustainability reporting. Accountability and transparency of reporting companies was necessary for a more sustainable view of business and current accounting techniques could be used in the operationalization of an accounting for sustainability. However, when the market for sustainability assurance emerged, auditors were generally criticized on their abilities to perform. The main point of accusation is that auditors only bring in their own expertise to this new area, while assurance on sustainability reporting is a multidisciplinary field requiring (besides auditors) environmentalists, socialists and economists in order to create a more comprehensive approach to the assurance practice (Power, 1997; Gray, 2002; Gray, 2010). Audit education does not involve any social or environmental accounting in its programs, which is the main issue why accountants do not live up to their potential within this field (Dixon, 2004). Their lack of knowledge on this account makes that they cannot always provide good quality of assurance. This failure makes room in the market for environmental consultants and other non-accountant assurance providers (Gray, 2000), who do possess this knowledge. Non-accountant firms, however, have some limitations of their own (e.g. lack of experience in the auditing field). Although Moroney et al. (2012) found that the quality of assurance does not differ among the different type of providers, other researchers found several important differences.

In transforming their skills in financial auditing to the field of sustainability assurance, auditors tend to follow a cautious approach. During the audit, auditors mostly look at underlying datasets to draw conclusions on the verifiability of the report (O'Dwyer and Owen, 2007; Perego and Kolk, 2012). Non-accountant firms on the other hand, take a more holistic approach (O'Dwyer and Owen, 2007). They tend to focus more on completeness, fairness and overall balance. Following this line of reasoning, Gürtürk and Hahn (2015) found that non-accountant firms use a wider diversity of methods than auditors, including risk analysis, media analysis and control of stakeholders over the process. Although auditors use these methods as well, non-accountant firms do so more frequently. In addition, non-accountant firms provide recommendations to their clients and commentary on systems, reporting methods and performance (O'Dwyer and Owen, 2007; Perego and Kolk, 2012). Users of sustainability reports may therefore find the content of assurance statements of non-accountant firms more informative.

However, research by Hodge et al. (2009) and Pflugrath et al. (2011) show that investors and financial analysts generally perceive the quality of assurance from auditors as

higher. Auditors have a long history in the assurance profession and have built up an image of high-quality assurance providers. Although they provide less recommendations and commentary on the clients processes, the quality related to the reporting format of the assurance report and the quality of verification procedures is generally higher than that of non-accountant firms, which is largely prescribed to the long-time experience in the field (Perego, 2009; Perego and Kolk, 2012). Furthermore, auditors are bigger in size compared to the generally smaller non-accountant firms. Firm-size is often used as a proxy for assurance quality, for bigger firms can gain scale efficiencies and often have a bigger reputation to lose.

3.3.2. Inherent Quality Implications of the Sustainability Assurance Process

As a result of the different approaches both types of assurance providers take, the nature of sustainability assurance is characterized by a trial-and-error process and the first attempts to resolve the difficulties inherent to this process relied extensively on 'gut-feel' (O'Dwyer, 2011). In trying to overcome some of the problems companies sought help from the potential users of assurance. The users informed assurance providers of their demands for the different aspects of the assurance service and assisted in determining what information has to be assured (O'Dwyer et al., 2011; Manetti and Toccafondi, 2012). However, the involvement of stakeholders in the assurance process has its implications for audit independence. In some industries, stakeholders have significant control over the assurance practice. They determine assurance providers' actions and how they should perform these actions, thereby exhibiting the company's interests rather than external transparency (Ball et al., 2000; O'Dwyer and Owen, 2005; Fonseca, 2010). Smith et al. (2011, p. 427) typically call this 'capture': "the possibility that powerful interests become institutionalized with a resulting loss of independence and credibility for sustainability reporting assurance practitioners". Independence is the main asset of assurance providers and the most important characteristic in adding credibility. Involvement with stakeholders harms independence, resulting in serious implications on the quality of the assurance service. Since the engagement with stakeholders holds both advantages and disadvantages, it has yet to be determined what direction to take.

3.3.3. Sustainability Assurance Standards

Just as with audit standards for financial statements, standard-setting agencies developed rules and procedures on how to perform an audit on sustainability reports. In the early years of the twenty-first century, sustainability reporting was still in its infancy and

companies were seeking on what performance indicators to report. The uncertainty resulted in great diversity between the content of sustainability reports from different companies (Gray, 2002). Due to the diversity in reporting content, the assurance approaches were exposed to a lot of variability and ambiguity. As a result, assurance reports differed a lot in format (Deegan et al., 2006). While companies increasingly published sustainability reports, there too was an increasing demand for appropriate guidelines on sustainability performance reporting and on sustainability assurance (Wallage, 2000). Regarding sustainability reporting, several guidelines were established, the GRI guidelines from the Global Reporting Initiative being the most frequently used. Since the first issue of the GRI guidelines in 2000, the guidelines received several updates, with the latest version, the G4 Guidelines, dating from 2013 (Global Reporting Initiative, 2013). While these guidelines significantly improved sustainability reporting, they did not address assurance. The GRI guidelines can therefore best be compared with IFRS. Both establish guidelines on how to report performance, although they both address other fields.

Standards on assurance on sustainability reporting were first established in 2003 by the International Auditing and Assurance Standards Board (IAASB) and AccountAbility. The IAASB issued the ISAE3000 standard, which does not focus specifically on sustainability reporting, but is intended for audits other than historical financial information (IAASB, 2013). AccountAbility established an assurance standard that does have this specific focus on sustainability reporting: the AA1000AS (AccountAbility 2008). Both standards are voluntary and differ in the approaches that they take. ISAE3000 focusses on the performance information that the client provides and describes procedures to check for material misstatements in the scope of the document. The focus of AA1000AS on the other hand is more on companies' stakeholders. It describes procedures to check whether the sustainably report holds all aspects of a company's sustainability performance that are relevant for stakeholders.

Although differences exist between the approaches of both standards, they have one aspect in common: both improved the assurance process of sustainability reporting. In the beginning of the twenty-first century, several authors questioned the reliability and consistency of sustainability assurance. When both standards were established, those authors praised the ability of ISAE3000 and AA1000AS to cope with the issues inherent to the assurance practice (Dando and Swift, 2003; Adams and Evans, 2004; O'Dwyer and Owen, 2007). Of course, the initial standards were not perfect, the assurance practice in this field was relatively new and improvements were necessary to improve the effectiveness and

reliability of sustainability assurance (Manetti and Becatti, 2009). Both standards received updates, the latest of ISAE3000 dating from 2013 and of AA1000AS from 2008. Although the differences in their approaches result in different levels of assurance quality (slightly in favor of AA1000AS), both standards have shown to improve the quality of assurance significantly (Gürtürk and Hahn, 2015).

3.4. Summary

This section discussed prior research regarding the assurance on sustainability reporting. It started with a list of factors that help explain the demand for assurance. Added credibility and reliability, reduced information asymmetry and its consequences and reductions in agency costs all provided incentives for companies to take assurance on sustainability reports. These factors could prove to be crucial in investors' buy-and-sell decision-making. Next, this section discussed the market's valuation of sustainability performance. Ever since the 1980s, companies have found it beneficial to report their sustainability performance, as became evident through increased stock prices. Quality of the reports, however, was crucial on this regard as investors have shown to value only high-quality reports. Assurance on sustainability reports could verify the quality on behalf of investors. However, the quality of assurance itself is not steady either, due to the nature of trial-and-error and stakeholder involvement. Assurance providers have not yet found a way to overcome these quality problems as quality of assurance differs from one assurance provider to another as audit firms and non-accountant firms both have other approaches of the sustainability assurance practice. The establishment of standards AA1000AS and ISAE3000 provides some light in the darkness, as both standards have shown to improve assurance quality.

3.5. Table of prior research

Table 1
Table of Prior Research

| <i>Authors</i> | <i>Title</i> | <i>Year</i> | <i>Purpose</i> | <i>Research Method</i> | <i>Sample (Period)</i> | <i>Findings</i> |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Brown-Liburd, H. and Zamora V.L. | The Role of Corporate Social Responsibility (CSR) Assurance in Investors' Judgments When Managerial Pay is Explicitly Tied to CSR Performance. | 2015 | Examining investors' stock price assessments of CSR assurance when information on CSR investment level is integrated with information on whether managerial pay is explicitly tied to sustainability. | Experimental survey that measures investors' judgment of stock price assessments, manipulating CSR investment level, CSR assurance presence and pay-for-CSR disclosure. | 268 individual investors from the US (2012) | In the presence of pay-for-CSR-performance and high CSR investments, investors' stock price assessments are greater only when assurance is also present. |
| Cheng, M.M., Green, W.J. and Ko, J.C.W. | The Impact of Strategic Relevance and Assurance of Sustainability Indicators on Investors Decisions. | 2015 | Determining the impact of strategic relevance and assurance of sustainability reports on investment decisions. | 2x2 between-subjects experimental survey. The first experiment manipulates strategic relevance and assurance. The second strategic alignment of ESG indicators and assurance. | 128 students of international business schools from Australia (2012) | Investors are more willing to invest in a company when their sustainability reports are assured and when the reports align with the company's strategy. |
| Gürtürk, A. And R. Hahn | An Empirical Assessment of Assurance Statements in Sustainability Reports: Smoke Screens or Enlightening Information? | 2015 | Examine the quality of sustainability reports as well as the similarities and differences between assurance statements and sustainability reports. | Deductive content analysis. Categories were developed from literature to apply to the assurance statements in the sample. | 61 assurance statements from Germany and the UK (2013) | Coercive tendencies in sustainability reports exist. Non-accountants have a more diversified method and have a slightly higher score in assurance quality. Auditors tend to follow ISAE3000 more than AA1000AS. |
| KPMG | The KPMG Survey of Corporate Responsibility Reporting 2015. | 2015 | To gather data regarding the quality and quantity of sustainability reporting | Survey (further details unspecified) | 4500 firms from 45 countries around the world (2015) | Data on frequency and quality of sustainability reporting |

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|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Peters, G.F. and Romi, A.M. | The Association between Sustainability Governance Characteristics and the Assurance of Corporate Sustainability Reports. | 2015 | Determining whether sustainability-oriented corporate governance structures impact the voluntary assurance on sustainability reports. | Logistic regression model measuring the likelihood of a firm to hire an assurance provider. Incorporates several corporate governance variables. | 912 observations from the US (2002-2010) | When companies have a Chief Sustainability Officer, they are more likely to adopt assurance on sustainability reports. |
| DeFond, M. and Zhang, J. | A Review of Archival Auditing Research. | 2014 | Providing a framework for systematically evaluating the strengths and weaknesses of different measures of audit quality. | Theoretical paper | | The authors provide a framework with four dimensions (directness, egregiousness, actual-or-perceived and measurement issues) that can be used to determine which audit quality measure to use |
| Matsumura, E.M., Prakash, R. and Vera-Munoz, S.C. | Firm-value Effects of Carbon Emissions and Carbon Disclosures. | 2014 | Examining the effect of carbon emissions and the act of voluntary disclosing carbon emissions on firm value | Balance sheet valuation model to assess the firm value for different values of carbon emissions. The probability of disclosure is measured using a logistic regression including several firm-characteristics | 550 firm-year observations from the S&P 500 index (2006-2008) | For every thousand metric tons of emissions, firm value decreases 212.000 dollars. Investors impose further penalties on firms that do not disclose these figures |
| Zorio, A., García-Benau, M.A., Sierra, L. | Sustainability Development and the Quality of Assurance Reports: Empirical Evidence. | 2013 | Investigating the determinants for corporate social responsibility reporting, assurance on the reports and the type of assurance provider. In addition, they provide a quality measure to address CSR reporting quality. | Logit regression to explain the sustainability reporting decision based on industry, IBEX-35 membership, size, profitability and leverage. | 690 observations from Spain (2005-2010) | CSR reports are of sufficient quality. In addition, the authors show that industry, IBEX-35 inclusion and whether the annual report is audited by Big 4 determines CSR reporting. These factors determine the assurance decision and type of assurer as well. |
| Berthelot, S., Coulmont, M. and Serret, V. | Do Investors Value Sustainability Reports? A Canadian Study. | 2012 | Investigate whether investors value sustainability reports in Canada by looking at the market value through the Ohlson model | Ohlson model of valuation that integrates the publication of a sustainability report in the valuation of a company. | 146 firm-year observations from Canada (2007) | Investors attach a positive value to the publication of sustainability reports. |

| | | | The research compares valuations of companies with or without the publication of a sustainability report. | | |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manetti, G. and Toccafondi, S. | The Role of Stakeholders in Sustainability Reporting Assurance. | 2012 | Understand whether stakeholders are significantly consulted during sustainability assurance processes | 161 firm-year observations from the UK, Spain and Germany (2009) | Stakeholders are increasingly involved in the assurance process. However, full stakeholder engagement is hindered and the quality of assurance statements can be improved by fully adhering to the wishes from stakeholders. |
| Moroney, R., Windsor, C. and Aw, Y.T. | Evidence of Assurance Enhancing the Quality of Voluntary Environmental Disclosures: an Empirical Analysis. | 2012 | Examine whether the quality of voluntary environmental disclosures is enhanced when assured and whether the quality differs with type of assurers | 74 firm-year observations from Australia (2003-2007) | Quality of voluntary environmental disclosures is significantly higher for assured companies than unassured companies. The quality does not differ with type of assurer. |
| Perego, P. and Kolk, A. | Multinationals' Accountability on Sustainability: The Evolution of Third-party Assurance of Sustainability Reports. | 2012 | Explore how multinationals adopt sustainability assurance practices and how assurance practices shape the quality of assurance. | 212 firms from the Fortune 500 (1999-2008) | Country level factors are determinant for adopting sustainability assurance. Institutional factors (signals from governments, litigations from legal environment) determine whether a company will adopt assurance. Organizational factors are important as well, since differences within countries exist. |
| Clarkson, P.M., Li, Y., Richardson, G.D. and Vasvari, F.P. | Does It Really Pay to be Green? Determinants and Consequences of Proactive Environmental Strategies. | 2011 | Examining what factors affect firms' decisions to adopt a proactive environmental strategy and whether pursuing proactive environmental strategies lead to improved financial performance | 2376 firm-year observations from the US four most polluting industries (1990-2003) | Firms who choose to improve environmental performance tend to improve their financial resources and management capabilities. In addition, this will lead to real economic benefits as improved ROA and cash flows. |

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|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dillard, J. | Double Loop Learning; or, Just Another Service to Sell: A Comment on "The Case of Sustainability Assurance: Constructing a New Assurance Service". | 2011 | Theoretical outline to the question whether assurance on sustainability reporting is meaningful and whether research on this topic is useful. | Theoretical paper | | The author comments on research on sustainability reporting. The audit techniques are being researched, but the question remains how actors are improving (learning) from engagements. |
| O'Dwyer, B. | The Case of Sustainability Assurance: Constructing a New Assurance Service. | 2011 | Understand how assurance providers have come to construct sustainability assurance practice and how, and the extent to which, these efforts have rendered sustainability reporting auditable | | 36 in-depth interviews from Big4 firms from western Europe (2005-2010) | The nature of sustainability auditing is fragile; the process is characterized by a trial-and-error nature. It is difficult to transfer traditional audit techniques to this new market. Initial attempts to resolve the difficulties relied extensively on tacit knowledge and 'gut feel'. |
| O'Dwyer, B., Owen, D.L. and Uneman, J. | Seeking Legitimacy for New Assurance Forms: The Case of Assurance on Sustainability Reporting. | 2011 | Analyses how the legitimation processes adopted by sustainability assurance providers have co-evolved with and impacted upon the development of the assurance practice | | 14 interviews from a Big4 firm (2002-2006) | The analysis reveals a complex interdependent interplay between different forms of legitimacy. It shows that legitimation strategies are characterized by opening up a dialogue with potential users of assurance and the encouragement of user influence over what is assured. |
| Pflugrath, G., Roebuck, P. and Simnet, R. | Impact of Assurance and Assurer's Professional Affiliation on Financial Analysts' Assessment of Credibility of Corporate Social Responsibility Information. | 2011 | Is financial analysts' assessment of credibility of corporate social responsibility information affected by assurance and assurance provider? | Experimental survey | 106 students from Australia, US and UK (2007) | Financial analysts think assurance adds more credibility to corporate social responsibility reports, especially when given by professional accountants. In addition, the relative impact is context specific, differing among industries and countries. |

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|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Smith, J., Haniffa, R. and Fairbass, J. | A Conceptual Framework for Investigating 'Capture' in Corporate Sustainability Reporting Assurance. | 2011 | Analysis of the process by which 'capture' takes place in sustainability assurance | Theoretical paper | | The authors propose an analysis of the practice aspects of SRA and a political analysis of the organizational process by which capture takes place. It does this by integrating elements of neo institutional theory and the arena concept to propose a conceptual framework for SRA based on an institutional arena. It also suggests the research method to be adopted to test the conceptual framework. |
| Barnea, A. and Rubin, A. | Corporate Social Responsibility as a Conflict Between Shareholders. | 2010 | Test whether increased CSR expenditure is due to firm value maximizations in response to a change in shareholders preferences or that managers seek to overinvest in CSR in order to improve their image of a 'good global citizen'. | | 2649 observations from the US (2003) | Insider ownership is negatively correlated with the firm's social rating, while institutional ownership is uncorrelated. Assuming high CSR rating is associated with high CSR expenditure; insiders induce firms to overinvest in CSR when they bear little of the costs. |
| Cho, C.H., Roberts, R.W. and Patten D.M. | The Language of U.S. Corporate Environmental Disclosure. | 2010 | Test the existence of a self- serving bias present in the language of companies' environmental disclosures | | 190 firms from S&P 500 index (2002) | A self-serving bias can be found in environmental disclosures and this is more evident when environmental performance is worsening. |
| Fonseca, A. | How Credible are Mining Corporations' Sustainability Reports? A Critical Analysis of External Assurance under the Requirements of the International Council on Mining and Metals. | 2010 | Evaluate the quality of assurance provided on reports published by members of the mining industry by analyzing the content. | | 16 companies with ICMM membership (2007) | Several quality problems exist. The extensive scope limitations and diversity of verification criteria employed by assurers indicate that mining companies had significant control over the practice. |

