

The effects of CSR activity on firm performance for companies located in the BRIC countries

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Abstract

Corporate social responsibility is a concept which received an increased amount of attention from the public, governmental bodies, the press and the business themselves. However, when investigating the research towards this topic, the findings are diverse with many different factors influencing this relationship. Additionally, it has been found that a majority of the research body is focused on explaining this relationship for companies located in developed countries, whereas developing countries are neglected. This study examines the effect of the proxies of CSR (being the ESG-index) on firm performance for both the short, and long-term (being RoA and Tobin's Q respectively). The dataset used is gathered from 2017 of 474 companies located in the BRIC countries. And a cross-sectional OLS regression analysis was adopted. However, based on this research, a negative and insignificant relationship was been found and therefore, no link has been established between the ESG index and both dependent variables. However, a positive relationship was established for firms with high ESG scores and the long-term performance of a firm.

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1. Introduction

Historically, Friedman suggest that, from a traditional economic perspective, managers should make decision maximizing the wealth of a firm's equity holders (Friedman, 1962). Therefore, managers should make decisions which maximize the present value of a firm's cash flow (let it be present or future) (Copeland, Murrin, & Koller, 1994). However, during the past decades, corporate social responsibility¹ has gained an increased amount of attention from the public, governmental bodies, the press and the business themselves. This increase in attention resulted in substantial sustainable investments, the publication of sustainable reports, and in-dept corporate analysis as well as fast governmental regulations and goals. Additionally, this rising attention also increases the scientific interest in the field of CSR, what actually drives CSR and what is the result of this CSR development (Malik, 2014). However, these developments could be considered as opposite to the traditional economic perspective. As they tend to be costly investments which yield no direct addition to the firm's current or future cash flow (Jensen & Meckling, 1976; Paine, 2002).

On the contrary, it can be argued that this development of socially responsible behavior could actually improve the firm's cash flow and might be consistent with the target of the firm's equity holders. As has been researched by McWilliams & Siegel (2000): social responsible behavior could, potentially, enable a firm to differentiate its products on the market by adding social responsibility. Additionally, sustainable investments can reduce a firm's risk to governmental fine exposure or reduce its exposure to risk (Freedman & Stagliano, 1991; Godfrey, 2004). Moreover, sustainable initiatives, can result in operational efficiency. Due to resource reducing initiatives, or investments aimed at improving energy efficiency, reduce carbon emissions and less transportation and operational expenses can decrease, leading to an improved cash flow. Therefore, it could be argued that there is an expected positive relationship between sustainable investments and firm performance.

When looking at the scientific research published regarding this topic, it must be noted that the findings are mixed. A number of resarches conducted by Konar and Cohen (2001), King and Lenox (2002), Callan and Thomas (2009); find a postivie relationship between corporate sustainable investments and firm performance. Whereas, Gonzalez-Benito & Gonzales-Benito (2005), and Aras et al. (2010); claim in their researches that there is no, or insignifficant, link between CSR and firm performance. Or, as researched by Chang & Kuo (2008); CSR has a positive, but only when the firm is highly sustainable. Therefore, it can be argued that there is still no consensus in the scientific world regarding the relationship between both concepts. Since most of the resarch is focussed on companies in developed countries, there is an increasingly interest in how the relationship works in developing countries. To contribute to this field of science, this paper will focus on the BRIC countries. Moreover, to try to fill this gap in the literature, the research question of this paper is developed as following: *What is the effect of CSR on firm performance in*

¹ Herafter named: CSR

the BRIC countries? To help answering this research question, a sub-question is established: *What is the effect of CSR on the short-run and long-run firm performance?*

This report starts with the literature review, explaining the relationship between CSR and firm performance in more detail by analysing previous published research. Moreover, this chapter defines, on a historical and present basis, the proxies used for both CSR and firm performance, as well as hypotheses developed. Hereafter, the variables selected for the research will be presented and with the following chapter explaining the methodology adopted, which choices has been made and how the data was gathered. Hereafter, the chapter containing all the analyses is presented, followed by the actual analyses of the results and the discussion. This paper finalizes with answering the previously mentioned research question, based on the sub-research question while adopting the results of the hypotheses.

2. Literature Review

When looking at the history of the research regarding this relationship, it can be noted that since the beginning of the scientific research the results have been diverse. Within some of the earliest research, a positive linear relationship is established (Moskowitz, 1972; Bragdon and Marlin, 1972; Bowman and Haire, 1975; Parket and Eilbert, 1975; Moskowitz, 1975; Belkaoui, 1976; Anderson and Frankle, 1980; Ingram, 1987). However, on the contrary, within the same decade of the researches which established a positive relationship, also the opposite can be found. When looking at the research conducted by Vance (1975), and Kedia and Kuntz (1981), this relationship shows a negative correlation. And when inspecting the research conducted by Fogler and Nutt (1975), Fry and Hock (1976) Alexander and Buchholz (1978), and Chen and Metcalf (1980), this relationship is inconclusive or insignificant.

Since the 70's and 80's, sustainability and its' relationship has gained an accelerated amount of attention. To try to explain this relationship better, the number of researches dedicated towards this topic also increased. However, even to date there is no consensus in regard to what the exact relationship between CSR and firm performance is. Even when multiple meta-analysis are conducted on previous research it is concluded by Roman et al. (1999), Orlitzky et al. (2003), and Margolis and Walsh (2003) that, although the majority is tended towards a positive relationship, there is a number of researches were an inconclusive, or a negative relation is concluded. Notable, Wu (2006), investigated the link between CSR and financial performance by mediating for firm size. Within this research it is illustrated that there is indeed a positive relationship between CSR and firm performance, the size of a firm is not of significant influence. Therefore, it can be argued that every firm has the possibility to profit from CSR investments.

When looking at the relationship between CSR and firm performance, and the possible influence of CSR it is noted by Donaldson and Preston (1995) and Porter and Kramer (2006) that further evolving the CSR initiatives further develop the competitive advantage of a firm. This competitive advantage, according to Baron (2008) can be attributed to the fact that firms are now able to attract customers whom value the added value of CSR. Additionally, as concluded by Baron, this might also affect the perception and behavior of investors. Particularly the investors who value these same initiations, even though it could lead to lower profits in the short run. As stated by Cheng et al. (2011) this can be attributed to the fact that companies face lower capital constraints and makes it easier to access additional funding. This observation is supported by Ghatak (2007), who noticed that firms whom consistently perform on the topic of CSR achieve higher profits then companies who break their CSR promises.