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| Gray, R.H. | Is Accounting for Sustainability Actually Accounting for Sustainability ... And How Would We Know? An Exploration of Narratives of Organizations and the Planet. | 2010 | Initiate an auto-critique of sustainability assurance that leads to a suggestion to improve the accounting for sustainability practice in a more holistic manner | Theoretical paper | | The author proposes that sustainability assurance has to look at more than just the auditing dimension and incorporate other dimensions (environmental, social) as well. |
| Guidry, R.P. and Patten, D.M. | Market Reactions to the First-Time Issuance of Corporate Sustainability Reports: Evidence That Quality Matters. | 2010 | Determine whether market participants value the first issuance of a stand-alone sustainability report. Investigate whether reporting quality is associated with a different market reaction. | Cross-sectional analysis of cumulative abnormal return and the influence of high or low quality reports. | 37 firm-year observations from Australia (2001-2008) | On average, no market reaction is found. However, when the quality of reporting is high, significant positive market reactions are found. |
| Schadewitz, H. and Niskala, M. | Communication Via Responsibility Reporting and Its Effect on Firm Value in Finland. | 2010 | Determining whether communication via responsibility reporting affects firm value | Ohlson model of valuation that integrates the communication via responsibility reporting in the valuation of a company according to investors | 276 firms from Finland (2002-2005) | Responsibility reporting is used in order to decrease information asymmetry. It results in a more precise market valuation of a firm. |
| Hodge, K., Subramaniam, N. and Stewart, J. | Assurance of Sustainability Reports: Impact on Report Users' Confidence and Perceptions of Information Credibility. | 2009 | Determining the added value of assurance on sustainability reports by looking at report users' confidence and perceptions of credibility. | Experimental survey | 145 MBA students from Australia (2008) | Users perceive assured reports to have more credibility. In addition, the type of assurance provider and level of assurance influence users' confidence in the assurance provided. |

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|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manetti, G. and Becatti, L. | Assurance Services for Sustainability Reports: Standards and Empirical Evidence. | 2009 | Illustrate the main international standards for the implementation of assurance services on sustainability and analyze whether published reports are drawn up according to GRI 2006 guidelines. | | 34 firm-year observations from European companies (2007) | The international standards could be improved in effectiveness and reliability by looking at national standards. |
| Perego, P. | Causes and Consequences of Choosing Different Assurance Providers: An International Study of Sustainability Reporting. | 2009 | Investigate the causes and consequences of choosing different assurance providers for sustainability reporting | Several logistic regression models to check the association between type of assurance provider, legal-environment and quality indicators. | 136 companies around the world (2005) | Companies with a weak governance system are more likely to choose a big4 accounting firm. In addition, big4 firms positively affect assurance quality in terms of reporting format and assurance procedures. Quality of recommendations and opinions on sustainability assurance is positively associated with non-accounting assurance providers. |
| Simnet, R., Vanstraelen, A. and Chua, W.F. | Assurance on Sustainability Reports: An International Comparison. | 2009 | Identify factors that are associated with the decision to voluntarily purchase assurance and the choice of assurance provider | | 2113 firms from 31 countries around the world (2002-2004) | Assurance and type of assurance provider is a function of country-, industry-, and company-related factors. Companies that want to build a corporate reputation are more likely to have their reports assured. Companies in stakeholder-oriented countries are more likely to have reports assured. |
| Choi, J. and Wong, T.J. | Auditors' Governance Functions and Legal Environments: An International Investigation. | 2007 | Examine whether a country's legal environment affect the auditors' roles as a bonding mechanism and as a credible signaling device. | | 56885 firm-year observations from 39 countries around the world (1993-1998) | Auditors have a more significant governance role in weak legal environments. |

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| Mock, T.J., Strohm, C. and Swartz, K.M. | An Examination of Worldwide Assured Sustainability Reporting. | 2007 | Investigate which countries and industries are more likely to have an assurance statement, what levels of assurance are provided and what factors affect the level of assurance. | 130 companies around the world (2002-2004) | European firms are more likely to have their reports assured. Companies operating in environmentally sensitive industries all assure their reports. In addition, they found that the key factor associated with the level of assurance is the type of assurance provider. A Big4 auditor generally gives lower levels of assurance. |
| O'Dwyer, B. and Owen, D. | Seeking Stakeholder- Centric Sustainability Assurance. | 2007 | Compare different international standards on assurance services for sustainability reporting and examine reports on their compliance with GRI guidelines. | 51 firm-year observations from Europe and UK (2003) | Stakeholders are not involved in the assurance practice, there is no specification in the assurance statements and audits tend to have serious scope limitations. The introduction of standards like AA1000AS provides improvements on this regard. |
| Deegan, C., Cooper, B.J. and Shelly, M. | An investigation of TBL report assurance statements: UK and European evidence. | 2006 | Document a study of European and UK sustainability reporting | 170 firm-year observations from Europe and UK (2000-2003) | There is much variability and ambiguity within the contents of third-party statements, both between and within countries. Attributes of reports (such as appearance of independence and clarity within the assurance statement) are absent from many of the reports. |
| Gray, R.H. | Social, Environmental and Sustainability Reporting and Organizational Value Creation? Whose Value? Whose Creation? | 2006 | Examine the extent to which social, environmental and sustainability accounting can or should contribute to shareholder value and consider the challenge it can offer in conventional valuation. | Theoretical paper | Modern financial capitalism is essentially designed to maximize environmental destruction. Changes in reporting are necessary, particularly adjustments to include social and environmental reporting models as a first step to begin to expose the extent to which the potential doomsday scenarios are worth of our attention or not. |

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|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Murray, A., Sinclair, D., Power, D. and Gray, R.H. | Do Financial Markets Care About Social and Environmental Disclosure? Further Evidence and Exploration From the UK. | 2006 | Explore whether stock market participants in the UK exhibit any reaction to the social and environmental disclosures. | A Pearson correlation test, a chi-square test and a general linear regression model were used to determine the association between CSR disclosures and share returns. | 660 observations concerning 100 UK companies (1988-1997) | Before 'coding' the data, no relation between the market's reaction and sustainability disclosure was found. After 'coding', company return is associated with the level of certain types of disclosures. |
| Cormier, D., Magnan, M. and van Velthoven, B. | Environmental Disclosure Quality in Large German Companies: Economic Incentives, Public Pressures or Institutional Conditions. | 2005 | Identify determinants of corporate environmental disclosure in a multi- theoretical setting. | | 304 firm-year observations from Germany (1992-1998) | Information costs (risk, reliance on capital markets, trading volume, ownership) are potentially important determinants of a firm's environmental disclosure strategy. |
| O'Dwyer, B. and Owen, D.L. | Assurance Statement Practice in Environmental, Social and Sustainability Reporting: A Critical Evaluation. | 2005 | Critical analysis of assurance statements of sustainability reports | Manually analyzing reports | 81 firm-year observations from UK and other European countries (2002) | Reports are withheld from certain stakeholders; assurance is not independent; different assurance providers have different approaches. |
| Park, J. and Brorson, T. | Experiences of and Views on Third-party Assurance of Corporate Environmental and Sustainability Reports. | 2005 | Explore the development of environmental and sustainability reporting in Sweden and the dynamic behind the decision to introduce third party assurance. | | 28 companies from Sweden (2003) | Assured companies were positive of the provided assurance service. Companies without assurance considered the added credibility not so evident and thought costs were too high. According to the companies, in order to become a lasting service, standards and guidelines must be further developed, stakeholder pressure should increase and the overall benefits of assurance should be more pronounced. |

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| Adams, C.A. and Evans, R. | Accountability, Completeness, Credibility and the Audit Expectations Gap. | 2004 | Discuss the lack of completeness of sustainability reporting and the lack of credibility to these reports. | Theoretical paper | | There is an over-emphasis on the validity of performance data at the expense of addressing completeness and credibility, which require stakeholder involvement. They advocate GRI guidelines and AA1000AS in their view that assurance guidelines need to be developed. |
| Clarkson, P.M., Li, Y. and Richardson, G.D. | The Market Valuation of Environmental Capital Expenditures by Pulp and Paper Companies. | 2004 | Examining the market valuation of environmental capital expenditure investment related to pollution abatement | | 183 firm-year observations from the US pulp and paper industry (1989-2000) | By capitalizing their environmental capital expenditure, future economic benefits arise, leading to increased market valuation. |
| Dixon, R., Mousa, G.A. and Woodhead, A.D. | The Necessary Characteristics of Environmental Auditors: A Review of the Contribution of the Financial Auditing Profession. | 2004 | Reviewing literature related to the contribution of financial auditors to environmental audits and provide a general framework for environmental auditors | Theoretical paper | | Several obstacles are identified that limit auditors' participation in environmental auditing including: accounting education, research in auditing profession, the experience and skills of the financial auditor, professional guidance on environmental matters, lack of environmental data, lack of environmental indicators, professional standards, limited public demand for environmental reports, the need for independent verification. |
| Dando, N. and Swift, T. | Transparency and Assurance: Minding the Credibility Gap. | 2003 | Discuss third party independent assurance to narrow the credibility gap that exists in environmental reporting. | Theoretical paper | | Verification has been of questionable robustness, reliability and consistency. The authors argue that there is a need for universal standards on assurance of social, ethical and environmental reporting. AA1000AS is such a standard. |

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| Gray, R.H. | The Social Accounting Project and Accounting, Organizations and Society. Privileging Engagement, Imaginings, New Accountings and Pragmatism Over Critique? | 2002 | Review the social accounting literature on the formation of new accountings | Theoretical paper | | The formation of new accountings has a need of alternative views, besides influences from conventional accounting. Despite a poor start, social accounting projects are advancing and increasingly informed by alternative/critical projects. |
| Ball, A., Owen, D.L. and Gray, R.H. | External Transparency or Internal Capture? The Role of Third Party Statements in Adding Value to Corporate Environmental Reports. | 2000 | Evaluate the extent to which verification statements appearing in published corporate environmental reports promote organizational transparency and the empowerment of external parties | Theoretical paper | | There is much evidence of auditee control over the process, harming independence. The current verification practice exhibits a managerial turn rather than representing corporate commitment to external transparency. |
| Gray, R.H. | Current Developments and Trends in Social and Environmental Auditing, Reporting and Attestation: A Review and Comment. | 2000 | Provide a personal review of developments in the audits of social and environmental reports. | Theoretical paper | | Accountants have the potential skill to take hold of social and environmental assurance, but they are currently failing to do so, which makes room in the market for new actors such as consultants. Accountants do not apply standards in this field and do not bring in skills, expertise and habits of independence. Education should add more social and environmental accounting in their programs to educate accountants in this new field. |
| Hughes II, K.E. | The Value Relevance of Non-financial Measures of Air Pollution in the Electric Utility Industry. | 2000 | Determining the effect of non-financial pollution measures on the market value of equity | | 46 firms around the world (1986-1993) | Non-financial pollution proxies are value-relevant in high-polluting industries. Investors exact a share price penalty linked to the degree to which emissions are polluted. |

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| Owen, D.L., Swift, T., Bowerman, M. and Humphrey, C. | The New Social Audits: Accountability, Managerial Capture or the Agenda of Social Champions? | 2000 | Evaluate how current assurance providers in sustainability assurance are performing in their audit practices. | | Interviews from the UK (number and sample period unspecified) | The authors evaluate assurance on sustainability reporting and express their concerns about the way assurance providers are currently performing the job. They fear that the social audit becomes just another management fad or the latest product in the management consultant's toolkit. Stakeholder involvement in the audit process raises additional doubts over the credibility of social accounting. |
| Wallage, P. | Assurance on Sustainability Reporting: an Auditor's View. | 2000 | Discuss the initial experiences with verification of sustainability reports | | The Shell Report (2000) | Verification of sustainability reports is very challenging for financial auditors. The author gives examples on characteristics of criteria to test management assertions and provides a description of verification procedures. |
| Power, M. | Expertise and the construction of relevance: accountants and environmental audit. | 1997 | Drawing attention to the construction of an overlap between the skills required for financial and non-financial auditing. | Theoretical paper | Mainly UK | Auditors mainly bring their own expertise in the new area of sustainability assurance. The author argues that this discipline is multidisciplinary, and that besides the auditors, other parties who bring in their own expertise should be involved in the development of assurance in this field. |
| Herremans, I.M., Akathaporn, P. and McInnes, M. | An Investigation of Corporate Social Responsibility Reputation and Economic Performance. | 1993 | Illustrate how companies perform that have better reputations for social responsibility | | (1982-1987) | Companies with better social responsibility outperform companies with poor social responsibility in the market and provided investors with better stock returns. |

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|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gray, R.H. | Accounting and Environmentalism: An Exploration of the Challenge of Gently Accounting for Accountability, Transparency and Sustainability. | 1992 | The article explores what the accounting profession can potentially do for contribution to accountability and transparency in non-financial accounting and the use of current accounting techniques for the operationalization of an accounting for sustainability. | Theoretical paper | | The article explains that accountability and transparency from the accounting profession is necessary for a more sustainable view of business. Current accounting techniques can be used in the operationalization of an accounting for sustainability. |
| Jaggi, B. and Freedman, M. | An Analysis of the Information Content of Pollution Disclosures. | 1982 | Testing the informational content of pollution disclosures by analyzing investors reaction | | 509 firms from the US (1973-1974) | A significant larger proportion of abnormal returns are found for disclosing firms, in particular in the month of disclosure. |
| Anderson, J.C and Frankle, A.W. | Voluntary Social Reporting: An Iso-beta Portfolio Analysis. | 1980 | Assessing the impact of social disclosures on capital markets | | 290 firm-year observations from the Fortune 500 (1971-1972) | The market values social disclosures positively. 'Ethical investors' exist. |
| Ingram, R.W. | An Investigation of the Information Content of (Certain) Social Responsibility Disclosures. | 1978 | Assessing the impact of social responsibility disclosures on security returns | | 287 firm-year observations from Fortune 500 companies (1970-1976) | The information content of disclosures varies across firms. Industry, abnormal earnings and fiscal year all have an impact on the relation between social responsibility disclosures and security returns. |
| Belkaoui, A. | The Impact of the Disclosure of the Environmental Effects of Organizational Behavior on the Market. | 1976 | Determining the effect of disclosing pollution control expenditures on stock market performance | | 50 firms from the US (1970) | Disclosing pollution control expenditures has a significant impact on stock market performance. |

Investors' Valuation of Assurance on Sustainability Reporting

| | | | | | |
|---------------------------|----------------------------------------------------------------|------|--------------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ball, R. and Brown, P. | An Empirical Evaluation of Accounting Income Numbers. | 1968 | Assess the usefulness of accounting income numbers. | US firms (1946- 1966) | Accounting income numbers are useful to investors. The market already incorporates part of the earnings information prior to the announcement and there is a post-announcement drift. |
|---------------------------|----------------------------------------------------------------|------|--------------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Note: The table can be used as a summary of the articles used in the section 'Prior Research. Some fields contain blank spaces, which is mainly due to the theoretical nature of the articles, using no research design or sample data. In addition, some fields are left blank due to unspecified information in the corresponding article.

4. Hypotheses Development

The previous section discussed the relevant research regarding assurance on sustainability reporting. Next, this thesis structures prior literature into an argument, indicating gaps in the literature in order to develop three hypotheses. In doing so, the thesis has moved from a rather broad perspective in the Theoretical Framework, via the more detailed section of Prior Research, to this narrow section that discusses the hypotheses. Hypothesis 1 relates to the effect of sustainability assurance on investors' valuation of company performance. Next the thesis investigates whether different levels of assurance quality influence the investors' valuation of sustainability assurance. It is expected that investors value high quality assurance more than low quality assurance. Therefore, Hypothesis 2 captures the effect of type of sustainability assurance provider on investors' valuation and Hypothesis 3 concerns the effect of assurance standards on investors' decision-making. This section is concluded by a discussion of the validity concerning this research.

4.1. *The Effect of Assurance on Investors' Valuation of Company Performance*

Assurance on sustainability reports is a costly service, so in order for companies to create a demand for this service, the benefits should be greater than the costs. Literature indicated several factors that have shown to explain the demand for assurance. Added credibility and reliability is considered the main factor. The audit of sustainability reports has the potential to identify several reporting errors and management biases in the content. For example, language is often used to promote the reporting company as a responsible player in society, thereby managing stakeholder impressions (Cho et al., 2010). Assurance processes identify whether the language content of reports is backed up by performance or whether these statements are just empty claims. As a result, this leads to increased user confidence and trust in the content of sustainability reports (Hodge et al., 2009; Pflugrath et al., 2011).

Increased confidence is important because investors have shown to value the sustainability performance of companies. From the 1980s onward, companies disclosing sustainability related information experienced a higher stock-market return than their non-disclosing competitors (Murray et al., 2006; Matsumara et al., 2014). However, just disclosing sustainability performance is not enough. Guidry and Patten (2010) found that the reporting quality is of significant importance in the effect of the issuance of sustainability reports and the reaction of the market. It is therefore beneficial for companies to hire

assurance providers to verify the quality of sustainability reports (Moroney et al., 2012). As stated above, assurance adds more credibility and reliability to the report, identifying errors and biases, which results in a report with a higher level of quality. However, the quality of assurance itself has been criticized. For example, assurance providers have been accused of not having the right expertise to perform the job (Gray, 2010). Following this lack of expertise the practice has been characterized by a nature of trial-and-error (O'Dwyer, 2011). Furthermore, in their search for improvements in this practice, assurance providers asked stakeholders, being the final users of the assurance statements, on their opinions of work delivered. While this process provides some indications for improvements, it also seriously harms the independence of the assurance provider. These developments are alarming, since independence is one of the major assets that assurance providers bring into this service.

Contradicting the negative image of sustainability assurance sketched in the previous paragraph, Hodge et al. (2009) and Pflugrath et al. (2011) found in a survey among MBA students that 'investors' perceived assured reports of greater reliability and credibility, compared to reports that did not receive assurance. However, prior research did not pay attention to the effect of assurance on investors' decision-making in the market. A small number of studies looked at investors' perceptions on sustainability assurance in surveys (e.g. Hodge et al., 2009; Pflugrath et al., 2011; Cheng et al., 2015), but none measured the direct effect of investors' actions that follow from their perceptions. This thesis investigates the financial consequences of assurance on sustainability reports in the form of investors' valuation in the market. Although the quality of assurance is doubtful, it is assumed that investors still perceive assurance as beneficial and therefore will react on the market more strongly to reports with an assurance statement than on reports without an assurance statement. The argument above is summarized in the following hypothesis:

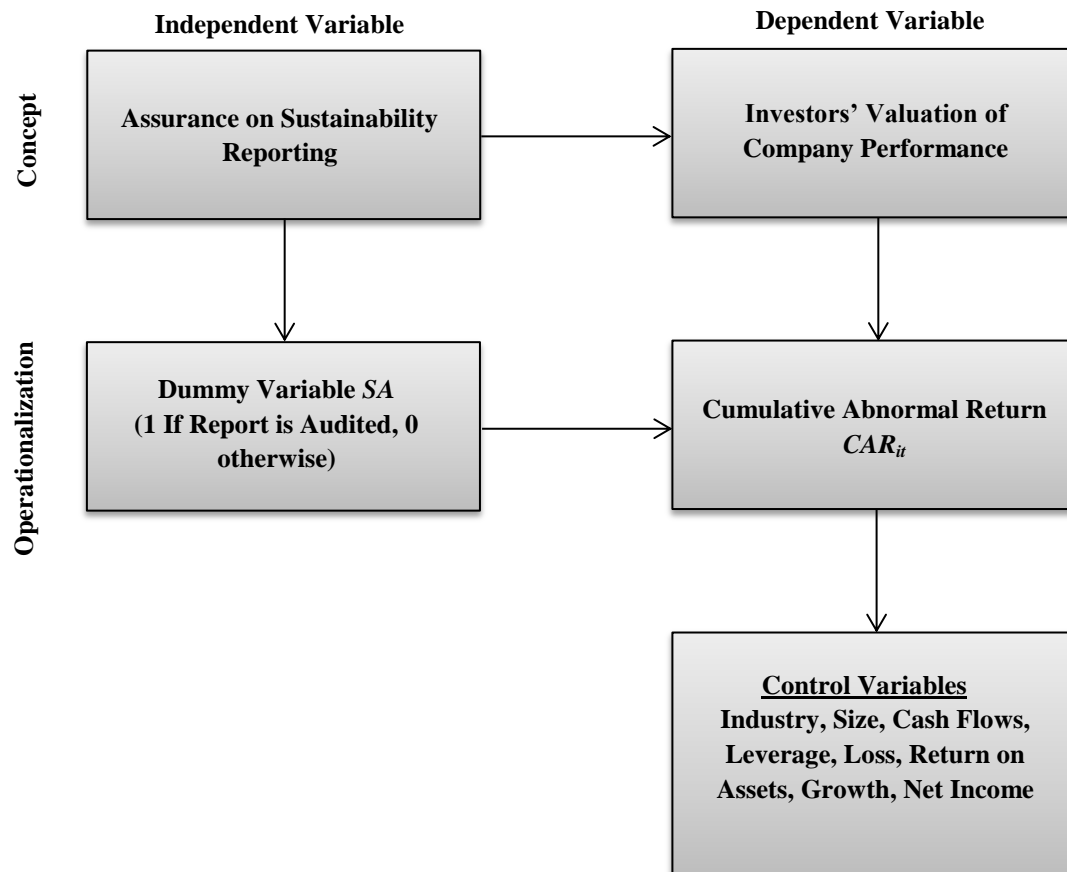
Hypothesis 1: Investors value sustainability reports with an assurance statement higher than sustainability reports without an assurance statement.

Hypothesis 1 addresses the first sub-question: Do investors value sustainability reports that have been assured over sustainability reports that have not been assured? Figure 1 depicts the predictive validity framework of Hypothesis 1. The operationalisation of the independent and dependent variables is discussed in the next section. The variables used to control for any factor that might affect the relation between assurance on sustainability reporting and investors' valuations are discussed in the research method as well.

Figure 1

Predictive Validity Framework of Hypothesis 1:

Investors Value Sustainability reports with an assurance statement higher than sustainability reports without an assurance statement.



Note: The independent variable 'Assurance on Sustainability Reporting' is operationalized using a dummy variable SA, which is 1 if the report is audited by an assurance provider and 0 otherwise. The dependent variable 'Investors' Valuation' is operationalized using the cumulative abnormal return of each company after the date of issuance of the sustainability report. Further explanation is provided in the research design.

While Hypothesis 1 focusses on the investors' valuation of sustainability assurance, it is interesting to investigate whether the quality of assurance has any effect on the relation between the adoption of sustainability assurance and the reaction of the market. Since the assurance quality differs from report to report, it may be the case that investors also value those reports in a different manner. Although Guidry and Patten (2010) investigated the implications of varying levels quality of sustainability reporting on the market's reaction, no prior research has focused on investors' valuation the quality of assurance. Will the market react stronger on assurance reports with a higher quality? Do investors value assured

sustainability reports with better quality higher than reports without assurance? The following two hypotheses try to capture those questions.

4.2. The Effect of Type of Assurance Provider

Assurance is generally provided by two distinct parties: traditional audit firms (e.g. Big Four and smaller audit firms) and non-accountant firms (e.g. environmental consultants, engineering firms). Audit firms generally follow a cautious approach in performing the audit of sustainability reports. They are using their skills and experience from financial audits and apply them to in the field of sustainability assurance: they mostly verify the underlying datasets by checking the reported data for material errors (O'Dwyer and Owen, 2007; Perego and Kolk, 2012). Non-accountant firms take another approach. They tend to focus more on the overall balance of the report, taking fairness and completeness into account as well. This approach uses a wider diversity of verification methods than the approach used by audit firms, including risk analysis, media analysis and controlling for the influence of stakeholders. Investors may therefore perceive assurance from non-accountant firms as having a better quality, since it uses a more holistic approach of verification. Results from Hodge et al. (2009) and Pflugrath et al. (2011) indicate the opposite. According to their research, investors perceive the assurance quality of audit firms as higher. This may not come as a surprise, since auditors have long-time experience in the field of assurance and have an image of a high-quality (financial) assurance provider. In addition, most audit firms are bigger in size than non-accountant firms which give them the benefits of scale efficiencies. Therefore it is expected investors valuation of assurance provided by audit firms are higher than that of non-accountant firms. This manifests itself in the following hypothesis:

Hypothesis 2: Investors value sustainability reports with assurance from audit firms higher than sustainability reports with assurance provided by non-accountant firms.

Hypothesis 2 addresses the second sub-question: Do investors value sustainability assurance provided by a member of the audit profession over non-accountant firms? Figure 2 shows the predictive validity framework for Hypothesis 2.

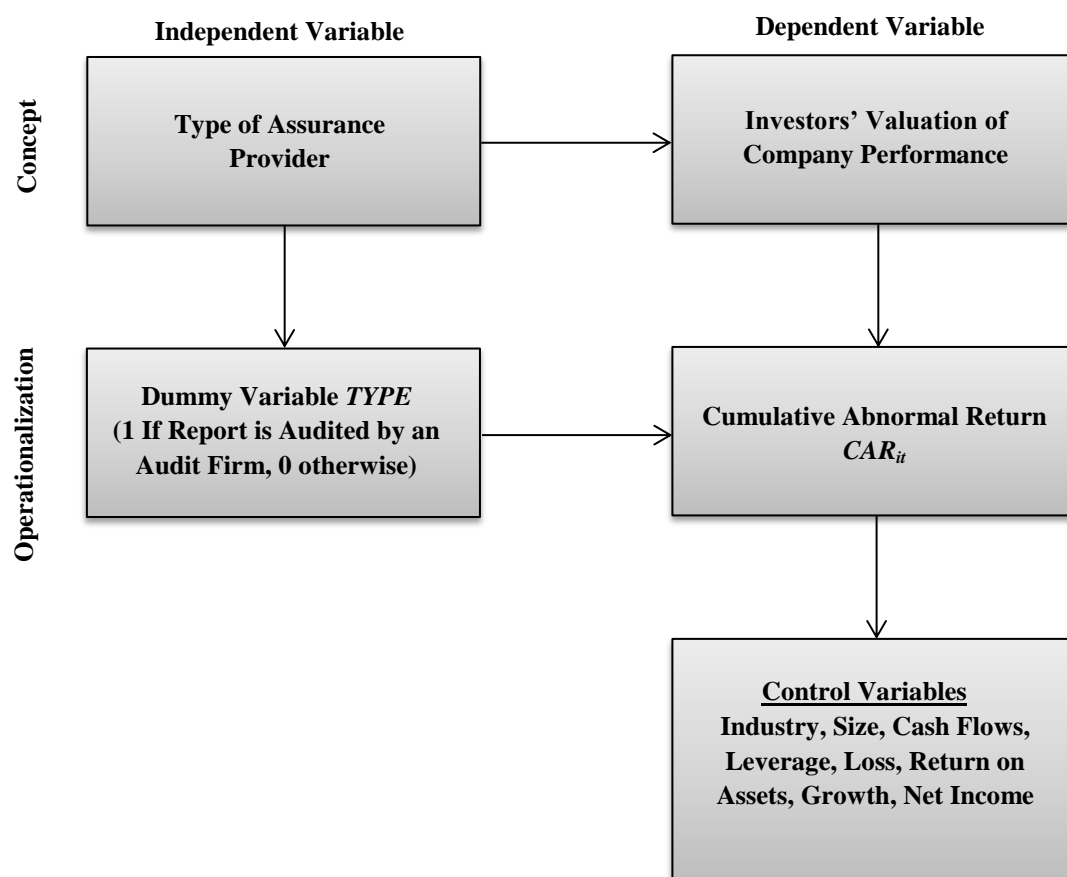
4.3. The Effect of the Use of Standards

Before the establishment of standards, assurance on sustainability reports had a lot of different approaches and accompanying assurance reports differed a lot in content (Deegan et al., 2006). The establishment of ISAE3000 and AA1000AS converged the differences in content and approaches to a more clear practice. Although differences (e.g. the focus on different aspects) between the two standards exist, both improved the quality of the assurance practice in the field of sustainability reporting. It should be noted though, that both standards are not mandatory. Both can be used on a voluntary basis and are intended as a tool for assurance providers in their audit.

Figure 2

Predictive Validity Framework of Hypothesis 2:

Investors value sustainability reports with assurance from audit firms higher than sustainability reports with assurance provided by non-accountant firms.



Note: The independent variable 'Type of Assurance Provider' is operationalized using a dummy variable *TYPE*, which is 1 if the report is audited by an audit firm and 0 otherwise. The dependent variable 'Investors' Valuation' is operationalized using the cumulative abnormal return of each company after the date of issuance of the sustainability report. Further explanation is provided in the research design.

After the original ISAE3000 and AA1000AS standards that were both founded in 2003, several improvements have been made (Manetti and Becatti, 2009). The latest version from ISAE3000 dates from 2013 and AA1000AS received its latest update in 2008. The commitment of standard-setters to update their standards shows their effort to improve the inherent quality of the assurance practice. It is expected that investors value the use of standards in sustainability assurance, which results in the following hypothesis:

Hypothesis 3: Investors value sustainability reports with assurance conducted with AA1000AS or ISAE3000 higher than sustainability reports with assurance conducted without standards.

Hypothesis 3 addresses the third sub-question: Do investors value sustainability assurance conducted following AA1000AS or ISAE 3000 over sustainability assurance conducted without standards? Figure 3 provides the predictive validity framework for Hypothesis 3.

4.4. Validity

Validity is an important concept in academic research. It defines the quality of the research method as it describes the extent to which the research measures what it claims to measure. The paragraphs below discuss the construct validity, internal validity and external validity of the three hypotheses in this research.

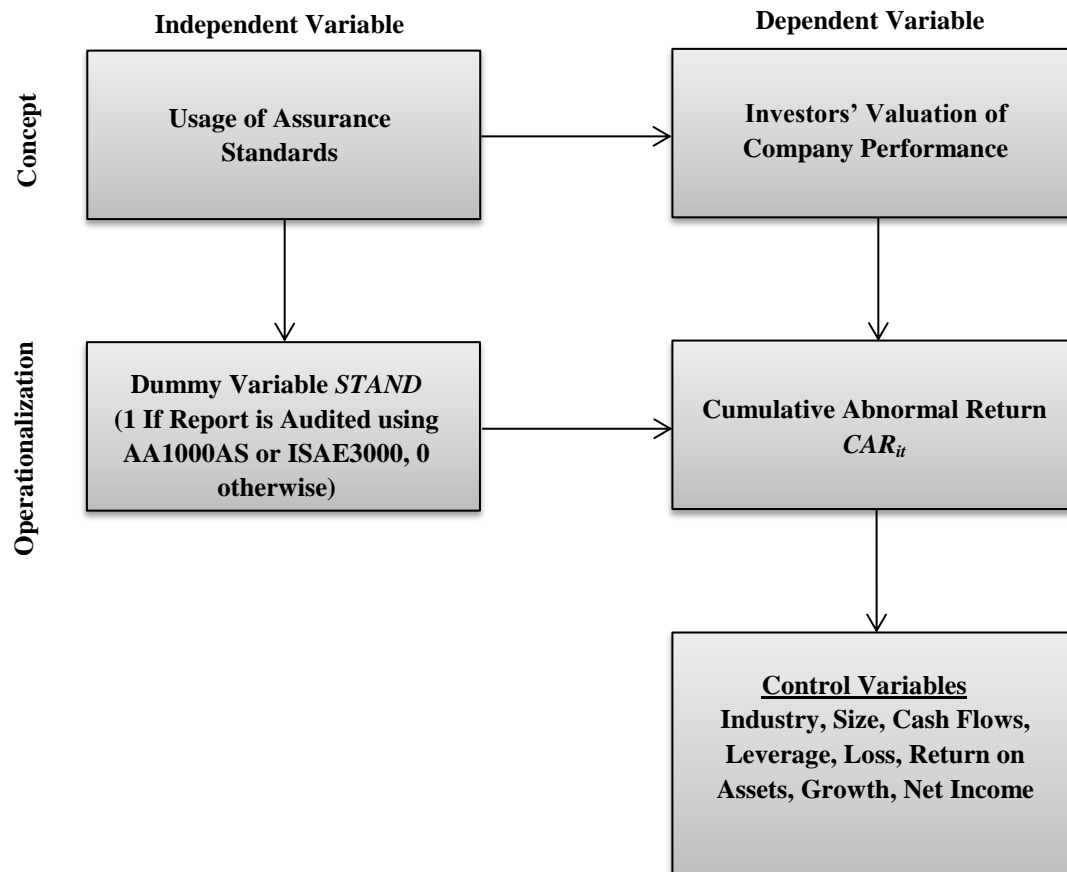
4.4.1. Construct Validity

Construct validity is the extent to whether the operationalized variables accurately measure the underlying construct. Since the independent constructs 'Assurance on Sustainability Reporting', 'Type of Assurance Provider' and 'Usage of Standards' are all operationalized using dichotomous variables, the construct validity is considered high for these constructs. The construct validity for Investors' Valuation however is not so evident. Investors valuation of a company's stock is measured using the cumulative abnormal return of that company, which has been used in prior research in this field (Guidry and Patten, 2010; Matsumura et al., 2014). This variable is the market return on a stock and is therefore based on investors' buy-and-sell decisions. These decisions reflect the value that investors put to different events influencing the company's performance. However, cumulative

Figure 3

Predictive Validity Framework of Hypothesis 3:

Investors value sustainability reports with assurance conducted with AA1000AS or ISAE3000 higher than sustainability reports with assurance conducted without standards.



Note: The independent variable 'Usage of Assurance Standards' is operationalized using a dummy variable *STAND*, which is 1 if the report is audited using AA1000AS or ISAE3000 and 0 otherwise. The dependent variable 'Investors' Valuation' is operationalized using the cumulative abnormal return of each company after the date of issuance of the sustainability report. Further explanation is provided in the research design.

abnormal stock return is just a proxy and does not directly measure investors' valuation. Nonetheless, since it's a proxy that is often used in prior research (as early as Ball and Brown, 1968) and considering it measures investors' buy-and-sell decision-making, 'Investors Valuation' is deemed to have a medium to high construct validity.

4.4.2. Internal Validity

Internal validity concerns the degree to which causal relations can be drawn between the independent and dependent variable. Generally speaking, internal validity is considered of a high degree when research is conducted in a controlled environment, without influences

from the outside world. In this research setting, internal validity of the research is determined by the degree to whether the cumulative abnormal return of a company is open to other factors than the independent variables. Although the research design controls for several factors, other factors could have a possible influence on the relation between the independent variables and the cumulative abnormal return. Since this research is not a fully controlled experiment, but it does incorporate several control variables, the internal validity is considered medium.

4.4.3. External Validity

External validity is the degree to whether the results of the research are generalizable and hold in other circumstances in the outside world as well. This research is conducted only for countries with a system of German civil law, as they operate in a stakeholder-oriented environment, which has its implications for the generalization to other countries. Country specific circumstances could influence the results; using data from different countries could therefore alter the outcomes of this research significantly. In addition, this research uses several control variables, which makes a comparison to real-life circumstances difficult. Therefore, the external validity is considered to be low.

4.5. Summary

This section developed three hypotheses that are tested in the subsequent sections. The first hypothesis follows the discussion concerning the benefits of assurance and the investors' valuation of sustainability performance. Hypothesis 1 was formulated as: Investors value sustainability reports with an assurance statement higher than sustainability reports without an assurance statement. Hypothesis 2 and 3 test whether the quality of assurance matters from an investors' point of view. Hypothesis 2 tests for the type of assurance provider and is formulated as follows: Investors value sustainability reports with assurance from audit firms higher than sustainability reports with assurance provided by non-accountant firms. The assurance from audit firms is considered of being of better quality because of their long-time experience, scale efficiencies and high-quality image. Hypothesis 3 tests whether standards have implications for the investors' valuation of sustainability assurance. It is formulated as: Investors value sustainability reports with assurance conducted with AA1000AS or ISAE3000 higher than sustainability reports with assurance conducted without standards. Both standards have proven to improve the quality of assurance.

The last parts of this section discussed the validity of this research. The construct validity is deemed to be medium to high: the dependent variables measure what they intent to measure, although the independent variable is a proxy and not a direct method of measuring investors' valuation of company performance. The internal validity is considered medium. The research is conducted in a controlled environment, however, other factors could still have a possible influence. The external validity is considered to be low. To add control variables is beneficial for the internal validity of this research, but harms the external validity: it makes the research less comparable to real-life circumstances. In addition, the research uses just five countries in the sample, which further harms the external validity.

5. Research Design

This section outlines the research design used to test the hypotheses that were formulated in section 4 of this thesis. Specifically, the research is conducted through an event study, which captures the effect of the publication of a sustainability report on the cumulative abnormal return (*CAR*) of a company's stock. After the *CAR* values have been obtained, a Spearman correlation matrix is constructed and three ordinary least squares (OLS) regressions are performed to test each of the three hypothesis. This section starts with a description of the sample, followed by a discussion of the event study, Spearman correlation and OLS-regression.