However, on the contrary to these strengthening characteristics of CSR it is noted by Fischer-Vanden and Thronburn (2011) that there is a chance that financial markets react negatively when a company announces to join environmentally friendly programs. This can be attributed to the fact that this announcement leads to negative financial performances on the short run. Brammer et al. (2006) concluded the same results, where announcements of sustainability efforts lead to a negative shock in the stock returns of a company. Mittal et al. (2008) argue in their paper that the relationship between CSR and firm

performance is a U-shaped relationship. This combines both 'groups' of conclusions, that in the early stage the relationship is considered negative at an early stage. Depending on the level of CSR, the relationship turns positive at a later state. This view is supported by Brammar and Millington (2008), which argue that the highest levels of CSR were associated with the highest levels of firm performance, and the lowest levels of CSR associated with the lowest performance. However, within their study they used only one variable for CSR; corporate charitability. This type of finding, that the relationship is U-shaped, has been reoccurring in the most recent research aimed at identifying the relationship. As stated, this conclusion was drawn by Brammer and Millington (2008), Mittal et al. (2008) and supported by the most recent research of Nollet et al. (2016). Nollet et al., used in their research the Bloomberg's ESG index (which will be explained further in this paper), as proxy for CSR and used both accounting and market-based measures for Firm Performance. That the relationship is U-shaped instead of linear is concluded based on the initial costs of the CSR investments and supports the fact that companies, as well as investors, should focus on the long-term benefits of these initiatives.

Why these researches tend to be inconclusive can be attributed to a number of observations. One of these observations is that each researcher uses a different selection of variables, both for CSR proxy, and for firm performance proxy. As noted by McWilliams and Siegel (2000, p. 603): *"Existing studies of the relationship between CSR and financial performance suffer from several important theoretical and empirical limitations."* A major limitation which is identified, is that some of the models which are used suffer from omitted variable bias and are thus, theoretically mis specifying the relationship.

According to Davidson and Worrell (1990), this lack of consensus can be attributed to three differences. the first reason is the usage of questionable social responsibility indexes. Secondly, there are poor measurements of financial/firm performance. Thirdly, unsuitable sampling techniques or analysis techniques are used. Supported by Ruf et al. (2001), which suggest that there is a major inconsistency regarding the theoretical foundation of the relationship, differences in measurement of CSP and firm performance, mismatch between variables and a lack of proper methodology. When taking these issues into account, it might be logical why the results of the scientific world are so diverse. In addition to the previous mentioned researchers, Galbreath and Shum (2012), Griffin and Mahon (1997), Margolis and Walsh (2003), and others have questioned the applied approaches used in the literature.

To overcome the issues, recent studies regarding this topic attempted to address a causal effect by incorporating the endogeneity which might influence the outcomes. This literature suggests that there might be more variables which cause this endogeneity (such as firm level heterogeneity and characteristics). Recently, Garcia-Castro et al. (2010) investigated the relationship while keeping this endogeneity in account. They conducted an OLS estimation technique using variables such as good management quality, company culture and values. It is concluded that there is a positive and significant relationship between sustainability and company performance using this OLS. To further account for endogeneity, a fixed-effect model was established, an IV estimator is introduced, and past financial performance is incorporated. Through this newly established model, the relationship becomes

insignificant. When altering the IV variable, the same conclusions can be drawn. However, as indicated by the researcher, a reason for this difference could be that the OLS estimation suffers from endogeneity and thus, shows a different result as the fixed-effect model. It must be noted that, when Garcia-Castro et al., developed the OLS estimation, certain control variables which were used in the fixed-effect model, were not incorporated, possibly biasing the results.

Contributing to the same line of thought, Surroca et al. (2010) adopt a two-stage estimation technique which corrects for endogeneity issues. Within this analysis, certain intangible assets of a company are taken into account through the essence of mediating variables. These variables are innovation, human capital, reputation and culture. These variables are analyzed through the possible effect of a causal relationship. Within this paper it is argued that CSR results in an improvement of these intangible assets, which in turn lead to improved firm performance. Therefore, the relationship between CSR and firm performance is not direct, but indirect through the improvement of these characteristics.

Moreover, as illustrated, there are a number of different approaches concerning the relationship of CSR and firm performance. Newer analytical approaches are being adopted to further eliminate statistical issues such as endogeneity effects and the (in)direct effects of this relationship is further elaborated upon. Based on the previously mentioned researches, it can be concluded that the link between CSR and firm performance is still not properly researched. Different techniques and variables lead to different conclusions. Therefore, it is necessary to conduct a research using the appropriate technique which corrects for endogeneity issues and to use variables which are relevant to firm performance to limit the omitted variable bias.

To investigate the research, the right proxies must thus be identified. As each researcher indicated its own definition of CSR, firm performance or which variables should be incorporated in the theoretical framework, it must be investigated which variables are considered mandatory for the relation, and which variables should not be incorporated.

When looking at the region to be analyzed in this paper, a majority of the research focusing on the relationship is focused on the developed world. Specifically, North America and Europe. Due to this, the focus of this research will be redirected to less researched areas. Even though this is nothing new, it must be noted that most research applied to developing, or transition countries are focused on multinational companies and their CSR activities in these types of countries (Amaeshi & Amao, 2009; Mishra & Suar, 2010). However, little focus can be found on activities of domestic companies. When evaluating the developing countries, one of the most important blocks of developing countries are the BRIC (Brazil, Russia, India, China) countries. These countries experienced massive economic growth over the past 20 years, but at a cost of environmental sustainability. Therefore, it might be useful for the literature to understand the relationship which current CSR initiatives have on the firm performance located in the BRIC countries.