5.1. Sample Selection

Data regarding sustainability reports has been gathered from the Global Reporting Initiative Database. The initial database started out with 1,571 firm-year observations from publicly listed companies in Austria, Germany, Japan, South-Korea and Switzerland from 2012 till 2015. The period 2012-2015 includes sustainability reports from 2011 till 2014 that were issued in the subsequent year. This period of time is selected because it provides the most recent data and multiple years are analyzed in order to create a bigger sample. The year 2016 was excluded for the absence of data in the dataset. This database includes the name of the company, country of origin, reporting standard used, the use of external assurance, type of assurance provider and assurance standard used. The publication date of sustainability reports in the database is collected by hand. Since this research focus is specifically on separate sustainability reports, 670 firm-year observations were dropped, because these reports were integrated in annual reports. Further, not every report shows a publication date, as a result another 436 firm-year observations were dropped.

Data regarding the *CAR* have been gathered from DataStream using the DataStream Event Study Tool which provides the abnormal returns for the period 2012-2015 using a seven-day event window and an estimation window of 120 days. Data on the control variables have been gathered from the Compustat Global database. The *CAR* and control variables of 283 firm-year observations could not be extracted; as a result, these observations were dropped and since some control variables had missing observations which had to be removed, the final sample consists of 153 firm-year observations. This sample is used to predict Hypothesis 1. Hypotheses 2 and 3 focus specifically on sustainability reports that have been assured, therefore, from the previous sample 72 observations were removed,

TABLE 2

Sample Selection Procedure

| <i>Selection Criteria</i> | <i>Observations</i> |
|----------------------------------------------|---------------------|
| Starting sample from 1/1/2012 – 31/12/2015 | 1,571 |
| Less: Reports issued with annual report | 670 |
| Missing publication date | 436 |
| Missing <i>CAR</i> and control variable data | 283 |
| Firm-year observations (H1) | 153 |
| Less: Reports without assurance | 72 |
| Firm-year observations (H2 and H3) | 81 |

The sample starts with 1,571 firm-year observations collected from publicly listed companies from Austria, Germany, Japan, South-Korea and Switzerland in the four-year period 2012-2015. After controlling for the publication of annual reports, missing publication dates and missing *CAR* and control variable data, 153 firm-year observations remain, which are used to test Hypothesis 1. For Hypothesis 2 and 3, reports without assurance are removed, resulting in a final 81 firm-year observations.

since those reports were not assured by a third party. Table 2 shows how the data is processed.

5.2. Methodology

The effect of the presence of assurance statement in a sustainability report on investors' valuation of company performance is determined using an event study. The event study measures the impact of an event on the market valuation of a firm. Basically, the market valuation is measured using *CAR* that is attributed to the event in question. The abnormal return is estimated by first determining the normal return, using an estimation window of a number of days before the event. Subsequently, the market return surrounding the event date is determined. The difference between the market return and the normal return is the abnormal return, as depicted in formula (1): it measures the deviation from the normal market valuation that is attributed to the specific event.

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{it}^M) \quad (1)$$

Where:

AR_{it} = The abnormal return for company i at time t , measured as the difference between the daily stock return and the normal market return.

R_{it} = The daily stock return (closing price) at time t for company i in the event window.

α_i = The market model intercept for company i .

β_i = The beta-coefficient of the market return, which is different for each company i depending on its characteristics.

R_{it}^M = The market return at time t for company i in the event window.

CAR is the sum of all abnormal returns for a company in the seven-day event window as is depicted in formula (2).

$$CAR_{it} = \sum_{t=1}^7 AR_{it} \quad (2)$$

Where:

CAR_{it} = The cumulative abnormal return for company i at time t .

AR_{it} = The abnormal return for company i at time t , measured as the difference between the daily stock return and the normal market return.

In this research an estimation window of 120 days is used, as well as a seven-day event window. The event date is defined as the publication date of the report, CAR being the sum of the abnormal return on the three days prior to the publication, the publication date and the three days after the publication. In this thesis, the outcome of this formula depicts how investors' valuation of company performance changes after the publication of a sustainability report relative to the company's normal performance.

5.2.1. Spearman correlation matrix

The event study measures the impact of the publication of a sustainability report on the market valuation of a company using CAR . A Spearman correlation is a measure that describes the dependence of two variables. The Spearman correlation coefficient is a number from -1 to 1 which indicates how well two variables correlate. The closer to -1 or 1, the more perfect the variables correlate, while a correlation coefficient of 0 means no correlation at all. A Spearman correlation matrix is performed, as a first indication of association between the variables in Hypothesis 1, 2 and 3. An explanation of the variables follows in the next section.

5.2.2. OLS-regression

Although CAR provides the modification in market valuation of a company that can be attributed to the publication of a sustainability report and the Spearman correlation tests for the association of the effect, it does not conclude that this association is significant or if the

two variables are in fact unrelated. An OLS-regression is used to draw a conclusion on the significance of an association between two variables. An OLS-regression creates a linear regression line based on a number of observations. In doing this, it tries to estimate and minimize the residuals between the observations and the regression line. The significance of an association between two variables depends on the distance between n observations and the regression line (the absolute value of the residuals), where a bigger distance means a larger difference between the observation and the expected value of that observation, indicating whether observations can be predicted. Generally, an OLS-regression has four assumptions that need to be verified in order to ensure that the results are robust. The assumptions include: autocorrelation, normality of residuals, homoscedasticity and multicollinearity. Statistical tests to check whether the model meets the assumptions are performed, their results described in section 6,5.

5.2.2.1. Control Variables

This research investigates the association between the presence of an assurance statement in sustainability reports and the market valuation of the firm. However, a lot of factors could influence this relation and excluding them in this research could imply that *CAR* is wrongfully attributed to the presence of assurance on sustainability reporting, thereby harming the internal validity of this research. Therefore, several control variables are added to rule out their possible influence on the relation between the independent and dependent variable. The below stated control variables are often included in research using OLS-regressions involving *CAR* (e.g. Guidry and Patten, 2010; Berthelot et al., 2012; Matsumura et al., 2014)

As stated before, this research already takes into account the effect of the publication of the annual report by ensuring an alternative publication date. In addition, firm-size could influence the relation between assurance on sustainability reporting and the market valuation: on average, bigger companies usually outperform smaller companies in the market (Guidry and Patten, 2010). As a proxy for firm-size, this research includes *SIZE* as the natural logarithm of total assets. In addition, *GRWTH* is included as the absolute change in total assets to account for the effect of actual change in size over the time period of one year (Mitra, 2007).

Second, investors of companies operating in socially exposed industries¹ are more interested in the sustainability performance of their companies since it has a bigger effect on the overall performance of the company (Guidry and Patten, 2010). It is expected that these investors react more to the publication of an assured sustainability report than investors of companies that do not operate in socially exposed industries. A dummy variable *IND* that is equal to 1 when a company is a member of a socially exposed industry and 0 otherwise is included to control for this effect.

Third, investors of companies that incurred a loss might not value the sustainability performance of a company, since their first interest would be the financial performance of a company. When a company incurred a loss, the investors might not care about sustainability related information anymore. It thereby influences the relation between the assurance of sustainability reports and the market valuation (Berthelot et al., 2012). Therefore, a dummy variable *LOSS* that is equal to 1 when a company incurred a loss and 0 otherwise is included.

The relation could be affected by the leverage ratios of companies as well. Generally, investors have more influence in companies that hold low leverage ratio's opposed to high leverage ratios where debtors are to be reckoned with (Matsumura et al., 2014). The leverage ratio *LEV* is defined as total liabilities divided by total shareholders' equity and is included in the OLS-regression as a control variable.

Next, operating cash flow is included in this OLS-regression as a control variable. Frankel et al. (2002) argue that firms with a relatively high level of operating cash flows could have more means to hire an assurance provider. *OCF* measures the absolute value of operating cash flows and is included in the OLS-regression.

ROA is included as a measure for accounting performance, defined as net income divided by total assets at year-end (Frankel et al. 2002). Better performing companies often show a higher abnormal return in the market. For the same reasons, *INC* is included, defined as net income. Controlling for both variables eliminates the possibility that *CAR* would be influenced by firm performance

5.2.2.2. OLS-regression analysis Hypothesis 1

Hypothesis 1 is tested using an OLS-regression analysis with *CAR* as dependent variable and a dummy variable *SA* as independent variable. The OLS-regression for this hypothesis is shown in OLS-regression (1).

¹ Following Brammer and Millington (2005) socially exposed industries are those that operate in the chemical, extractive, paper, pharmaceutical, alcoholic beverage or defense industries.

$$CAR = \alpha_0 + \beta_1 SA + \beta_2 IND + \beta_3 SIZE + \beta_4 OCF + \beta_5 LEV + \beta_6 LOSS + \beta_6 ROA + \beta_6 GRWTH + \beta_6 INC + \varepsilon \quad (1)$$

SA is equal to 1 when a sustainability report is published with an assurance statement and 0 otherwise. Recall that Hypothesis 1 predicts that investors value sustainability reports with an assurance statement higher than sustainability reports without assurance. Following that *CAR* is used as a proxy to measure the company valuation of investors, Hypothesis 1 predicts that β_1 is positive and significant, indicating that the publication of a sustainability report that includes an assurance statement has a positive significant effect on investors valuation of a company opposed to the publication of a sustainability report without an assurance statement.

5.2.2.3. OLS-regression analysis Hypothesis 2

In order to test whether investors value sustainability reports with assurance from audit firms higher than sustainability reports with assurance provided by non-accountant firms, the sample is reduced to only include reports with an assurance statement. The hypothesis is tested using an OLS-regression including *CAR* as dependent variable. The independent variable is the dummy variable *TYPE* and the OLS-regression includes the same control variables as the OLS-regression for Hypothesis 1. OLS-regression (2) shows the OLS-regression for Hypothesis 2.

$$CAR = \alpha_0 + \beta_1 TYPE + \beta_2 IND + \beta_3 SIZE + \beta_4 OCF + \beta_5 LEV + \beta_6 LOSS + \beta_6 ROA + \beta_6 GRWTH + \beta_6 INC + \varepsilon \quad (2)$$

TYPE equals 1 when assurance is provided by an audit firm and 0 otherwise. Hypothesis 2 predicts a positive and significant β_1 , which indicates that sustainability assurance given by an audit firm has a positive significant effect on investors' valuation of a company opposed to sustainability assurance provided by a non-accountant firm.

5.2.2.4. OLS-regression analysis Hypothesis 3

Hypothesis 3 uses the same *SA*=1 sample as Hypothesis 2 and predicts that investors value sustainability reports with assurance conducted with AA1000AS or ISAE3000 higher than sustainability reports with assurance conducted without standards. The investors'

valuation of a company is measured using *CAR* as the dependent variable in the OLS-regression. *STAND* is the independent variable that is included to measure the use of standards in the assurance service. OLS-regression (3) shows the OLS-regression analysis for Hypothesis 3.

$$CAR = \alpha_0 + \beta_1 TYPE + \beta_2 IND + \beta_3 SIZE + \beta_4 OCF + \beta_5 LEV + \beta_6 LOSS + \beta_6 ROA + \beta_6 GRWTH + \beta_6 INC + \varepsilon \quad (3)$$

STAND equals 1 when the assurance provider has used AA1000AS or ISAE3000 in the assurance service and 0 otherwise. Hypothesis 3 predicts a positive and significant β_1 , indicating that the use of standards AA1000AS or ISAE3000 has a positive and significant effect on investors valuation of company performance, opposed to assurance services that do not make use of those standards. All variables in that are used in the OLS-regressions for Hypothesis 1, 2 and 3 are defined in Table 3.

TABLE 3
Variable Definitions

| <i>Variable</i> | <i>Definition</i> |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CAR</i> | Cumulative Abnormal Return, the market model abnormal return for a specific company during the seven days surrounding the publication of a sustainability report. |
| <i>SA</i> | Sustainability Assurance, a dummy variable being equal to 1 when a sustainability report has an assurance statement and 0 otherwise. |
| <i>TYPE</i> | Type of assurance provider, a dummy variable being equal to 1 when a sustainability report is verified by an audit firm and 0 otherwise. |
| <i>STAND</i> | The use of standards, a dummy variable being equal to 1 when a sustainability report is verified using AA1000AS or ISAE3000 and 0 otherwise. |
| <i>IND</i> | Industry, a dummy variable begin equal to 1 when the firm is a member of a socially exposed industry. Socially exposed industries are: chemical, extractive, paper, pharmaceutical, alcoholic beverage or defense industries. |
| <i>LOSS</i> | Indicates whether a firm incurred a loss that particular year, a dummy being equal to 1 when a firm incurred a loss and 0 otherwise. |
| <i>TA</i> | Total Assets, defined as the natural logarithm of total assets at the end of a company's book year. |
| <i>OCF</i> | Operating Cash Flows, defined as the natural logarithm of the operating cash flows of a company at the end of the book year. |
| <i>LEV</i> | Leverage, defined as the ratio of total liabilities and total shareholder's equity at the end of a company's book year |
| <i>ROA</i> | Return on Assets, defined as the natural logarithm of the ratio of net income and total assets at the end of a company's book year. |
| <i>GRWTH</i> | Growth of the company, defined as the absolute difference of assets between year <i>t</i> and <i>t-1</i> . |
| <i>INC</i> | Net income, the net income of a company. |

CAR is the dependent variable; *SA*, *TYPE* and *STAND* are the independent variables; *IND*, *LOSS*, *TA*, *OCF*, *LEV*, *ROA*, *GRWTH*, *INC* in OLS-regression (1), (2) and (3).

5.3. Summary

This section outlined the research design used to investigate the research question: ‘Do stock market investors value the presence of an assurance statement in sustainability reports?’ The general approach is the use of an event study, where the effect of the publication of a sustainability report with and without an assurance statement on the market’s valuation of a company is being analyzed. With the *CAR* values that follow the event, three OLS-regressions are performed in order to test the three hypotheses. The first OLS-regression that tests Hypothesis 1 uses *SA*, a dummy variable being equal to 1 when a sustainability report has an assurance statement and 0 otherwise, as independent variable. The second OLS-regression tests Hypothesis 2 using *TYPE* as independent variable, which is also a dummy variable being equal to 1 when the assurance service is performed by an audit firm and 0 otherwise. The third OLS-regression is performed to test Hypothesis 3 and includes *STAND* as independent variable, a dummy variable which equals 1 when standards AA1000AS or ISAE3000 are used in the assurance service and 0 otherwise. Finally, several additional checks are performed to ensure that the results are not misleading. Statistical tests to check for linearity, normality of residuals, homoscedasticity and multicollinearity all serve this purpose.

6. Results

This section presents the results of the described method of research that was outlined in the previous section. It starts with a description of the different variables used in the OLS-regressions in order to provide a quick overview on the quality of the sample. Then, one by one, each hypothesis is discussed using a Spearman correlation matrix and the output of the OLS-regression. Since the OLS-regression follows several assumptions in order to draw clear, unbiased conclusions out of the output, several additional tests are performed to check for the assumptions underlying the OLS-regression: 1) normal distribution of estimated errors, 2) homoskedasticity of the error variance, 3) multicollinearity of variables and 4) autocorrelation.

6.1. Descriptive statistics

Table 4 presents the descriptive statistics of the variables used in the main OLS-regressions of this research. The descriptive statistics for the total sample are depicted under Sample Hypothesis 1. The sample is further broken down to create a sample where $SA=1$ for testing Hypothesis 2 and 3. What becomes clear is that the average CAR for the companies in both samples is slightly negative with mean CAR values of -0.007 and -0.008 , indicating that on average the investors valued the company negatively during the 7 days surrounding the event date. Companies in the total sample have a probability of 53,5% to hire an assurance provider to verify the content of their sustainability reports, which is in line with previous reports from KPMG (2015). When a company decides to hire an assurance provider, audit firms have a probability of 69,9% of being selected. Apparently, the companies in the sample agree with the benefits of quality that audit firms have over non-accountant firms that have been outlined in section 3 and 4. In addition, assurance providers have a probability of 67,5% to use standards in their work, which indicates their apparent contribution to the assurance providers' work. The sample where $SA=1$ seems to have a less even distribution than the total sample which becomes evident through the higher standard deviations reported for the latter. Whether this holds implications for the assumptions of the OLS-regression is tested in section 6.5.

6.2. Results Hypothesis 1

The results for Hypothesis 1 are presented in two stages. First a Spearman correlation matrix indicates the correlation of the dependent and independent variable, which provides a first indication of the expected association. Next, an OLS-regression indicates whether this

TABLE 4
Descriptive statistics

| <i>Variable</i> | <u>Total Sample</u> | | | | | <u>Sample SA=1</u> | | | | |
|-----------------|---------------------|-------------|------------------|-------------|-------------|--------------------|-------------|------------------|-------------|-------------|
| | <i>Obs.</i> | <i>Mean</i> | <i>Std. Dev.</i> | <i>Min.</i> | <i>Max.</i> | <i>Obs.</i> | <i>Mean</i> | <i>Std. Dev.</i> | <i>Min.</i> | <i>Max.</i> |
| <i>CAR</i> | 153 | -0.007 | 0.027 | -0.089 | 0.088 | 81 | -0.008 | 0.034 | -0.089 | 0.088 |
| <i>SA</i> | 153 | 0.535 | - | 0 | 1 | - | - | - | - | - |
| <i>TYPE</i> | - | - | - | - | - | 81 | 0.699 | - | 0 | 1 |
| <i>STAND</i> | - | - | - | - | - | 81 | 0.675 | - | 0 | 1 |
| <i>IND</i> | 153 | 0.110 | - | 0 | 1 | 81 | 0.120 | - | 0 | 1 |
| <i>SIZE</i> | 153 | 11.159 | 3.204 | 5.649 | 18.924 | 81 | 11.682 | 3.274 | 5.649 | 18.924 |
| <i>OCF</i> | 153 | 134,398 | 461,385 | -505,453 | 3,375,248 | 81 | 198,291 | 610,855 | -505,453 | 3,375,248 |
| <i>LEV</i> | 153 | 1.842 | 1.334 | 0.033 | 7.920 | 81 | 2.260 | 1.545 | 0.033 | 7.920 |
| <i>LOSS</i> | 153 | 0.116 | - | 0 | 1 | 81 | 0.193 | - | 0 | 1 |
| <i>ROA</i> | 153 | 0.038 | 0.038 | -0.071 | 0.178 | 81 | 0.030 | 0.043 | -0.071 | 0.178 |
| <i>GRWTH</i> | 153 | 382,266 | 2,094,911 | -358,371 | 1.81e+7 | 81 | 688,745 | 2,833,250 | -358,371 | 1.81e+7 |
| <i>INC</i> | 153 | 152,193 | 883,257 | -717,807 | 6,417,303 | 81 | 265,951 | 1,197,208 | -717,807 | 6,417,303 |

Descriptive statistics of the variables including mean, standard deviation, minimum and maximum. The descriptive statistics are divided into 2 categories, the leftmost column depicting the sample testing Hypothesis 1, the rightmost column lists the statistics for the sample testing Hypothesis 2 and 3 where SA=1. All variables, excluding the dependent variable *CAR* and the dummy variables *SIZE*, *TYPE*, *STAND*, *IND* and *LOSS* are winsorized at the 1st and 99th percentile. Standard deviations for dummy variables are not presented since these variables follow a binomial distribution and therefore do not hold any useful information.

association is in fact significant as well as the direction and magnitude of the coefficient estimate. Recall that Hypothesis 1 is formulated as:

Hypothesis 1: Investors value sustainability reports with an assurance statement higher than sustainability reports without assurance.

The variable of interest is *SA*, which indicates whether a sustainability report contains an assurance statement. To test Hypothesis 1, a Spearman correlation is performed to identify whether an association of *SA* with *CAR* exists. The results of this test are presented in Table 5 Panel A. The Spearman correlation matrix shows a small correlation of 0.024 between *SA* and *CAR*. In line with the expectations under Hypothesis 1, the direction of the relation is positive, implying that the fact that a sustainability report has been assured by a third party holds positive implications for investors' valuation of company performance. A noteworthy issue is that the correlation between variables *OCF* and *INC*, *SIZE* and *INC* and *SIZE* and *OCF* are rather high, although not worrisome yet. Additional tests in section 6.5 investigate this issue to further degree.

To further investigate the relation between *SA* and *CAR*, an OLS-regression is performed. The results of the OLS-regression are presented in Table 6. The adjusted R^2 of the model, which explains how well the model predicts independent variable *CAR*, is reported as 0.033. This value is not very high, although this field of research does not report high adjusted R^2 in general (e.g. Guidry and Patten (2010) report an adjusted R^2 of 0.068; Murray et al. (2006) report an adjusted R^2 of 0.104). Recall that the coefficient-estimate β_1 of the OLS-regression shows the relation between *SA* and *CAR*. In the model the β_1 is slightly positive, which is in line with Hypothesis 1. However, the coefficient-estimate is not significant on any level, with a p-value of 0.905. Following these results, Hypothesis 1 is rejected.

Contradicting the expectations of the previous section, control variables *IND*, *LEV*, *LOSS* and *ROA* are not significant in this model. *SIZE* and *INC* are significant and positively related to *CAR*, which is in line with the expectations. *OCF* and *GRWTH* are significant, but show a negative relation with *CAR*, contradicting the expectations. A possible explanation is that investors expected the growth of the company and the operating cash flows to be higher in that particular year. However, an exact explanation of the observed effect goes beyond this thesis.

TABLE 5
Spearman Correlation Matrix

| Panel A: Spearman Correlations for OLS-regression (1) | | | | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|
| $CAR = \alpha_0 + \beta_1 SA + \beta_2 IND + \beta_3 SIZE + \beta_4 OCF + \beta_5 LEV + \beta_6 LOSS + \beta_6 ROA + \beta_6 GRWTH + \beta_6 INC + \varepsilon$ | | | | | | | | | | |
| | CAR | SA | IND | SIZE | OCF | LEV | LOSS | ROA | GRWTH | INC |
| CAR | 1.000 | | | | | | | | | |
| SA | 0.024 | 1.000 | | | | | | | | |
| IND | -0.011 | 0.039 | 1.000 | | | | | | | |
| SIZE | 0.029 | 0.161 | -0.046 | 1.000 | | | | | | |
| OCF | 0.069 | 0.078 | -0.076 | 0.853 | 1.000 | | | | | |
| LEV | 0.013 | 0.363 | -0.043 | 0.142 | 0.053 | 1.000 | | | | |
| LOSS | -0.065 | 0.247 | -0.058 | 0.113 | -0.100 | 0.314 | 1.000 | | | |
| ROA | 0.003 | -0.254 | -0.012 | -0.387 | -0.166 | -0.507 | -0.543 | 1.000 | | |
| GRWTH | -0.057 | -0.020 | -0.014 | 0.555 | 0.450 | -0.050 | -0.139 | 0.019 | 1.000 | |
| INC | 0.125 | -0.045 | -0.024 | 0.705 | 0.785 | -0.149 | -0.543 | 0.143 | 0.540 | 1.000 |

| Panel B: Spearman Correlations for OLS-regression (2) | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|
| $CAR = \alpha_0 + \beta_1 TYPE + \beta_2 IND + \beta_3 SIZE + \beta_4 OCF + \beta_5 LEV + \beta_6 LOSS + \beta_6 ROA + \beta_6 GRWTH + \beta_6 INC + \varepsilon$ | | | | | | | | | | |
| | CAR | TYPE | IND | SIZE | OCF | LEV | LOSS | ROA | GRWTH | INC |
| CAR | 1.000 | | | | | | | | | |
| TYPE | 0.101 | 1.000 | | | | | | | | |
| IND | -0.068 | 0.004 | 1.000 | | | | | | | |
| SIZE | -0.072 | 0.049 | -0.165 | 1.000 | | | | | | |
| OCF | 0.019 | 0.204 | -0.187 | 0.756 | 1.000 | | | | | |
| LEV | -0.091 | 0.089 | -0.198 | 0.203 | 0.153 | 1.000 | | | | |
| LOSS | -0.076 | 0.039 | -0.080 | 0.111 | -0.161 | 0.305 | 1.000 | | | |
| ROA | 0.127 | -0.033 | 0.066 | -0.319 | -0.017 | -0.478 | -0.670 | 1.000 | | |
| GRWTH | -0.124 | -0.039 | -0.076 | 0.549 | 0.361 | -0.001 | -0.139 | 0.048 | 1.000 | |
| INC | 0.093 | 0.116 | -0.090 | 0.562 | 0.698 | -0.131 | -0.670 | 0.375 | 0.445 | 1.000 |

| Panel C: Spearman Correlations for OLS-regression (3) | | | | | | | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|
| $CAR = \alpha_0 + \beta_1 STAND + \beta_2 IND + \beta_3 SIZE + \beta_4 OCF + \beta_5 LEV + \beta_6 LOSS + \beta_6 ROA + \beta_6 GRWTH + \beta_6 INC + \varepsilon$ | | | | | | | | | | |
| | CAR | STAND | IND | SIZE | OCF | LEV | LOSS | ROA | GRWTH | INC |
| CAR | 1.000 | | | | | | | | | |
| STAND | 0.008 | 1.000 | | | | | | | | |
| IND | -0.068 | 0.103 | 1.000 | | | | | | | |
| SIZE | -0.072 | 0.145 | -0.165 | 1.000 | | | | | | |
| OCF | 0.019 | 0.165 | -0.187 | 0.756 | 1.000 | | | | | |
| LEV | -0.091 | 0.246 | -0.194 | 0.203 | 0.153 | 1.000 | | | | |
| LOSS | -0.076 | 0.197 | -0.080 | 0.111 | -0.161 | 0.305 | 1.000 | | | |
| ROA | 0.127 | -0.245 | 0.066 | -0.319 | -0.017 | -0.478 | -0.670 | 1.000 | | |
| GRWTH | -0.124 | 0.143 | -0.076 | 0.549 | 0.361 | -0.001 | -0.139 | 0.048 | 1.000 | |
| INC | 0.093 | -0.003 | -0.090 | 0.562 | 0.698 | -0.131 | -0.670 | 0.375 | 0.445 | 1.000 |

The table displays the Spearman correlation analysis for Hypothesis 3. The highest correlation possible is 1.000, the lowest -1.000.

TABLE 6
OLS-Regression Output

| Panel A: Output OLS-regression (1) | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------|----------|----------------|
| $CAR = \alpha_0 + \beta_1 SA + \beta_2 IND + \beta_3 SIZE + \beta_4 OCF + \beta_5 LEV + \beta_6 LOSS + \beta_6 ROA + \beta_6 GRWTH + \beta_6 INC + \varepsilon$ | | | | |
| <i>Variable</i> | <i>Coefficient-Estimate</i> | <i>Std. Error</i> | <i>t</i> | <i>p-value</i> |
| SA | 0.0006 | 0.0055 | 0.12 | 0.905 |
| IND | -0.0014 | 0.0080 | -0.18 | 0.860 |
| SIZE | 0.0021* | 0.0011 | 1.93 | 0.056 |
| OCF | -2.14e ⁻⁸ * | 1.26e ⁻⁸ | -1.69 | 0.092 |
| LEV | -0.0006 | 0.0023 | -0.27 | 0.786 |
| LOSS | 0.0018 | 0.0108 | 0.17 | 0.867 |
| ROA | 0.0449 | 0.1015 | 0.44 | 0.659 |
| GRWTH | -2.15e ⁻⁸ *** | 7.08e ⁻⁹ | -3.04 | 0.003 |
| INC | 5.11e ⁻⁸ ** | 1.98e ⁻⁸ | 2.59 | 0.011 |
| _cons | -0.0285* | 0.0149 | -1.91 | 0.058 |
| Adjusted R ² | 0.033 | | | |
| N | 153 | | | |
| Panel B: Output OLS-regression (2) | | | | |
| $CAR = \alpha_0 + \beta_1 TYPE + \beta_2 IND + \beta_3 SIZE + \beta_4 OCF + \beta_5 LEV + \beta_6 LOSS + \beta_6 ROA + \beta_6 GRWTH + \beta_6 INC + \varepsilon$ | | | | |
| <i>Variable</i> | <i>Coefficient-Estimate</i> | <i>Std. Error</i> | <i>t</i> | <i>p-value</i> |
| TYPE | 0.0087 | 0.0081 | 1.07 | 0.288 |
| IND | -0.0063 | 0.0109 | -0.58 | 0.562 |
| SIZE | 0.0016 | 0.0017 | 0.96 | 0.338 |
| OCF | -7.50e ⁻⁹ | 1.59e ⁻⁸ | -0.47 | 0.638 |
| LEV | -0.0033 | 0.0027 | -1.23 | 0.223 |
| LOSS | 0.0077 | 0.0126 | 0.61 | 0.543 |
| ROA | 0.0982 | 0.1262 | 0.78 | 0.439 |
| GRWTH | -1.47e ⁻⁸ * | 8.28e ⁻⁹ | -1.78 | 0.079 |
| INC | 2.96e ⁻⁸ | 2.34e ⁻⁸ | 1.26 | 0.211 |
| _cons | -0.0263 | 0.0213 | -1.24 | 0.221 |
| Adjusted R ² | 0.050 | | | |
| N | 81 | | | |
| Panel C: Output OLS-regression (3) | | | | |
| $CAR = \alpha_0 + \beta_1 STAND + \beta_2 IND + \beta_3 SIZE + \beta_4 OCF + \beta_5 LEV + \beta_6 LOSS + \beta_6 ROA + \beta_6 GRWTH + \beta_6 INC + \varepsilon$ | | | | |
| <i>Variable</i> | <i>Coefficient-Estimate</i> | <i>Std. Error</i> | <i>t</i> | <i>p-value</i> |
| STAND | 0.0029 | 0.0080 | 0.36 | 0.723 |
| IND | -0.0069 | 0.0112 | -0.62 | 0.537 |
| SIZE | 0.0020 | 0.0017 | 1.19 | 0.237 |
| OCF | -1.40e ⁻⁹ | 1.49e ⁻⁸ | -0.94 | 0.351 |
| LEV | -0.0033 | 0.0028 | -1.18 | 0.243 |
| LOSS | 0.0085 | 0.0127 | 0.67 | 0.504 |
| ROA | 0.1139 | 0.1262 | 0.90 | 0.370 |
| GRWTH | -1.71e ⁻⁸ ** | 8.00e ⁻⁹ | -2.13 | 0.037 |
| INC | 3.74e ⁻⁸ * | 2.23e ⁻⁸ | 1.68 | 0.098 |
| _cons | -0.0263 | 0.0216 | -1.21 | 0.229 |
| Adjusted R ² | 0.037 | | | |
| N | 81 | | | |

Coefficient estimates are rated *, ** or *** indicating the significance of the variable on the 10%, 5% and 1% respectively.

6.3. Results Hypothesis 2

The results for Hypothesis 2 follow the same structure as hypothesis 1, starting with the Spearman correlation matrix and followed by the OLS-regression. Hypothesis 2 is formulated as:

Hypothesis 2: Investors value sustainability reports with assurance from audit firms higher than sustainability reports with assurance provided by non-accountant firms.

TYPE indicates whether a sustainability report has been assured by an audit firm or a non-accountant firm. The Spearman correlation matrix presented in Table 5 Panel B shows a correlation of 0.101 between *CAR* and *TYPE*. In line with the expectations formed in Hypothesis 2, the direction of the relation is positive, indicating that investors value audit firms over non-accountant firms in providing the assurance service. The correlation matrix also shows relatively high correlations between *SIZE* and *OCF*, *OCF* and *INC*, *LOSS* and *ROA* and *LOSS* and *INC*. Whether the correlations have implication for the assumptions underlying the OLS-regression is presented in section 6.5.

Although the Spearman correlation shows a positive association between *TYPE* and *CAR*, it does not prove whether this relation is significant. OLS-regression (2) tests the hypothesis for significance. The results of the OLS-regression are presented in Table 6 Panel B. The adjusted R² is 0.050. The coefficient estimate β_1 predicts the direction and relation of *TYPE* and *CAR*. The β_1 value is 0.0087 which indicates a small positive relation between *TYPE* and *CAR*. The p-value, however, is not significant with a value of 0.288. Therefore, Hypothesis 2 is rejected.

6.4. Results Hypothesis 3

Recall that Hypothesis 3 is formulated as follows:

Hypothesis 3: Investors value sustainability reports with assurance conducted with AA1000AS or ISAE3000 higher than sustainability reports with assurance conducted without standards.

The variable *STAND* is used to measure whether the assurance provider has made use of the standards AA1000AS or ISAE3000. The correlation between *STAND* and *CAR* is presented in Table 5 Panel C. The Spearman correlation matrix shows a slightly positive correlation between *STAND* and *CAR* of 0.008. This is in line with the expectation that

investors value sustainability reports with assurance conducted with standards higher than sustainability reports with assurance conducted without standards. As the sample is similar to the sample used in Hypothesis 2, similar correlations are observed for the control variables.

The results for OLS-regression (3) are presented in Table 6 Panel C. The table shows a positive β_1 , which is in line with the expectations of Hypothesis 3, although it is not significant on any level with a p-value of 0.723. Hypothesis 3 is therefore rejected.

6.5. Additional tests

In order to draw clear conclusions from the results presented in Table 6, the assumptions underlying the OLS-regression have to be verified. The results may be misleading if one or more of the assumptions are violated. Specifically, the following assumptions are tested for OLS-regression models (1), (2) and (3): 1) normal distribution of estimated errors, 2) homoskedasticity of the error variance, 3) multicollinearity of variables and 4) autocorrelation. The following sections each describe one of the assumptions for all three OLS-regressions together.

6.5.1. Normal distribution of estimated errors

An OLS-regression produces, besides the output regarding the predictors shown in Table 6, a set of residuals (ε). Based on the variables in the model, the OLS-regression predicts an outcome for the dependent variable. The ε is the difference between the predicted value and the observed value of the dependent variable. In other words, the ε are unexplained variations in the model. In order to obtain valid p-values, the residuals should follow a normal distribution. Would it not, the unexplained variation in the model would not be randomly distributed, harming the explanatory ability of the predictors in the model.

Several statistical tests are able to check the normal distribution of estimated errors in the OLS-regression. The histograms presented in Figure 4 in the appendix give a first indication of normality. In OLS-regression (1), (2) and (3), the histograms show no real dangers for the violation of the normality assumption. In addition, the more detailed checks presented in Figure 5 and 6 show no real harms for not normally distributed residuals, although the normal quantile plot for OLS-regression (1) in Figure 6 Panel A shows a small deviation from the normal distribution line in the upper and lower tail. To subject the OLS-regression to a final test on normality, Shapiro-Wilk test is performed. The p-value for OLS-

regressions (1), (2) and (3) are insignificant. Therefore, it is safe to assume that the residuals are normally distributed.

6.5.2. *Homoskedasticity of the error variance*

The second assumption relates to the homoskedasticity of the error variance. It tests whether the residuals are dependent on the other variables in the model, which is in fact not desirable situation. This situation is called heteroskedasticity. For example, if the variance of the residuals increases when *SIZE* increases, this is a case of heteroskedasticity. As with the test for normality, it is essential to check for heteroskedasticity since both can invalidate the statistical tests for significance.

As a first check for heteroskedasticity, a rvf-plot has been used that plots the residuals against the predicted values of *CAR*. Figure 7 depicts these plots. Due to some deviated observations in the graph, one can observe a slightly heteroskedastic result for OLS-regression (1). The shape of the observations in total is slightly heteroskedastic as well for OLS-regression (2) and (3) as well, although to a lesser degree. To check whether the observed pattern is in fact heteroskedastic, White's test and Breusch-Pagan test are performed. Both test the null hypothesis that the error variance is homoskedastic. As can be seen in the results in Table 8, the tests for OLS-regression (1), (2) and (3) are not significant with p-values ranging from 0.155 to 0.950. It is therefore assumed that the error variance is homoskedastic.

6.5.3. *Multicollinearity of variables*

The predictors in an OLS-regression need to be independent of each other. No linear relation or whatsoever should exist between two or more of the variables. The observations of one variable can be predicted to some extent from the observation of another variable. When a relation between variables exist, we speak of an issue of multicollinearity, which has implications for the coefficient estimates for the involved variables. Multicollinearity can change the direction, magnitude and significance of a coefficient.

The first indication of multicollinearity is the correlation between two variables, which is presented through a Spearman correlation matrix in Table 5. A relatively high correlation could be observed for several variables, most noteworthy the 0.853 between *SIZE* and *OCF*. Second, the variance inflation factors (VIFs) presented in Table 9 are used to check whether this correlation is in fact a sign for multicollinearity. As can be observed from Table 9, the correlation between *SIZE* and *OCF* does not turn out to be worrisome. However, the VIFs for

INC and *GRWTH* are troublesome in all three OLS-regressions with VIF values exceeding the 10-benchmark. This may not come as a surprise, since firms with higher levels of net income also report a growth in assets in most cases. When two or more variables are multicollinear, often one of them is dropped in favor of the other.