2.1. CSR and its definitions

As has been mentioned already, a major part of the differences in findings can be attributed to the fact that researchers use different proxies for CSR. What we now define as CSR differentiated over time and was first identified by Brundtland (1987, p. Chapter 2) as; Sustainable development, or: *“The development that meets the needs of the present without compromising the ability of future generations to meet their own needs”*. This definition has been the starting point of most of the sustainability research conducted. However, throughout the years this concept evolved to later definitions such as; Corporate Citizenship (Marsden and Andriof), Sustainable Entrepreneurship, Triple Bottom Line (Elkington 1997), Business Ethics (Kilcullen and Ohles Kooistra 1999) and to what we now know as Corporate Social Responsibility (Guanzi and O’Brien 2000, van Marrewijk 2001, Gobbel 2002).

When looking at the past researches focusing on CSR, it is noted that in the 70’s and 80’s the index of Milton Moskowitz’s social responsibility ratings was favorable to use. Sturdivant and Ginter (1984), Alexander and Buchholz (1978) and Cochran and Wood (1984) used this index as proxy for CSR and the results was that there is an insignificant relationship between the index and market-based returns, which were ‘share growth’ and ‘returns adjusted for risk. In the later decade, the 90’s, the index developed by Fortune Magazine; the annual survey of corporate reputations, was a popular index to use as proxy for CSR. McGuire et al. (1988) and Cotrill (1990) used this index to test the relationship on various measures of financial accounting based returns, market returns adjusted for risk and market concentration/share, where it showed a positive and significant relationship for most variables.

In an attempt to illustrate the overall impact a company has, MSCI developed the ESG index. This index focuses on the Environmental, Social and Governance impacts, which firms have. For environmental activity these indicators² are; environmental scores and social responsibility, for social responsibility factors such as; number of employees and turnover rate and gender diversity are measured. Finally, governance mechanics are taken into account, these measures consist of; size of board, board duration and meetings per year (Bassen & Kovacs, 2008). However, as indicated by Peiris and Evans (2010), the ESG index might lack consistency and undermines standardized definitions needed for their comparative value. It is the case that companies are willing to cooperate by providing necessary or accurate data regarding their own sustainable and financial performance or might be biased in their own favor. In an attempt to solve this issue, ASSET4, a company which collects, and sells objectively, and comparable ESG data of companies all over the world provides their own accumulated ESG scores. To this date, this index is able to provide a high level of in-depth information as it is consisting of three different subcategories. Due to the extensive information the ESG index is able to provide, when comparing to different indices illustrating CSR, the ESG index developed by Bloomberg will be used as the proxy for CSR.

² Relevant information on how the scores are calculated is given in Appendix 1.

2.2. Firm performance and its definitions

When looking at the proxies of firm performance which has been used in the scientific field, it can be noted that a wide array of variables can be selected. In the literature, a number of market-based, as well as accounting-based measures are used. Additionally, variables illustrating the short-run, or the long-run are considered. Examples of these accounting and financial based variables are: Return on Assets (ROA), Return on Equity (ROE), Tobin-Q, Earnings Per Share (EPS), Dividend Yield (DY), Operation Profit (OP), and countless others. Of the mentioned variables for accounting and market-based measurement, RoA, RoE and Tobin's Q are by far, most favorite to illustrate firm performance. When investigating the variables of RoA and RoE, it must be noted that they are mainly backward looking, accounting based variables. What they illustrate is; the higher RoA or RoE is, the more efficiently the assets are used in favor of shareholders (Haniffa & Hudaib, 2006; Ibrahim & AbdulSamad, 2011).

However, as explained by Fama (1970), when evaluating the long-term performance of a firm, market-based performance measures are better forward looking variables. When evaluating the literature focusing on the long-term market-based performance measures, Tobin's Q, Market-to-Book Value (MTBV) and Market Value Added (MVA) measures, are considered most popular. However, Tobin's Q is most used, by far (Demsetz & Villalonga, 2001). Since the relationship between CSR and firm performance might be influenced when looking at the long, or at the short run, the two most widely used indicators will be used. These indicators are RoA for the short-run and Tobin's Q for the long-run.

3. Research framework

Within this chapter, the theoretical lens through which the research problem will be answered, will be presented. It starts with clearly developing the research question and sub-questions. Hereafter the hypotheses are developed. It finalizes with the presentation of the variables used and the methodology adopted to answer the research question.

3.1. Research question and hypotheses development

As has been illustrated in the previous chapter of this paper, the scientific world is still rather diversified when it comes to the relationship of CSR and firm performance. A number of researchers claim that there is a positive relationship (Moskowitz, 1972; Bragdon and Marlin, 1972; Bowman and Haire, 1975; Paret and Eilbert, 1975; Moskowitz, 1975; Donaldson and Preston, 1995; Roman et al., 1999; Konar and Cohen, 2001; Orlitzky et al., 2003; King and Lenox, 2002; Margolis and Walsh, 2003; Porter and Kramer, 2006 and Callan and Thomas, 2009). On the contrary, the opposite effect is illustrated in the researches of Vance (1975), Chen and Metcalf (1980) and Kedia and Kuntz (1981). There is also a third group of researchers which show that this relationship is insignificant or inconclusive (Fogler and Nutt, 1975; Fry and Hock, 1976; Alexander and Buchholz, 1978; Gonzales-Benito and Gonzales-Benito, 2005; and Aras et al., 2010).

Why these researches tend to be inconclusive and diverse can be attributed to a number of observations. One of these observations is that each researcher uses a different selection of variables, both for CSR proxy, and for firm performance proxy. Moreover, according to Davidson and Worrell (1990), this is because of usage of questionable CSR indexes, poor measurement of firm performance and usage of unsuitable/poor analyzing and sampling techniques. To try to fill in this gap, the research question of this research paper is stated as following: *What is the effect of CSR on firm performance in the BRIC countries?*

When looking at the proxies used for measuring CSR and firm performance, historically, a diverse selection was used. Based on this, it is argued that there is no consensus in the scientific world regarding this relationship. Additionally, as illustrated by Brammer et al. (2008) and Mittal et al. (2008), the effects of CSR and firm performance also differentiate on whether the firm performance proxy is focused on the short-term, or on the long-term. It is argued that CSR has a negative effect on the short run, but bears a positive relationship on the long-term. The main arguments given is that CSR investments are costly, and thus perceived negatively on the stock market, leading to a negative shock. However, the relationship might have a positive influence on the long-run, because it leads to a comparative advantages, allows for easier access of capital and sustainable companies might be more attractive for investors sharing the same view. Therefore, two sub-research questions are developed for this research: *What is the effect of CSR on the short-run and long-run firm performance?*

As has been mentioned in the literature review, the ESG index will be used to measure CSR performance of the firm, while RoA and Tobin's Q are used to measure the firm performance. Since the ESG index is based on three different pillars (Environmental, Social, and Governance), it will be used accordingly and

subdivided into three variables. Additionally, RoA is used for the short-run firm performance and Tobin's Q used for the long run performance.

However, what the possible effects are of the ESG indices on both firm performances, has not yet been explained. Therefore, the literature focusing on these effects has been reviewed.

3.1.1. Environmental performance on firm performance

when looking at the influence of environmental performance on firm performance, Hassel et al (2005), offers two different views on the impact. The first view is described as the 'cost-concerned approach', which basically views environmental initiatives as extravagant cost which result in reduced earnings, due to increased prices. The opposing view is the 'value-creation approach' which illustrates that environmental initiatives add value to the firm's profitability ratios. Following these two opposing views, past literature can be classified. When looking at the short-term relationship, Friedman (1970) states that managers merely promote sustainable initiatives to pursue their own interests instead of it being in the company's benefit. Strengthened by the findings of McWilliams and Siegel (2000), whom find no relationship between environmental performance and firm performance. Mainly on the basis that firms engaging in sustainability activities have increased product prices, while firms who are not engaged in such activities are able to sell at lower prices, empowering them in the short run. Jayachandran et al. (2013), and Jacobs et al. (2010) support this conclusion.

However, on the contrary, a majority of the literature supports an opposite concept, where environmental performance is actually a value-creation approach. Russo and Fouts (1997) find a positive correlation between environmental performance and corporate performance while being moderated for industry growth. Additionally, Cormier et al. (2007) argue that environmental responsible companies are often found to be more transparent and credible, improving their reputation for investors and stakeholders, while also lowering cost of credit. Which can argue in favor of positive future growth perspectives. In similar vein, Arafat et al. (2012) conclude that firms in developing economies who tend to be more environmental friendly, increase their profitability in the future. This upward trend for changing behavior when looking at the short, or long term is enforced by researches Dowell, Hart and Yeung (2000) and Derwall et al. (2005), whom found a positive relationship between environmental performance and firm value (measured by Tobin's Q). When taking both perspectives into account, it can be noted that the first perspective (the cost-concerned approach) focusses on the short-term firm performance effect and tends to be a negative relationship. Opposing this perspective, the latter 'value-creation approach' focusses on the long-term effects by taking into account improved investor and stakeholder perspective. This approach views the long-term relationship between environmental performance and firm performance as a positive relationship. On this basis, two hypotheses have been developed.

H1a: Environmental activity has a negative effect on the short-term firm performance (being RoA).

H1b: Environmental activity has a positive effect on the long-term firm performance (being Tobin's Q)

3.1.2. Social performance on firm performance

In addition, the effects of environmental performance on firm performance, the effects of social performance on firm performance will be evaluated. When looking at the research conducted by Brammer and Millington (2008), unusually good social performers in regards to charitable giving, a sub-part of CSR, tend to over-perform on the long-term basis. Hillman and Keim (2001) have found in their research, that excellent community performance positively affect financial performance, while community underperformance lead to a negative effect on financial performance. An argument for the positive effect on firm performance can be subtracted from Pava and Krasz (1996), whom detected a shift in investor behavior. This shift entails that investors started considering social criteria when allocating funds to companies. Positively affecting social active companies by improving their credit ratings. In similar vein, a study conducted by Brown (1998), where stock performance between 1984 and 1996 have been investigated, concluded that firms with reputation of high social performance have higher firm performances. However, these researches mainly focused on the longer-run effects of social performance on firm performance. When studying the short-run relationship between the two variables, there a number of researches which suggest there is a positive relationship. An example is the research conducted by Ferrero-Ferrer et al. (2012), whom state that when companies engage in social good doing, it will increase their visibility which, subsequently, attracts more customers.

However, counter-arguing this positive relationship, a body of research found that this positive effect is conditionally. Inoue et al. (2010), conducted an analysis to identify the relationship between the short term and long term performance against different aspects of CSR. Using RoA and Tobin's Q as proxies, the effects where only positive for half the industries examined. However, an even larger body of research found no, or insignificant relationship between social performance and firm performance. Similar views are shared among the research conducted by Berman et al. (1999), Seifert et al. (2003) and Jiao (2010), whom agree that no significant or neutral relationship exist between social performance and firm performance. However, this could be due to the fact that companies should match the communities needs with their own in order for social performance to be influential for firm performance (Waddock & Graves, 1997). Tying everything up, the majority of the research focused on the relationship between social performance and firm performance tend to expect a positive relationship for both the long, and short run. However, some researches concluded that a neutral, or insignificant relationship between both variables exist. Based on this, the following two hypotheses are constructed.

H2a: Social activity has a positive effect on the short-term firm performance (being RoA).

H2b: Social activity has a positive effect on the long-term firm performance (being Tobin's Q)

3.1.3. Corporate governance activity on firm performance

When discussing the third pillar of the ESG index, being corporate governance, it can be noted that most of the existing research shows an empirically positive relationship between both variables. On a firm level, Holthausen and Larcker (1999) find that companies which have developed weaker governance

mechanisms, have stronger agency problems and therefore, weaker firm performance. The agency problem, as defined by Jensen and Meckling (1976, p. 308): “*an agency relationship as a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent*”. The agency problem arises when both parties have a conflict of interest. Where each party aims to maximize its own welfare. To ensure that the agent (in a company’s case, the manager) acts in the interest of the shareholder, the right incentive should be given, or costs occur to monitor the agent. The latter is also known as agency costs (Jensen & Meckling, 1976). Therefore, weaker governance mechanisms lead to higher probability of the agency problem, which in turn lead to higher agency cost.