However, before removing one of the variables, a test for model specification errors is conducted. Such a test checks whether the model is properly specified. The variable of prediction \hat{y} represents the predictive value of the model. In order for the model to be specified correctly \hat{y} should be significant. The variable \hat{y}^2 is the variable of squared prediction, which should not be significant: if the squared predictors are significant, the model would not have any explanatory power, which means more variables should be added. In this case, the focus is in particular on \hat{y} , considering that one of the two variables *INC* and *GRWTH* should be dropped to meet the assumption of multicollinearity. The results of the model specification test are presented in Table 10. For OLS-regressions (1), (2) and (3), a significant p-value for \hat{y} is observed, which means *INC* or *GRWTH* should not be dropped. However, it should be noted that to include both variables creates a situation of multicollinearity, which puts a limitation on the results of all three OLS-regression analysis in the correctness of the coefficient estimates.

To check whether the results differ by using OLS-regressions with no multicollinearity, additional regressions are performed excluding either *INC* or *GRWTH*. The results for the dependent variables do not change after removing *INC* or *GRWTH* from the three regressions. The coefficients are still positive but insignificant. In addition, the residuals of the model that excludes *INC* or *GRWTH* are not normally distributed and heteroskedastic in these OLS-regressions. Therefore, the issue of multicollinearity is accepted in this model.

6.5.4. Autocorrelation

A check for autocorrelation should be performed, since this research makes uses of data in multiple years. Autocorrelation is when the residuals of the three OLS-regressions can predict the residuals in subsequent years, that is, the correlation between residuals and the lagged residuals is relatively high. A simple correlation table for the residuals in each OLS-regression and there lagged form tests the sample for autocorrelation. Table 11 presents this correlation table. The correlation for all three variables in not extremely high with correlations varying from 0.192 to 0.264, therefore it is assumed that autocorrelation is not present in this sample.

6.6. Summary

This section described the results regarding the three hypothesis that were developed in section 4. Hypothesis 1 is rejected. The output of the Spearman correlation matrix provided an indication of a positive association between the publication of a sustainability report with an assurance statement and the market's valuation of a company. However, this association is not significant on any level. Next, in order to check whether investors' valuation changes when the quality of assurance improves, Hypothesis 2 and 3 are tested. The Spearman correlation matrix for Hypothesis 2 indicated a positive association between quality improvements in type of assurance provider, but this association turned out to be insignificant. Therefore, Hypothesis 2 is rejected. Hypothesis 3 is rejected as well. The Spearman correlation matrix indicated a positive association between the use of standards and the market's valuation, although the OLS-regression output indicates that this association is not significant.

7. Conclusion

7.1. Concluding Remarks from the Results

In light of the global rise of sustainability reporting and assurance, this thesis tries to contribute to existing research by investigating whether investors' valuation of company performance is affected by an assurance statement in a sustainability report. Opposed to a sustainability report without assurance, a report that contains such a statement is considered to contain less errors and management biases, and is therefore considered to have higher quality. Following the findings of Guidry and Patten (2010), it is therefore expected that investors' valuation of company performance would be higher when a firm issued a sustainability report with an assurance statement than when a firm issued a report without an assurance statement, a line of reasoning that is embodied in Hypothesis 1. However, the results prove Hypothesis 1 to be insignificant, indicating that there is no association between the presence of an assurance statement in a sustainability report and investors' valuation of company performance. Investors do not seem to value the assurance on sustainability reports. Regarding prior research that focused on assurance quality, this may not come as a surprise, since the assurance service in this field has been criticized since its earliest days. Hypothesis 2 and 3 try to correct for the effect bad quality assurance may have on investors' valuation. Hypothesis 2 focusses on the type of assurance provider, where audit firms generally perform an assurance service of better quality. Hypothesis 2 therefore states that the investors' valuation of company performance is higher when an audit firm performs the assurance than when a non-accountant firm is hired. In addition, assurance is considered to be of better quality when assurance standards have been used in conducting the service. Hypothesis 3 incorporates standards by stating that investors value sustainability reports with assurance conducted with standards AA1000AS or ISAE3000 higher than sustainability reports that have been assured without the use of those standards. Both Hypothesis 2 and Hypothesis 3 are insignificant. Investors are indifferent on the inclusion of an assurance statement in sustainability reports for the sample that is used in this research, even when the assurance is of high quality.

7.2. Discussion of the Results

Investors are becoming more and more aware of the corporate social responsibility of companies and its effect on company's financial performance (Clarkson et al., 2011). Instead of the traditional focus on the financial numbers that are published in a company's annual and quarterly reports, investors now take all kinds of publications into account. The publication of

a sustainability report too has a positive effect on investors' valuation of company performance (Berthelot et al., 2012). Guidry and Patten (2010) add that when the quality of a report is low, the market would not react, while investors' valuation of company performance is affected by high-quality sustainability reports. Generally spoken, an assurance statement adds credibility and reliability to a sustainability report and validates the high quality of a report. Hodge et al. (2009) and Pflugrath et al. (2012) found that investors have more confidence in sustainability reports with an assurance statement for exactly those reasons.

This thesis, however, contradicts this view on sustainability assurance as it is found that investors do not value the assurance statement in a sustainability report. While the research of Hodge et al. (2009) and Pflugrath et al. (2012) had some limitations since they merely measured opinions and moreover used students as a proxy for stock-market investors, this study takes an archival approach and measures real-life consequences of actions. A common disadvantage of this research design is that respondents, especially MBA students, may parrot explanations that they have studied in business schools. For example, business schools teach that assurance contributes to the credibility of a document without a doubt, while the answer that is more aligned with their true beliefs may differ. This answer may not be given in favor of the 'correct' answer of business schools. The research design used in this research measures the direct effect of investors buy-and-sell decision making, which improves on the above mentioned studies in two ways: 1) it measures real-life consequences of buy-and-sell decisions instead of opinions; 2) the sample consists indirectly uses stock-market-investors instead of MBA students as proxy for investors. The insignificance of the results contradicts PAT as well, since PAT predicts that the presence of an assurance statement hold real consequences for investors' decision-making. The results of this thesis predict the opposite. This thesis, therefore, provides evidence against PAT, at least in the field of assurance on sustainability reporting.

A possible explanation for the insignificance of the results can be found in prior research. As Hypothesis 2 and 3 prove to be insignificant, a higher quality assurance is not associated with *CAR*. Apparently, investors are indifferent about the quality of an assurance statement. Prior research shows that there are reasons to doubt the quality of assurance on sustainability reports. A possibility exists where investors may deem the quality of assurance during the time period of the research too low. For example, O'Dwyer (2011) states that the nature of sustainability assurance is characterized by a trial-and-error process and Smith et al. (2011), among others, indicate that the assurance service is affected by capture: the process where stakeholders are involved in the assurance process, harming the independence of the

assurance provider. Would investors take these implications on assurance quality into account, the results of this thesis may not come unexpected.

An interesting fact that this research points out is that investors are indifferent to which assurance provider is hired for the service. Authors such as O'Dwyer and Owen (2007), Perego and Kolk (2012) and Gürtürk and Hahn (2015) all point out the differences in working methods and resulting assurance quality between audit firms and non-accountant firms in this field. Hodge et al. (2009) and Pflugrath et al. (2012) clearly show that investors prefer audit firms over non-accountant firms to perform the assurance on sustainability reports. The results of this thesis appear to contradict this view through the insignificance of Hypothesis 2. Investors in the sample of this research do not show a preference among assurance providers, which implies that they deem the quality of the service that they provide to be of a similar level. Therefore, the results are more in line with the findings of Moroney et al. (2012), who found no real quality differences among assurance providers.

From a practical perspective, the results imply that the assurance in this field is still in need for new developments from standard setters and assurance providers. The desired effects of assurance, increased user-confidence and trust in the information content of a sustainability report, are not yet accomplished, at least not from an investors' perspective. Standard setters should walk further down the path they took in creating assurance standards AA1000AS and ISAE3000 by continuously developing new standards following the latest trends in sustainability reporting and assurance. Assurance providers should improve their service in order for investors to value their efforts. Perhaps audit firms and non-accountant firms can learn from each other's approaches in performing the assurance service in order to develop a high-quality assurance practice.

7.3. Limitations of the Research Method

This thesis is subjected to several limitations. First, and perhaps most importantly, the OLS-regression used in this research has an issue of multicollinearity. Multicollinearity has implications for the coefficient of the predictors used in the OLS-regression. Variables *INC* and *GRWTH* have high VIF values and should be removed to remove the effect of multicollinearity. However to exclude one of them would harm the adjusted R^2 and would not seem appropriate according to the model specification test. To check for the effect multicollinearity has on the coefficient, additional regressions are performed excluding either *INC* or *GRWTH*. However, the results for the hypotheses do not change after resolving multicollinearity by either removing *INC* or *GRWTH* from the analysis: the dependent

variables are still insignificant. In addition, by removing *INC* or *GRWTH*, the research violates the normality and heteroskedasticity assumption. Therefore, the issue of multicollinearity, including its limitations on the coefficients in the model, is accepted.

Second, although the control variables have been winsorized, the descriptive statistics in Table 4 indicate that *OCF*, *ROA*, *GRWTH* and *INC* are skewed to the left and therefore not normally distributed. A normal distribution is required to properly control for their effect.

Third, in determining the *CAR*, this research did not account for the publication of annual reports. The publication of an annual report could affect *CAR* in the event window. Several steps have been undertaken to control for this influence to some extent. First, integrated reports, where sustainability and financial performance are presented in one document, have been removed. Second, the research adds several control variables that are taken from the annual reports of the companies. Although the publication of an annual report is not fully controlled for, some measures have been taken to account for the effect.

A final drawback is that the validity of the research method presents a limitation to the results. The internal validity is considered medium since this research adds several control variables, although it cannot control for every possible influential factor. The external validity is considered low, since the research controls for several factors, making it difficult to make any comparison with reality. In addition, this research is conducted with companies operating in countries with a German civil law system. The results could therefore not be generalizable to other countries. Both types of validity should be taken into account while analyzing the results of this thesis.

7.4. Directions for Further Research

Flowing from the limitations of this study, the association of sustainability assurance and investors' valuation of company performance could be further investigated by using a bigger sample by, for example, not only including countries with a German civil law system, but also other stakeholder-oriented countries as defined by La Porta et al. (1997). A bigger data sample would perhaps remove the skewness of the control variables. In addition, the *CAR* observations should be controlled for the publication date of the annual report to fully grasp its effects instead of the minor checks that this research uses.

Next, as a follow-up to this study, further research could investigate why there is no association between sustainability assurance and investors' valuation of company performance. This study merely indicates that there is no association between the two, further

research could indicate the reasons behind this observation. Perhaps it is due to the lack of quality in the assurance service, although no scientific prove has yet been provided.

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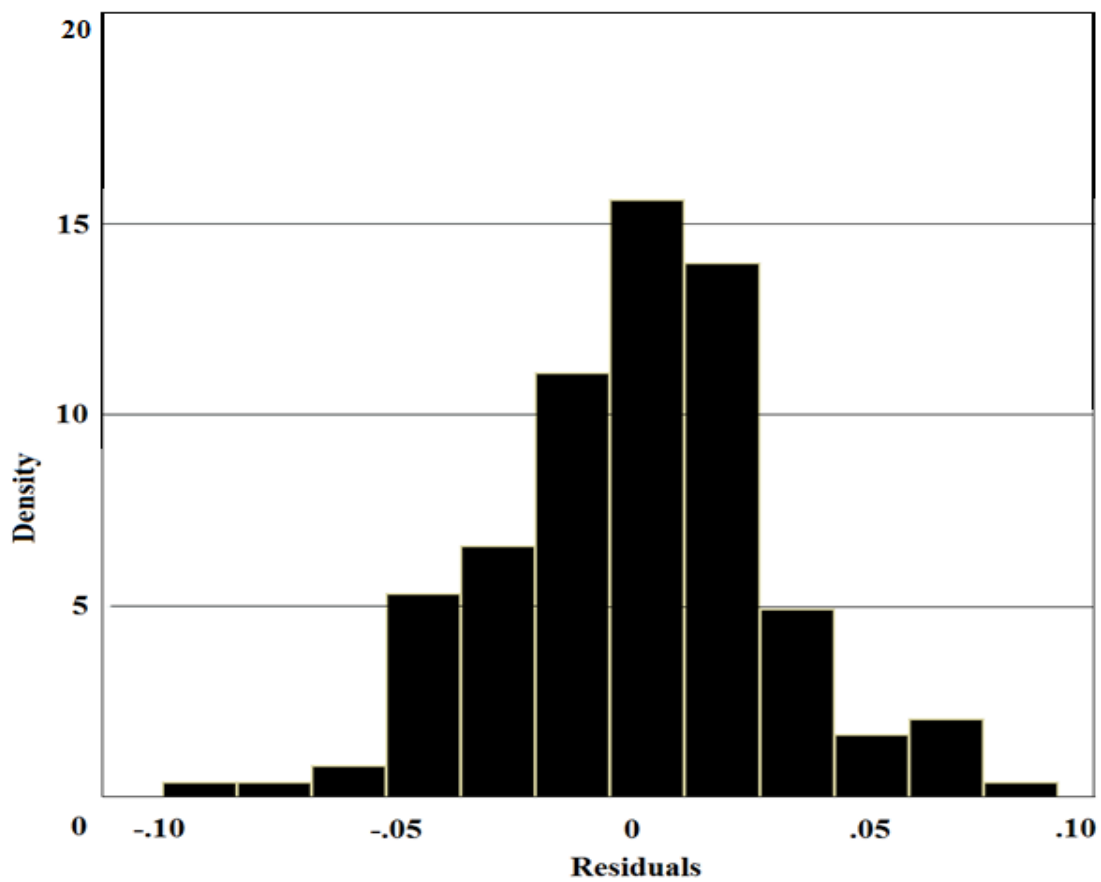
9. Appendix

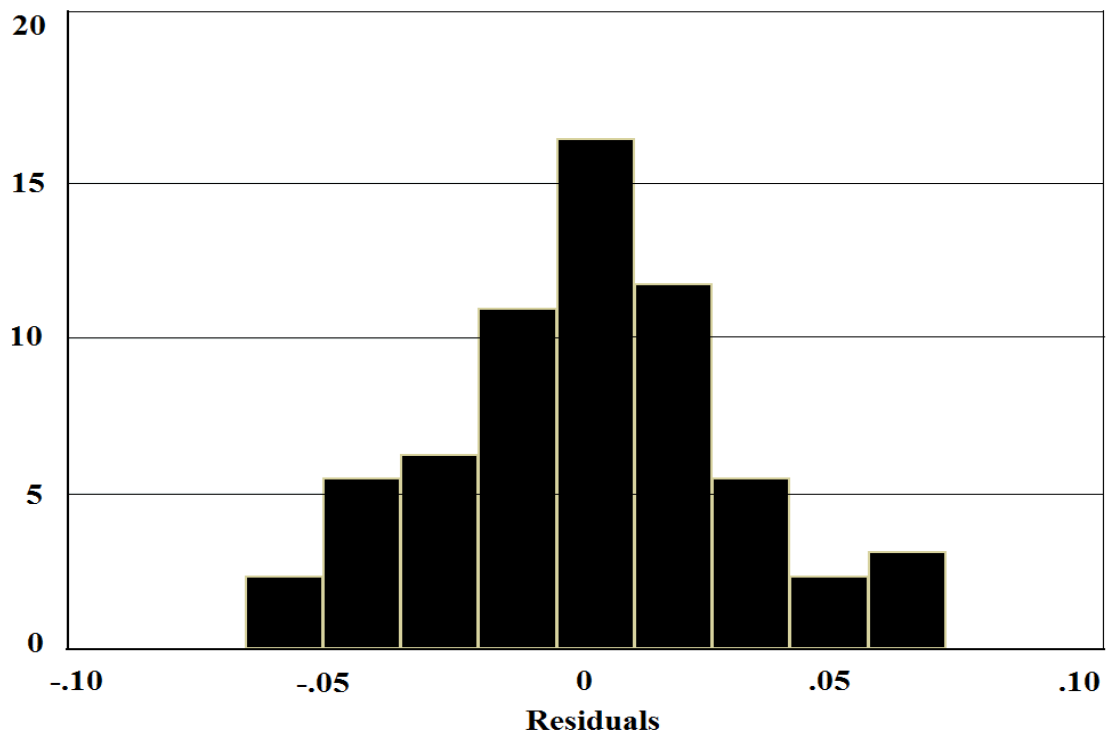
The appendix presents all figures and tables used for the additional analysis for testing the assumptions underlying the OLS-regressions. It starts with the figures and tables testing the normality assumptions, followed by the tests for heteroskedasticity. Next, the figures and tables for the analysis testing for multicollinearity are presented. This section is concluded by the table that presents the results for autocorrelation.

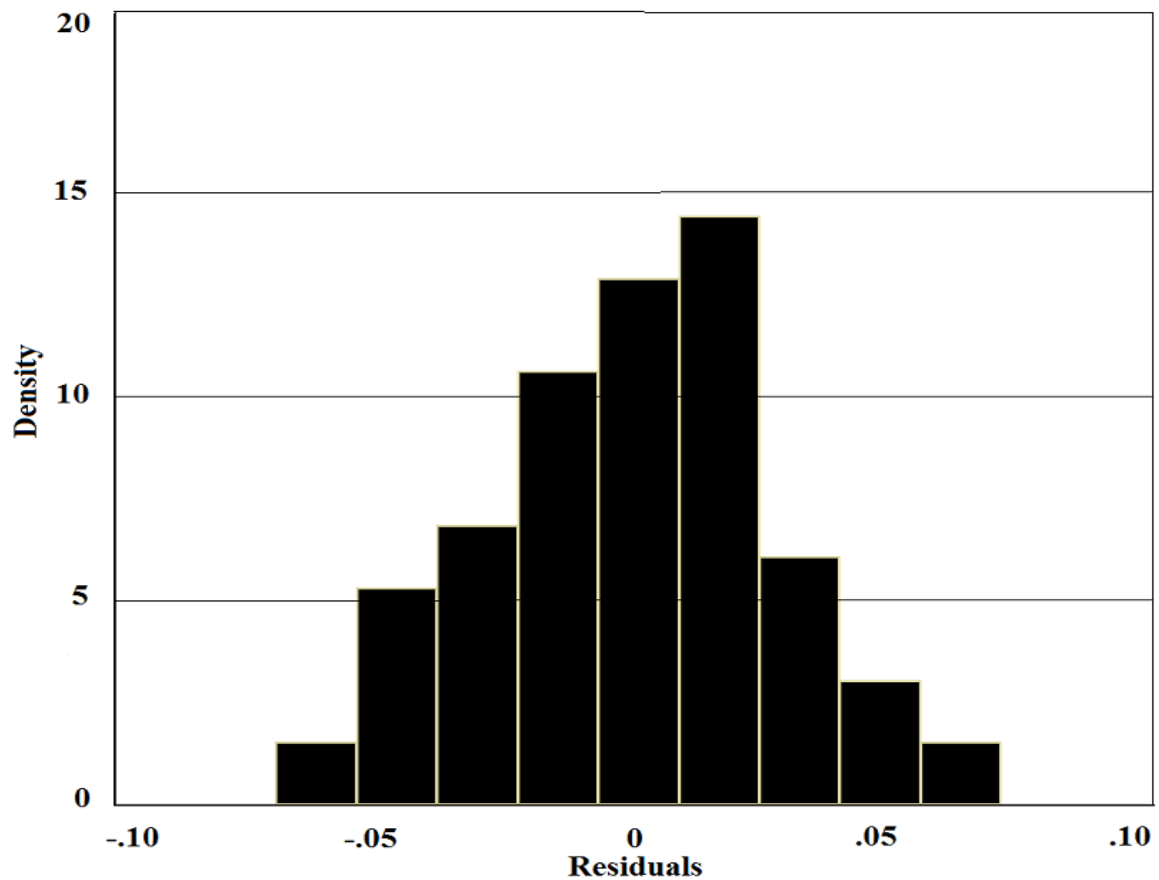
FIGURE 4

Histogram residuals OLS-regression

Panel A: Histogram residuals OLS-regression (1)



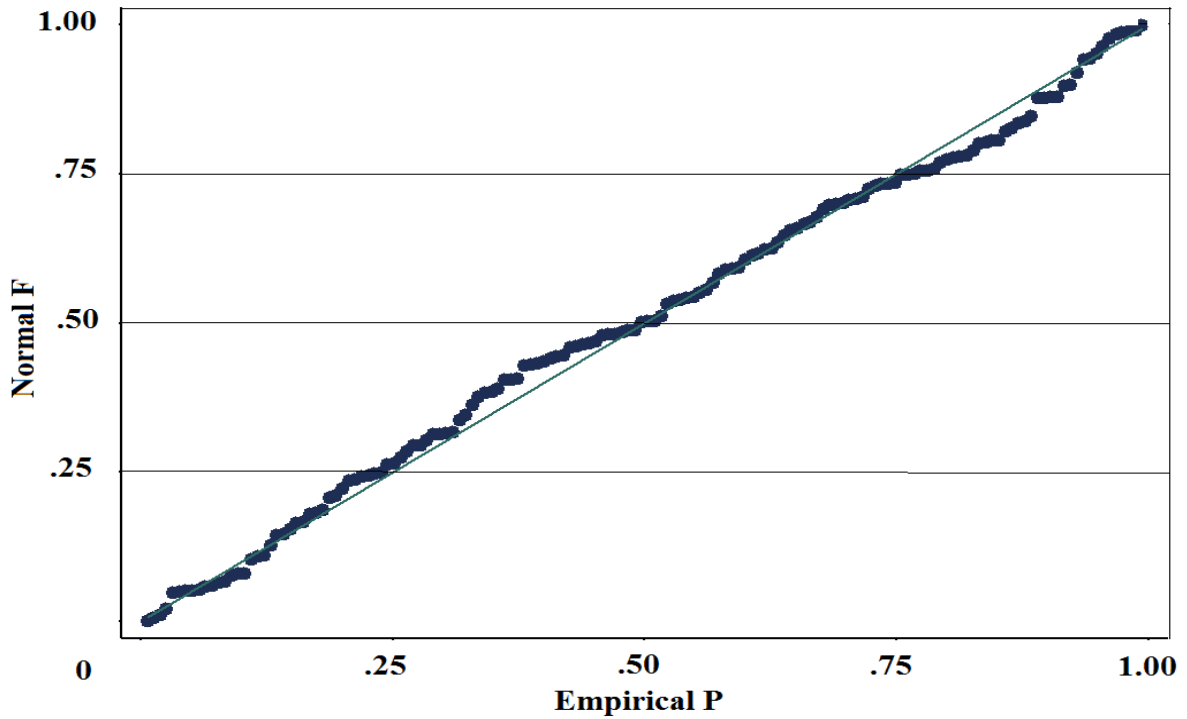
Panel B: Histogram residuals OLS-regression (2)

Panel C: Histogram residuals OLS-regression (3)

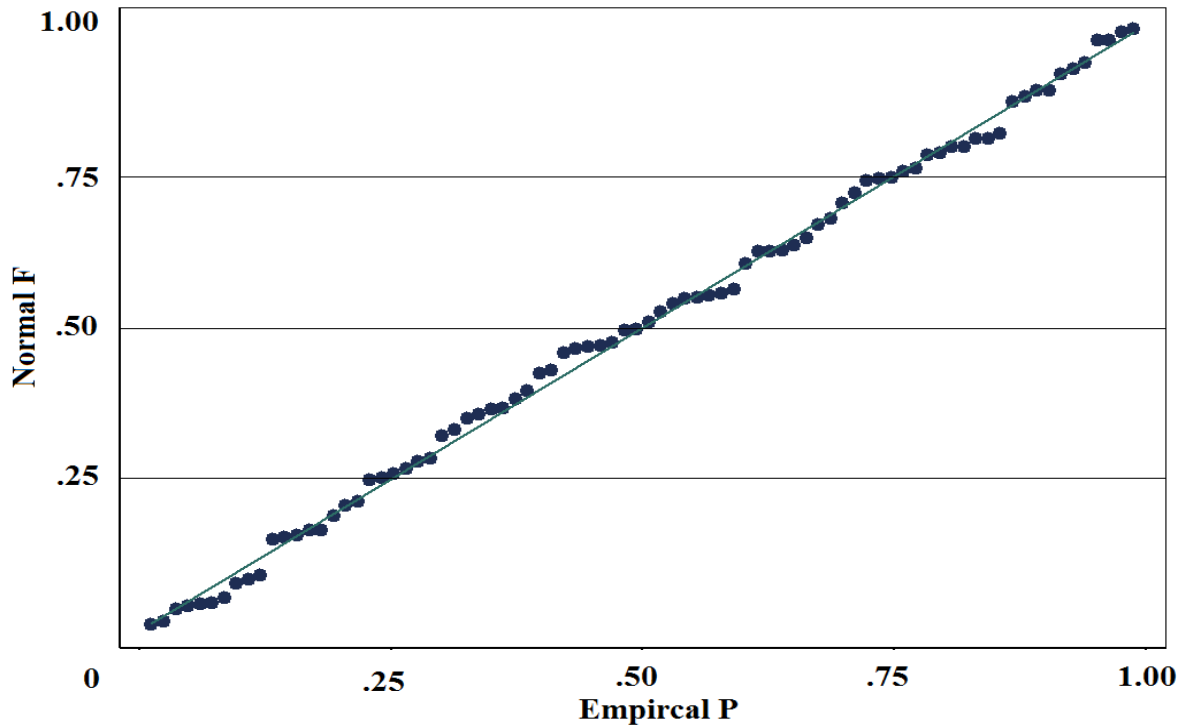
The histograms depict the frequency distribution of observed residuals. All histograms follow a normal distribution, indicating that the assumption of the normal distribution of estimated errors is met.

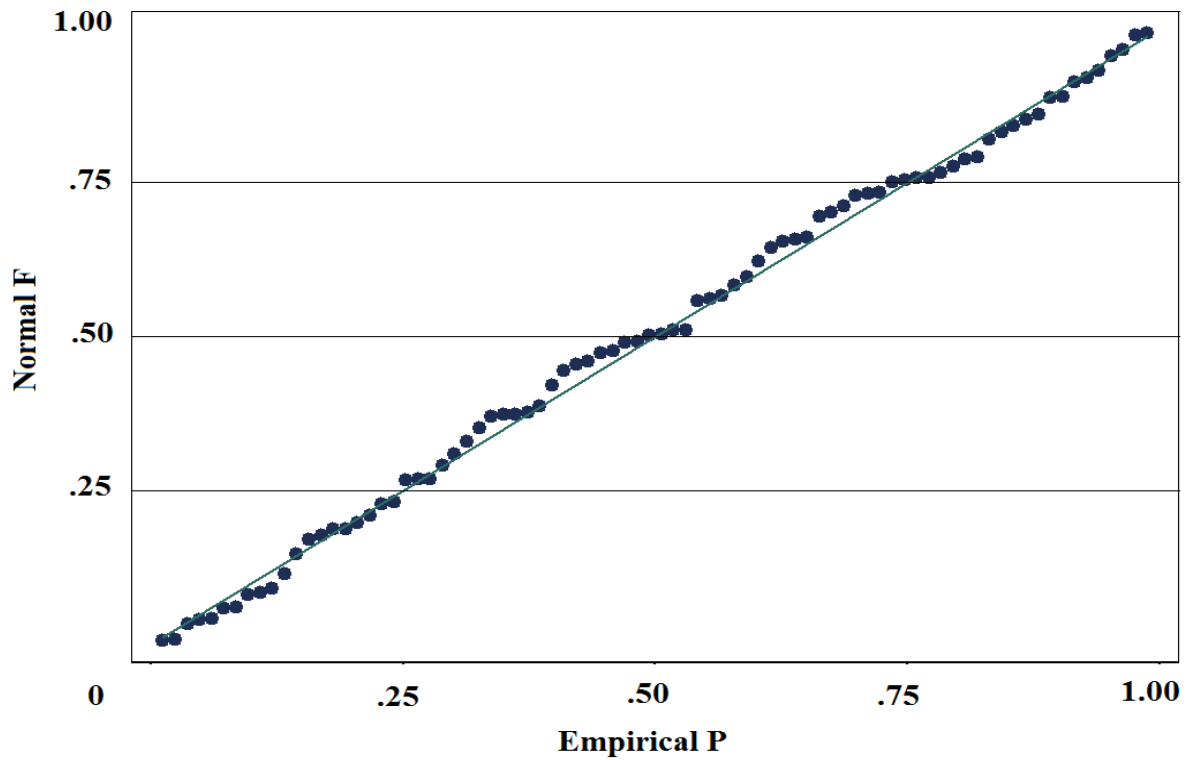
FIGURE 5
Standardized Normal Probability Plot

Panel A: Standardized normal probability plot OLS-regression (1)



Panel B: Standardized normal probability plot OLS-regression (2)

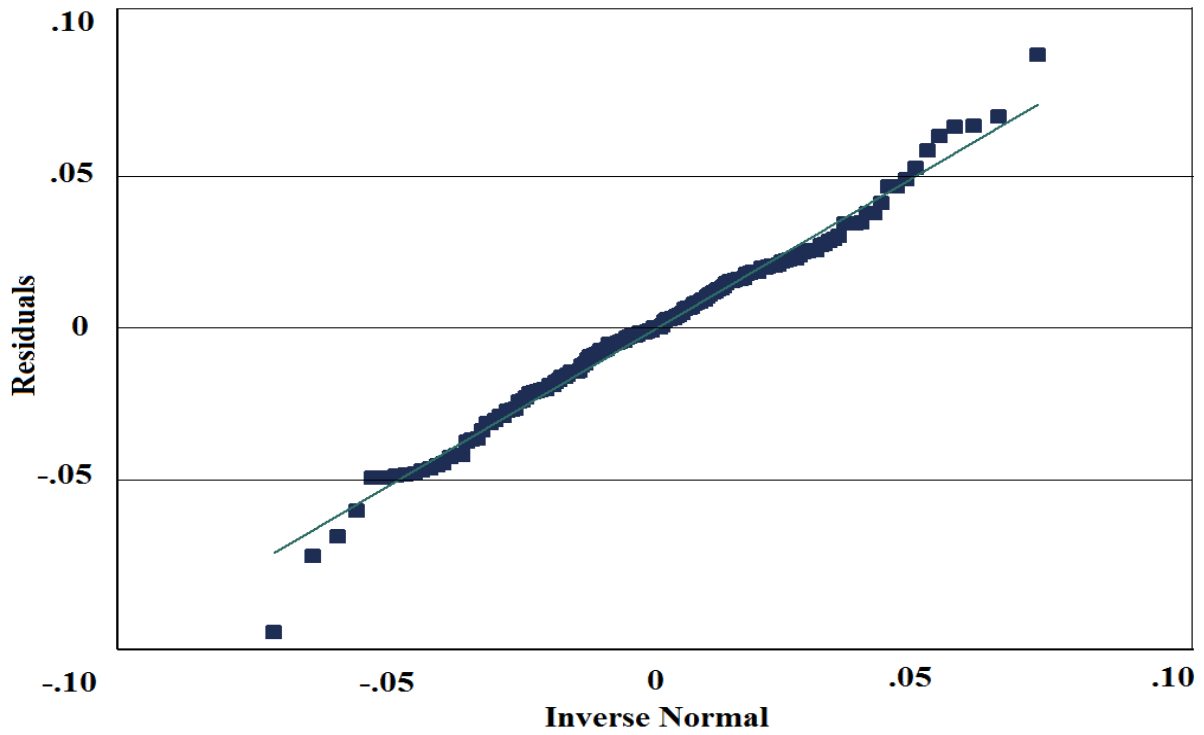


Panel C: Standardized normal probability plot OLS-regression (3)

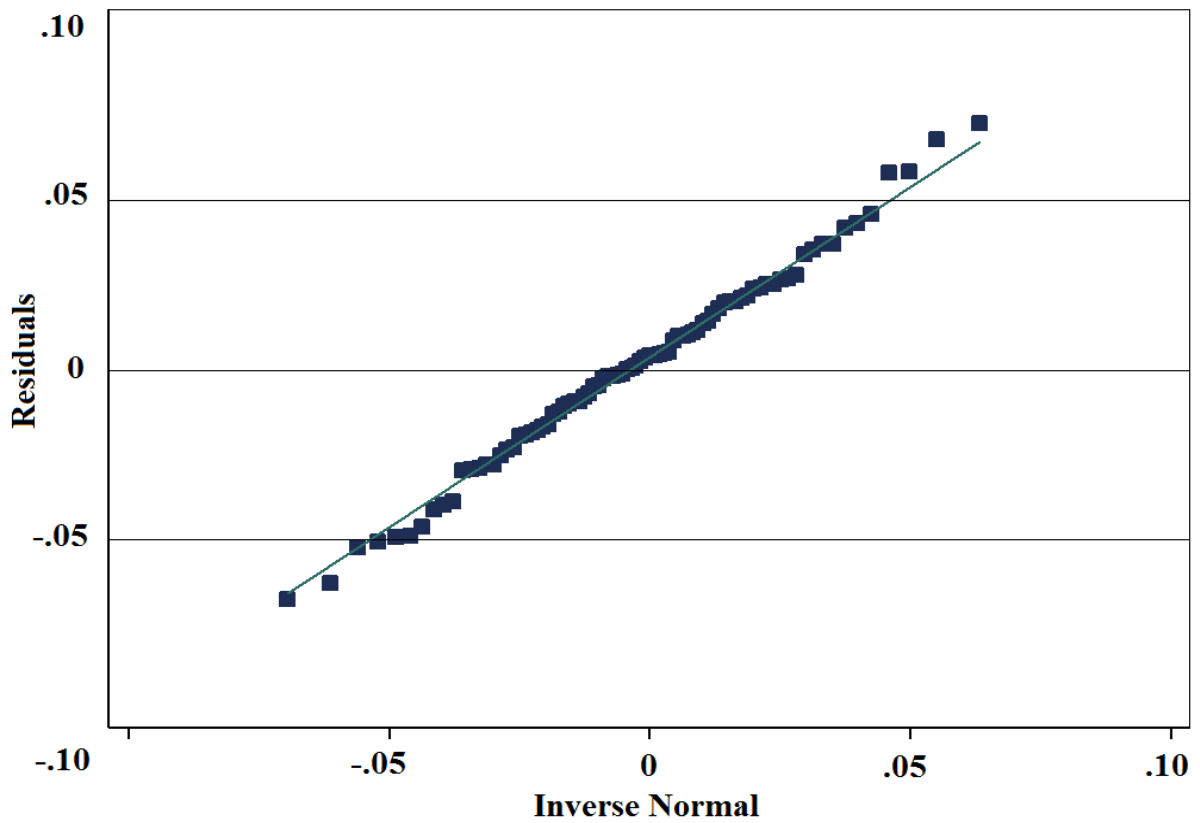
The y-axis depicts the normal cumulative distribution of residuals; the x-axis depicts the observed cumulative distribution of residuals. The points in the figures depict how much the cumulative residuals derive from the normal distribution. The standardized normal probability plot tests the OLS-regression for non-normality around the mean of the distribution. In this case, OLS-regressions (1), (2) and (3) show a normal distribution around the mean.

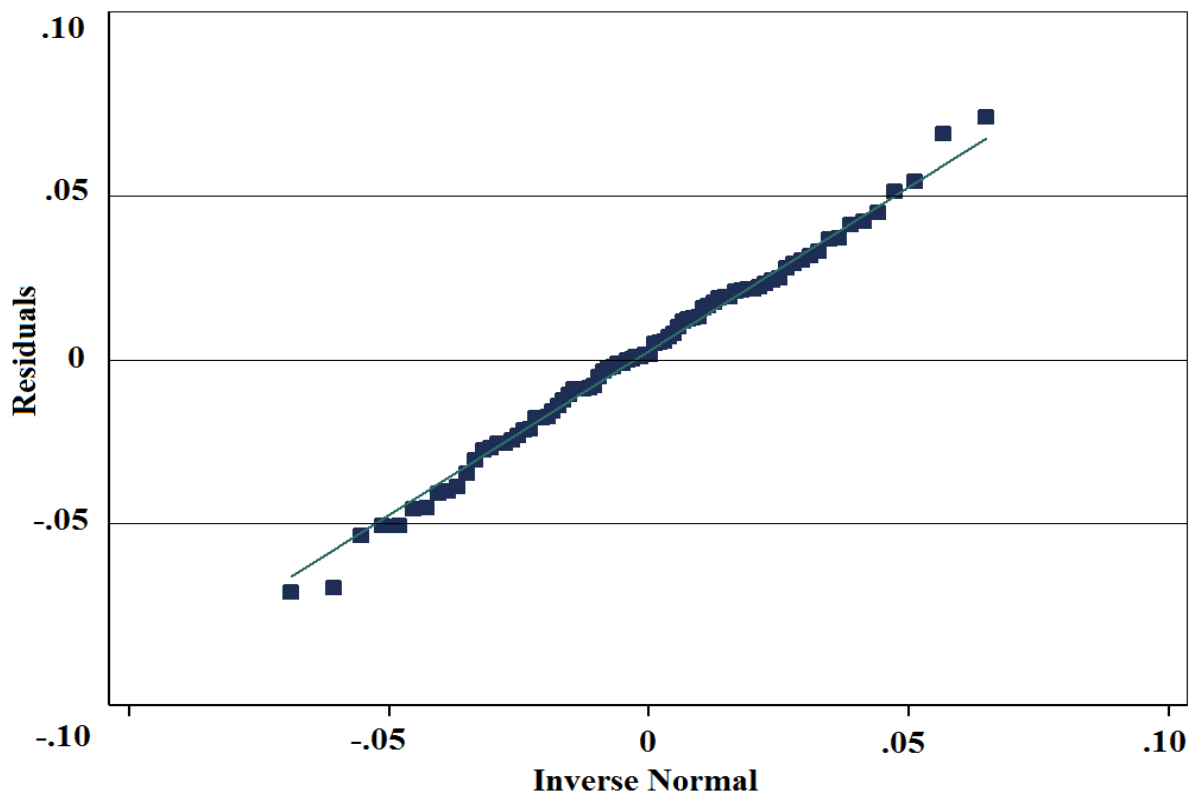
FIGURE 6
Normal Quantile Plot

Panel A: Normal quantile plot OLS-regression (1)



Panel B: Normal quantile plot OLS-regression (2)



Panel C: Normal quantile plot OLS-regression (3)

The y-axis depicts the distribution of residuals; the x-axis depicts the inverse normal cumulative distribution of residuals. The x-axis uses the inverse function in order to create a quantile function of the residuals distribution. The points in the figures depict how much the residuals derive from the normal quantile distribution. The normal quantile plot tests the OLS-regression for non-normality around the tails of the distribution. In this case, OLS-regression (1) shows a slight non-normal distribution in the upper and lower tail. OLS-regression (2) and (3) show a normal distribution around the tails.