Continuing this line of research, several researches confirm that good corporate governance positively affects firm performance. According to Bauer et al. (2004), good corporate governance lead to higher investor trust, which in turn assesses the firm as less risky and therefore, lower rate of returns are expected which positively influencing firm value. Additionally, Gomer et al (2004), studied US companies in the 1990 and concluded that firms with weak corporate governance have a significantly lower firm value expectation and valuation. Again, a similar argument is given in this paper. That firms with weak corporate governance have lower firm value due to the increase in agency costs which are estimated by investors. The positive effects of corporate governance and firm performance have been supported by Cremers and Nari (2005), and Brown and Caylor (2006) and Orlitzky et al. (2003).

However, a majority of the researches focused on corporate governance mainly conclude that there is no effect. McWilliams and Siegel (2000) finalize their paper with the fact that the general relationship between corporate governance and firm performance is neutral, or insignificant. Strengthened by Bhagat and Bolton (2008) whom could not confirm that there was a causality between poor governance and lower stock returns in their research. Contrarily, Core et al. (2006) have proven that within their dataset, companies with poor governance actually have slightly higher stock returns. However, note that within these particular researches, stock returns were used as variable instead of return on assets or Tobin’s Q. Altogether, the majority of the research regarding this relationship conclude with a positive relationship of corporate governance and firm performance. On this basis, the following two hypotheses are established:

H3a: Corporate Governance has a positive effect on the short-term firm performance (being RoA).

H3b: Corporate Governance has a positive effect on the long-term firm performance (being Tobin’s Q)

3.1.4. Differentiating effect between high and low scoring firms

On the basis that companies which currently have low ESG scores are not able to reap the benefits of engagement in ESG activities, it could be argued that they will experience lower firm performances when compared to companies which are already engaging in high ESG activities. Continuing this line of thought, it has been argued that setting up ESG activities require substantial investments (Jensen & Meckling, 1976; Paine, 2002). Whereas continuing these activities have diminishing costs. Therefore, the following

hypotheses has been constructed to test whether companies with high ESG scores are associated with higher performances:

H4a: Companies with high ESG scores are associated with higher short-term firm performances (Being RoA)

H4b: Companies with high ESG scores are associated with higher long-term firm performances (Being Tobin's Q)

3.2. Variable selection

To answer the research question and the sub-questions stated in the previous chapter, the independent, dependent, and control variables must be selected. These variables will be presented below, and argued why there are included in this research.

3.2.1. dependent variables

As has been argued in the literature review, and supported by the research problem design, there will be two main dependent variables for this research. These variables are indicators for short, and long-term firm performance.

When researching the short-term effect of CSR on firm performance, the variable of the Return on Assets is used. It is a account-based measurement focused on the past performance of the company. As CSR investments tend to directly influence this return, it is focused on the short-term and will directly. The variable RoA is established by dividing the net operating income by the average total assets. Therefore, the RoA can be calculated as following:

$$\text{Return on assets ratio} = \frac{\text{Operating Profit Margin}}{\text{Total Asset Turnover}}$$

As argued by Jahan (2012), RoA assess how efficiently the company can manage its assets to generate profits. This ratio is considered valuable for investors as it illustrates clearly how well a company is managed, or able to manage its assets.

For researching the effect on the long-term firm performance, Tobin's Q is used to represent the firms' value from a market-based approach. This approach is, as argued, best to explain this long-term relationship. Tobin's Q is developed by dividing the total market value of a company by the total asset value of the company.

$$\text{Tobin's Q} = \frac{(\text{Market capitalization} + \text{Total liabilities})}{(\text{Common stock} + \text{Total liabilities})}$$

As is argued by Wagner (2010), the total market value of a company is defined by the number of shares outstanding multiplied by the share price (for publicly listed companies). As argued in the same research, this measure is closely related to the ratio between (in)tangible asset values. It is a measure which adopts a forward looking approach and illustrates best what the future expectations of the company are. Another reason why this variable is selected for the long-term performance, is that it is easily comparable to other firms as there is no adjustment or normalization needed, which is the case when using other market-based approaches (Lang & Stulz, 1994)

3.2.2. Independent variables

As has been illustrated in the literature review, the CSR ratings of a company will be used to establish the effect it has on the firm performance. For this measurement, the ESG scores will be used. The main reason this measurement is used, is because it effectively measures CSR on three different pillars. These pillars are: environmental activity, social activity, and governance activity. As has been argued, these three pillars will be divided into three different independent variables as to measure a more precise influence and allows for an in-depth analyzes of the relationship. The three pillars are each based on its own indicators. For economic activity, these indicators are subdivided into: Client Loyalty, Performance, and Shareholder Loyalty. For environmental activity, these indicators are: Resource Reduction, Emission Reduction, and Product Innovation. Finally, for social activity, the indicators are: Employment Quality, Health and Safety, Training and Development, Diversity, Human Rights, Community, and Product Responsibility. In total, more than 250 key performance indicators are used to establish the main indicators. The final scores range between 0 to 100% and are benchmarked against other companies within the dataset.

However, since originally the ESG index consisted of four pillars (which will be explained in the data collection section), a new average weighted score has been calculated using the following formula:

$$\text{Weighted score} = \frac{\text{Environmental score} + \text{Social score} + \text{Corporate governance score}}{3}$$

3.2.3. Control Variables

To effectively measure the relationship between CSR and firm performance, multiple control variables are added which influence firm performance.

As has been argued by Robins and Wiersema (1995), larger firms are positioned better to attract investment funding needed for continuing their growth. Additionally, this funding can be used to utilize opportunities in the market better and enables flexibility in allocating resources to areas which can be considered weaknesses of the company. What this allows, is that whenever an issue occurs, bigger firms are able to effectively and efficiently solve this issue before it harms their performance (Waddock & Graves, 1997). When looking at proxies which effectively measure firm size, in the same article of Waddock and Graves, it is illustrated that these are both the total value of the assets, and the number of employees.

Without controlling for these influences, the relationship between CSR and firm performance cannot be analyzed properly. Therefore, both variables will be used within this research.

An additional variable which has been selected is the level of risk a company experiences. Risk, measured by dividing long-term debt by total assets, is a ratio illustrating the default possibility by not being able to interest. This control variable has been deemed to be negatively influencing company performance and Tobin's Q (Dowell, Hart, & Yeung, 2000). As has been mentioned by Yazdanfar and Öhman (2015), higher level's of debt are related to higher agency costs of external debt and thus negatively influencing firm profitability. Therefore, the expected relationship within this research is also negative. As mentioned, the following formula is used to calculate the risk level of a company:

$$Risk = \frac{Total\ Debt}{Total\ Assets}$$

The next control variable selected is the sales growth rate of a company. According to Schmalensee (1989), Hirsch (1991) and Konar and Cohen (2001): Sales growth, and more specifically, recent sales growth positively influences firm performance. Therefore, in this research, the growth of sales from 2016 to 2017 has been used as a control variable. This has variable been calculated using the following formula:

$$Growth = \frac{Sales\ 2017 - Sales\ 2016}{Sales\ 2016} * 100$$

The final control variable selected for this research, is the liquidity ratio of a firm. Omondi and Muturi (2013) concluded in their paper that a company's financial performance is influenced by the optimal liquidity level of a firm. This is the result of the trade-off risk and return ratio's. This finding is supported by researches of Kaddumi and Ramadan (2012), Raheman and Nasr (2007) and Alzorqan (2014). The liquidity ratio of a firm has been calculated using the following formula:

$$Liquidity = \frac{Total\ Assets}{Total\ liability}$$

3.3. Variables selected

Concluding the above mentioned information, an overview of which variables are selected can be seen in the table below.

Dependent Variable	Independent Variable
Tobin's Q (tobq)	Environmental activity (envs)
Return on assets ratio (roar)	Social activity (socs)
	Corporate governance activity (govs)
	Weighted Score (weis)
Control Variables	
Log of total value of assets (Intota)	Growth (grow)
Log of number of employees (lnempl)	Log of liquidity (lnliqu)
Log of risk (lnrisk)	

Table 1: List of variables used

4. Research Methodology and Data

To successfully conduct this research and to illustrate what the effects of CSR on firm performance (Tobin's Q, and RoA) are, statistical analysis will be conducted. For this research, the focus is on the relationship for companies located within the BRIC countries. The information available for the year 2017 was used, pooling information of 485 companies spread over four different countries.

As the relationship between the input and output variables should be constant with respect of the time period, the selected variables can be regarded as time-invariant. As the data thus contain a time specification, a cross-sectional analysis will be conducted. This information will result in the following regression model:

$$y_{it} = \alpha + \beta X_{it} + u_{it}$$

In this model, the y_{it} is the dependent variable (in this case, Tobin's Q, and RoA), X_{it} represents the explanatory variables due to the time-invariance and the alpha is the constant term due to differentiation of effect. The u_{it} accounts for the unobserved variables which might influence the dependent variable.

When taking into account the selected variables, the following two main econometric models are constructed. For the short term effect, RoA will be used as dependent variable:

$$RoA_i = \alpha - \beta envs_i + \beta socs_i + \beta govs_i + \beta lnsale_{17_i} + \beta lnempl_i - \beta risk_i + \beta grow_i + \beta liqu_i + u_i$$

Where $i = 1, \dots, 4$

When looking at the long-term effect, Tobin's Q will be used as dependent variable, leading to the following model:

$$Tobin's\ Q_i = \alpha + \beta envs_i + \beta socs_i + \beta govs_i + \beta lnsale_{17_i} + \beta lnempl_i + \beta risk_i + \beta grow_i + \beta liqu_i + u_i$$

Where $i = 1, \dots, 4$

4.1. Database selection and data collection

Since the research is focused on the firm level, and contains multiple variables including financial and sustainability variables, it is concluded that Eikon is the best suitable database. Eikon provides information regarding a wide range of different company classes. Eikon, and in this case mainly Datastream, is the world's most comprehensive financial database which currently has 65 years of information on company level financial details (Refinitiv, 2019). Additionally, Eikon uses over 2,000 contributing sources and is deemed trustworthy when it is in regards to the data it contains.

The ESG performance data, as mentioned before, is taken from the ASSET4 database, incorporated in Eikon. ASSET4 is a company that collects, and sells, objective and comparable ESG information to institutions. The

scores accumulated are provided as a rating (scoring between 0 and 100%) and benchmarked against other companies within the database. Although, normally the data provided is based on four different pillars (Environmental, Social, Governmental and Economic), the economic pillar has been left out of this research due to its irrelevance of the goal of the paper.

The subset which is used in this research is the ASSET4 BRIC set. Originally, the number of companies included in this subset was 505 companies. However, after deleting the companies which had a significant amount of missing data for the scores, 474 companies were left. This would have been reduced to less than 200 if the research would be conducted over multiple years, also why this paper only focusses on the year 2017 (as it is the most relevant, and the only year where a large enough dataset would remain). Additionally, the dependent and control variables were collected from DataStream. Although the variable R&D, as argued by current research papers, should be included in the research, the information availability of this variable was too incomplete to be taken into account.

4.2. Dataset valuation

As mentioned, this research uses cross-sectional analysis as the timespan of the data is only one year (2017), which is the most recent year and therefore illustrates the most accurately what is the latest trend.

4.2.1. Missing values

To ensure that the analysis is conducted based on quality data, the dataset has been tested on the multiple assumptions of the OLS estimation technique. However, due to the sample size of the research being “only”

Variable	Missing	Total	Percent Missing
ISIN	0	474	0.00
Company name	0	474	0.00
GGISO	0	474	0.00
Company code	8	474	1.69
Weighted score	0	474	0.00
Environmental score	0	474	0.00
Social score	0	474	0.00
Governmental score	0	474	0.00
Total assets	0	474	0.00
Total number of employees	37	474	7.81
Sales of 2016	7	474	1.48
Sales of 2017	0	474	0.00
Total debt	17	474	3.59
Market capitalization	1	474	0.21
Total liabilities	0	474	0.00
Common stock	0	474	0.00
Total asset turnover	1	474	0.21
Operating profit margin	1	474	0.21
countrynum	0	474	0.00
Country	0	474	0.00
countryfe1	0	474	0.00
countryfe2	0	474	0.00
countryfe3	0	474	0.00
countryfe4	0	474	0.00