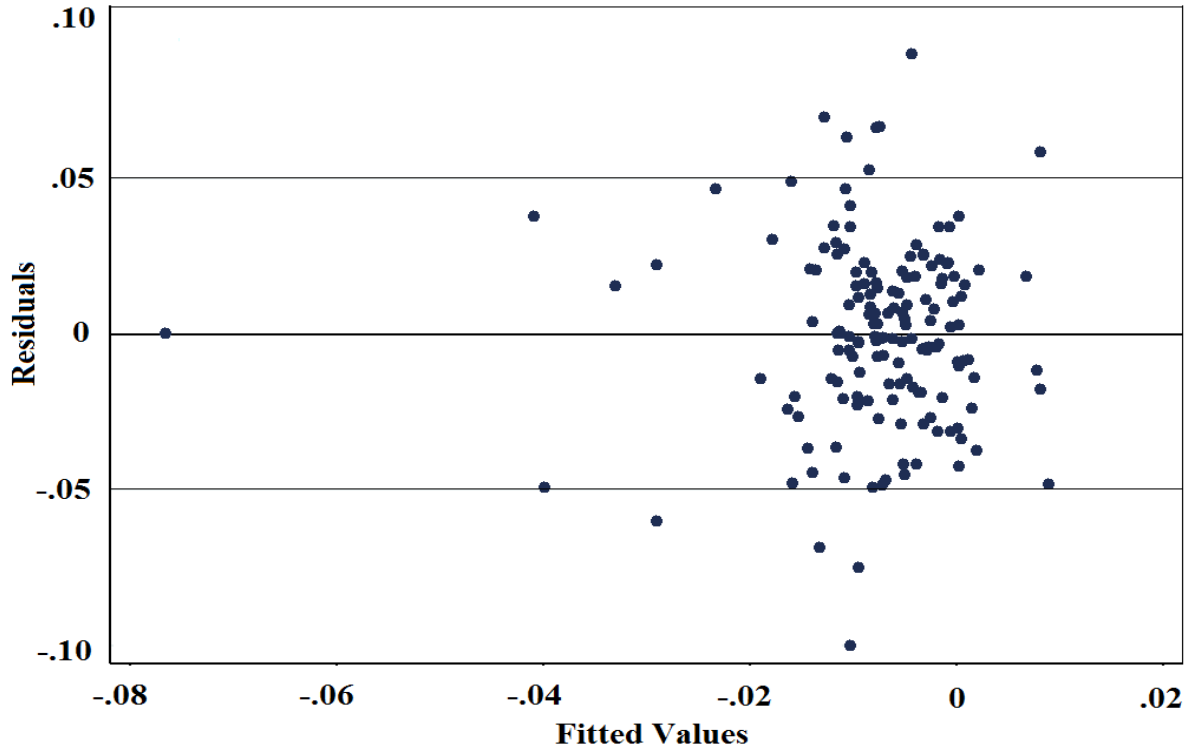
TABLE 7
Shapiro-Wilk Test For Normal Data

| Panel A: Shapiro-Wilk test OLS-regression (1) | | | | | |
|------------------------------------------------------|---------------------|----------|----------|----------|----------------|
| <i>Variable</i> | <i>Observations</i> | <i>W</i> | <i>V</i> | <i>z</i> | <i>p-value</i> |
| ε | 154 | .991 | 1.120 | .257 | .398 |
| Panel B: Shapiro-Wilk test OLS-regression (2) | | | | | |
| <i>Variable</i> | <i>Observations</i> | <i>W</i> | <i>V</i> | <i>z</i> | <i>p-value</i> |
| ε | 82 | .99 | .486 | -1.581 | .943 |
| Panel C: Shapiro-Wilk test OLS-regression (3) | | | | | |
| <i>Variable</i> | <i>Observations</i> | <i>W</i> | <i>V</i> | <i>z</i> | <i>p-value</i> |
| ε | 82 | .994 | .442 | -1.792 | .963 |

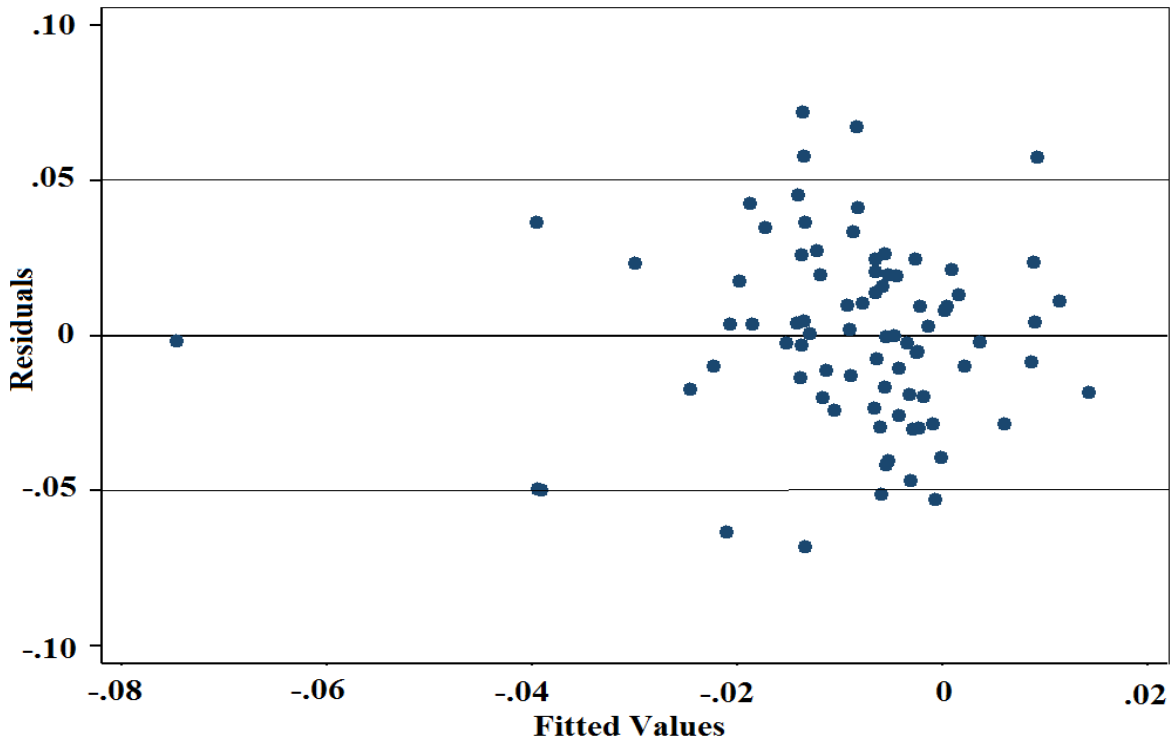
The Shapiro-Wilk test checks the null-hypothesis of normal distribution of the residuals. W , V and z are variables in the Shapiro-Wilk test. When the p -value is significant, the null hypothesis is rejected and the data is not normally distributed. In this case, the p -value is not significant on any level, so the null hypothesis is not rejected.

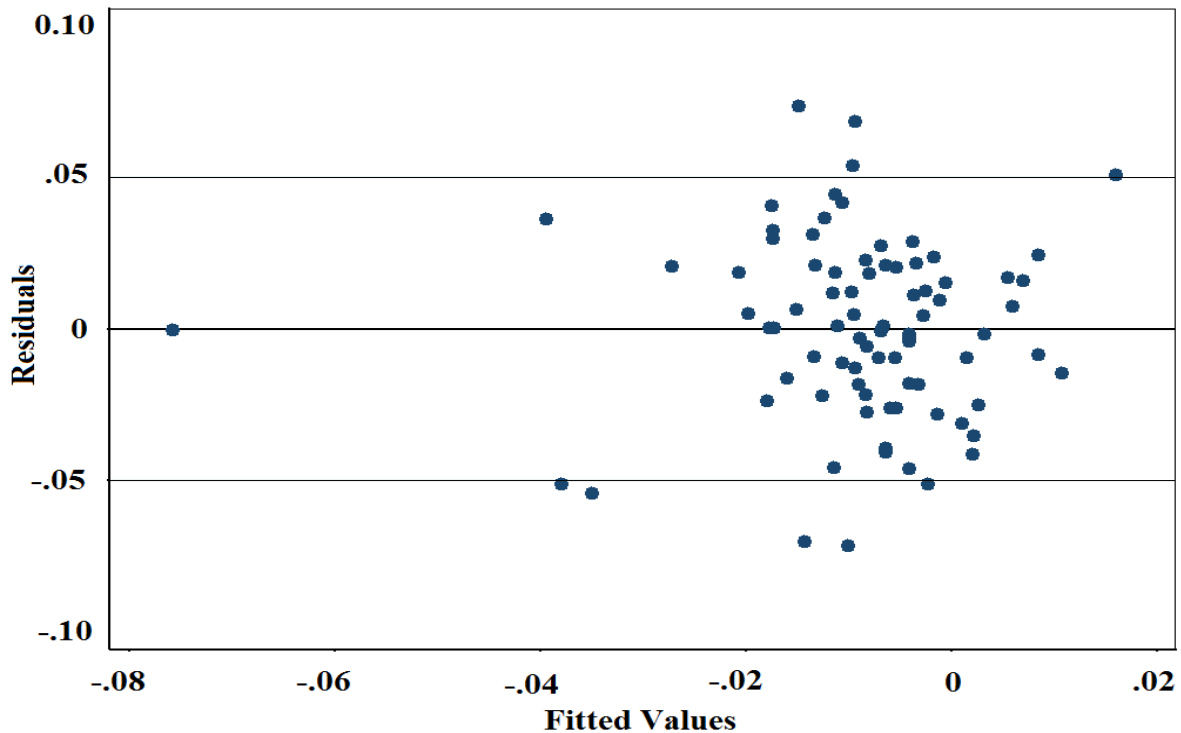
FIGURE 7
Residuals Versus Fitted Plot

Panel A: Residuals versus fitted plot OLS-regression (1)



Panel B: Residuals versus fitted plot OLS-regression (2)



Panel C: Residuals versus fitted plot OLS-regression (3)

The y-axis depicts the distribution of residuals; the x-axis depicts the fitted or predicted value of the residuals. The fitted values are dependent on the predictive variables in the OLS-regression. There should be no pattern in the observed residuals, if there would be a pattern, the sample residuals would be dependent on the predictive variables in the OLS-regression, indicating heteroskedasticity. In this case, all OLS-regressions show a small pattern that starts narrow and ends wide, although the main reason for this pattern are the outliers in the graph, the bulk of the observations showing no particular pattern. Additional tests are necessary to reach a conclusion on heteroskedasticity.

TABLE 8
Statistical Tests For Heteroskedasticity

| <i>OLS-Regression</i> | White's Test | | Breusch-Pagan Test | |
|-----------------------|-------------------------|----------------|---------------------------|----------------|
| | <i>Chi</i> ² | <i>p-value</i> | <i>Chi</i> ² | <i>p-value</i> |
| OLS-Regression 1 | 35.64 | .950 | 2.02 | .155 |
| OLS-Regression 2 | 43.90 | .749 | 1.38 | .240 |
| OLS-Regression 3 | 42.90 | .783 | 1.03 | .310 |

Both the White's test and the Breusch-Pagan test check the null hypothesis of homoskedasticity. If the p-value is significant, the null hypothesis is rejected and the sample is heteroskedastic. In this case both tests are not significant. Therefore, the null hypothesis of a homoskedastic sample is accepted.

TABLE 9
Variance Inflation Factors (VIF)

| Panel A: VIFs OLS- regression (1) | | |
|------------------------------------------|------------|--------------|
| <i>Variable</i> | <i>VIF</i> | <i>1/VIF</i> |
| INC | 49.83 | .020 |
| GRWTH | 36.19 | .028 |
| OCF | 5.52 | .181 |
| ROA | 2.27 | .441 |
| SIZE | 1.94 | .515 |
| LOSS | 1.88 | .531 |
| LEV | 1.53 | .655 |
| SA | 1.22 | .819 |
| IND | 1.04 | .961 |

| Panel B: VIFs OLS-regression (2) | | |
|-----------------------------------------|------------|--------------|
| <i>Variable</i> | <i>VIF</i> | <i>1/VIF</i> |
| INC | 65.76 | .015 |
| GRWTH | 46.19 | .022 |
| OCF | 7.78 | .129 |
| SIZE | 2.53 | .395 |
| ROA | 2.36 | .423 |
| LOSS | 1.98 | .504 |
| LEV | 1.40 | .714 |
| TYPE | 1.18 | .851 |
| IND | 1.06 | .939 |

| Panel C: VIFs OLS-regression (3) | | |
|-----------------------------------------|------------|--------------|
| <i>Variable</i> | <i>VIF</i> | <i>1/VIF</i> |
| INC | 58.73 | .017 |
| GRWTH | 42.62 | .023 |
| OCF | 6.80 | .147 |
| SIZE | 2.42 | .413 |
| ROA | 2.33 | .429 |
| LOSS | 1.99 | .502 |
| LEV | 1.48 | .676 |
| STAND | 1.19 | .843 |
| IND | 1.11 | .903 |

This table presents the variance inflation factors (VIFs) of the variables in the three OLS-regressions. VIF measures how much the variance of the specific variable would increase out of correlation with other variable(s). It is an indication for multicollinearity. Generally, a VIF that is greater than 10 is a sign of multicollinearity. In this case, the variables *INC* and *GRWTH* show high VIF values in OLS-regression (1), (2) and (3). These variables show multicollinearity with each other and the other variables in the model.

TABLE 10
Test For Model Specification

| Panel A: Model Specification Table OLS-regression (1) | | | | |
|--------------------------------------------------------------|--------------|------------------|----------|----------------|
| | <i>Coef.</i> | <i>Std. Err.</i> | <i>t</i> | <i>p-value</i> |
| <i>_hat</i> | .947** | .471 | 2.01 | .046 |
| <i>_hatsq</i> | -1.141 | 8.510 | -.13 | .893 |
| <i>_cons</i> | .000 | .004 | -.07 | .947 |
| <i>Adjusted R²</i> | .078 | | | |
| <i>N</i> | 154 | | | |

| Panel B: Model Specification Table OLS-regression (2) | | | | |
|--------------------------------------------------------------|--------------|------------------|----------|----------------|
| | <i>Coef.</i> | <i>Std. Err.</i> | <i>t</i> | <i>p-value</i> |
| <i>_hat</i> | .800* | .458 | 1.75 | .085 |
| <i>_hatsq</i> | -4.592 | 8.615 | -.53 | .595 |
| <i>_cons</i> | -.001 | .004 | -.16 | .872 |
| <i>Adjusted R²</i> | .137 | | | |
| <i>N</i> | 82 | | | |

| Panel C: Model Specification Table OLS-regression (3) | | | | |
|--------------------------------------------------------------|--------------|------------------|----------|----------------|
| | <i>Coef.</i> | <i>Std. Err.</i> | <i>t</i> | <i>p-value</i> |
| <i>_hat</i> | .959** | .475 | 2.02 | .047 |
| <i>_hatsq</i> | -896 | 8.53 | -.11 | .917 |
| <i>_cons</i> | .000 | .004 | -.04 | .971 |
| <i>Adjusted R²</i> | .122 | | | |
| <i>N</i> | 82 | | | |

This table presents the test for model specification. The variable of prediction *_hat* represents the predictive value of the model. In order for the model to be specified correctly *_hat* should be significant. The variable of squared prediction *_hatsq* should not be significant: if the squared predictors are significant, the model would not have any explanatory power, which means more variables should be added. In this case the p-values for *_hat* in OLS-regression (1), (2) and (3) are all significant. It can therefore be concluded that the model is correctly specified. The p-values for *_hatsq* are insignificant for OLS-regression (1), (2) and (3), indicating that no additional variables should be added.

TABLE 11
Test For Autocorrelation

| Panel A: Correlations Residuals OLS-regression (1) | | |
|-----------------------------------------------------------|------------------------|-----------------|
| | <i>Lagged residual</i> | <i>Residual</i> |
| <i>Lagged Residual</i> | 1.000 | |
| <i>Residual</i> | .192 | 1.000 |

| Panel B: Correlations Residuals OLS-regression (2) | | |
|-----------------------------------------------------------|------------------------|-----------------|
| | <i>Lagged residual</i> | <i>Residual</i> |
| <i>Lagged Residual</i> | 1.000 | |
| <i>Residual</i> | .228 | 1.000 |

| Panel C: Correlations Residuals OLS-regression (3) | | |
|-----------------------------------------------------------|------------------------|-----------------|
| | <i>Lagged residual</i> | <i>Residual</i> |
| <i>Lagged Residual</i> | 1.000 | |
| <i>Residual</i> | .264 | 1.000 |

The test for autocorrelation shows the correlation between the residuals and prior years' residuals. The correlation is relatively low in this case, indicating no autocorrelation.