Table 2: Missing observations

474 companies, it falls below the threshold of 500+, for outliers to have no significant effect on the results (Berry & Feldman, 2011). Therefore, the sample should be tested for outliers and/or influencers. To establish whether the dataset used suffers from outliers, or influencers, a series of tests were conducted. Hereafter, the dataset will be tested on the assumptions of OLS to establish if the regression method can be used, if not, other options will be evaluated. However, before establishing the effects of outliers, the missing values of the control variables will be filled. In table 2, the amount of missing values per variables are illustrated. As can be seen, eight variables display missing values. The variable of company code is irrelevant in this case due to value not being incorporated in the final analyses. When looking at the table, it is noted that of

the variables with missing observations, all are control variables where the missing values can be replaced

through imputation³. The most common way of replacing missing values is by calculating the average value of the variable and use this number to replace the missing value (Allison, 2001). However, since the dataset contains four different countries, the mean value will be calculated for each of the country individually, as can be seen in table 3. Where avg stands for 'average'.

Country	Avg sale 2016	Avg sale 2017	Avg employees	Avg tot. Debt	Avg mark. Capt.	avg tot. Assets turnover	avg oper. Profit margin
BR	7052234	7962668	28578.26	11576314	10372733	.5294737	14,66
CN	14294185	15463367	43141.28	20961382	20951382	.5096323	16,32
IN	6412648	6564512	29873.91	6688685	13046691	.6161616	16,71
RU	15437941	19872838	124499.8	11069245	17930062	.67	23,08

Table 3: Average values per variable and per country

Now that the missing observations in the dataset has been handled, the outliers can be identified and variables checked on their normal distribution.

4.3. Outlier identification and variable logging

In order to give a clear overview of the variables used in this research, the descriptive statistics have been computed. The results of the descriptive statistics are presented in table 4. The sample size of this study consists of four countries and data gathered is from the year 2017. As can be seen, the total number of observations is 480. however, when looking at the minimums and maximums of the variables, it must be noted that almost every variable has a huge spread, which might indicate severe cases of outliers and/or influencers.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Tobin's Q	474	1.412	1.099	0.207	9.260
Return on asset ratio	474	0.0698	0.0707	-0.155	0.387
Weighted score	474	42.82	24.62	7.407	92.62
Environmental score	474	51.90	28.67	12.07	95.19
Social score	474	49.56	29.04	7.470	96.17
Corporate governance score	474	26.99	23.34	1.530	92.26
Total assets	474	7.536e+07	3.233e+08	384,604	3.747e+09
Total number of employees	474	42,467	73,668	17	494,297
Risk	474	0.594	2.342	0.000196	37.91
Growth	474	0.299	3.464	-0.931	75.23
Liquidity	474	1.957	1.647	0.915	24.20

Table 4: Descriptive statistics

Due to the fact that the database has less then 500 observations, it must be tested on the presence of outliers. There are three ways an observation is unusual.

1. **Outlier:** An outlier is an observation with large residual. This observation has an dependent-variable value which is unusual when compared to the rest of the data entries and may indicate sample peculiarity (Jaccard, 2003).

³ Imputation: Missing values are estimated using information present in the data

2. **Leverage:** An observation with an extreme value on an independent variable. This observation is then considered a point with high leverage, meaning that the observation deviates from the mean.
3. **Influence:** An observation influence the coefficient if removing the observation changes the estimate substantially.

Whereas the first two characteristics are not necessarily troublesome, the third characteristic is what should be approached with caution. To further illustrate presence of outliers, a graph matrix has been established, which can be found in table 5. When zooming in on the graphs between Tobin's Q and Total assets, Level of debt, and Growth rate of sales (found in appendix 3), it is noted that certain values are extremer when compared to the majority.

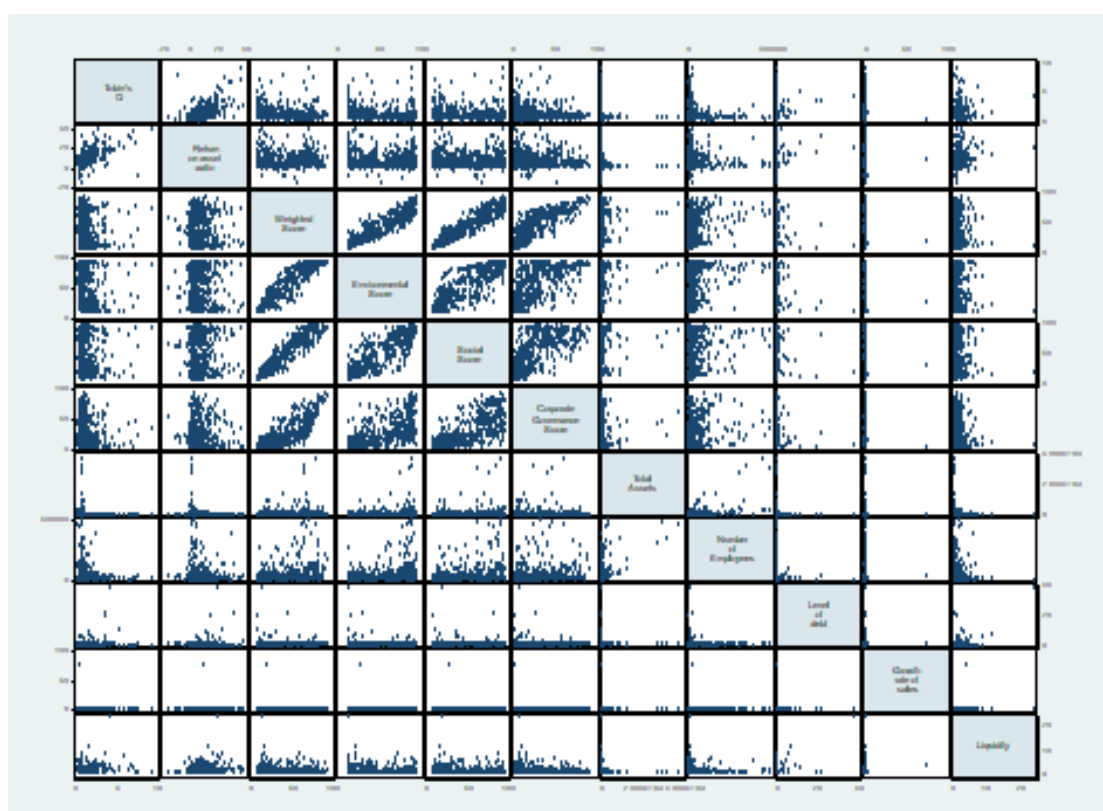


Table 5: Graph matrix

Before taking any actions to deal with the cases of extreme values, or outliers, certain steps can be undertaken as to reduce the severity of these cases. For this, the normal distributions of the values have been observed to investigate whether these variables are actually normally distributed. This step is important for the further testing of the hypotheses through regression analysis. The distributions of the variables can be found in appendix 4. From these distributions it is noted that each and every variable tested are extremely right skewed. meaning the majority of observations fall below the median. To solve this issue, the log of the variables have been taken to ensure a more normalized distribution of the variables, as seen in appendix 5, which also limits the influence possible outliers can have on the regressions. Note that the variable total asset turnover has not been logged due to it being a ratio. Moreover, variables growth and total common stock, have not been logged due to the presence of negative values. With Tobin's Q as

the initial dependent variable, the regression analysis in table 6, model 1 has been established. Additionally, model 3 illustrates the regression while using return on asset as dependent variable.

On the basis of the regression in model 1, the studentized residuals have been computed, where the list of extreme values can be found in appendix 4. Studentized residuals were preferred above standardized residuals due to its application for finding and evaluating residuals. Studentized residuals are calculated from the model fit to every observation except the observation which is diagnosed. Therefore, the influence of the observation can be determined due to its influence on the regression model (Kutner, Nachtsheim, & Neter, 2004). Generally, observations with a studentized residual which surpasses the threshold of two (being both positive or negative) is considered an influencer and affects the coefficient significantly enough to be eliminated. Following this procedure, 18 observations which significantly influence the coefficients have been removed from the dataset.

	Tobin's Q Model 1	Tobin's Q Model 2	RoA Model 3	RoA Model 4
Environmental score	-0.001 (0.41)	-0.001 (0.45)	0.000 (0.28)	0.000 (0.25)
Social score	0.002 (0.55)	-0.002 (0.81)	0.000 (1.43)	0.000 (1.12)
Corporate governance score	-0.002 (0.78)	0.000 (0.23)	-0.000 (0.97)	-0.000 (0.53)
Log of total assets	-0.261 (6.96)**	-0.171 (7.20)**	-0.013 (5.76)**	-0.011 (5.11)**
Log of number of employees	0.042 (1.16)	0.046 (2.03)*	0.006 (2.77)**	0.007 (3.38)**
Log of risk	-1.492 (2.89)**	-1.253 (3.41)**	-0.035 (1.10)	-0.028 (0.85)
Growth	-0.019 (1.46)	-0.013 (1.69)	-0.000 (0.25)	-0.000 (0.11)
Log of liquidity	2.246 (1.54)	1.187 (1.16)	0.590 (6.52)**	0.582 (6.33)**
_cons	4.293 (2.14)*	3.623 (2.55)*	-0.367 (2.94)**	-0.412 (3.24)**
R^2	0.23	0.26	0.28	0.28
N	474	456	474	456

* $p < 0.05$; ** $p < 0.01$

Table 6: Regression analysis including and excluding outliers

Running the same regression as model 1, model 2 of table 6 has been estimated. In turn, model 4 illustrates the same regression as model 3 without the influential observations. Although, it should be noted that the result have not significantly changed. Most noticeable, the fitness of both models increased very slightly without the inclusion of the influencers. Moreover, no coefficient change significantly without the expected outliers and there is no theoretical foundation found to exclude the found outliers. Therefore, those outliers will remain in the dataset which will be used for the final regressions.

The same procedure has been followed when the outliers with a studentized residual of larger than 3 (which were 10 observations) were removed, leading to no significant changes in the estimated regression.

Finally, the same procedure was followed when identifying the studentized residuals and only the most extreme observation was removed from the dataset. This too did not lead to significant changes in the illustrated coefficients or significances.

4.4. Regression analyses formula based on hypotheses

To test the hypotheses developed in chapter 2, multiple regressions were conducted to illustrate the hypothesized effects. The formula's which will be used for these regressions, are presented below. The definitions used in the formulas can be find in table 1 of section 3.3. Additionally, the predicted sign has been incorporated in the formula. These formula's will be tested in the following chapter.

To answer the first set of hypotheses, the environmental score will be used.

H1a: Environmental activity has a negative effect on the short-term firm performance (being RoA)

$$RoA = \beta_0 - \beta_1 ENVS + \beta_2 LNTOTA + \beta_3 LNE MPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

H1b: Environmental activity has a positive effect on the long-term firm performance (being Tobin's Q)

$$Tobin's Q = \beta_0 + \beta_1 ENVS + \beta_2 LNTOTA + \beta_3 LNE MPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

For the second set of hypotheses, social score was used as independent variable

H2a: Social activity has a positive effect on the short-term firm performance (being RoA)

$$RoA = \beta_0 + \beta_1 SOCS + \beta_2 LNTOTA + \beta_3 LNE MPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

H2b: Social activity has a positive effect on the long-term firm performance (being Tobin's Q)

$$Tobin's Q = \beta_0 + \beta_1 SOCS + \beta_2 LNTOTA + \beta_3 LNE MPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

The third set of hypotheses are aimed towards the influence of Corporate governance on both performance measures, therefore corporate governance was used as independent variable.

H3a: Corporate Governance has a positive effect on the short-term firm performance (being RoA)

$$RoA = \beta_0 + \beta_1 GOVS + \beta_2 LNTOTA + \beta_3 LNE MPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

H3b: Corporate Governance has a positive effect on the long-term firm performance (being Tobin's Q)

$$Tobin's Q = \beta_0 + \beta_1 GOVS + \beta_2 LNTOTA + \beta_3 LNE MPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

The forth set of variables requires a modified formula as above. Due to the differentiation between high and low scoring firms, a dummy variable (HighESG) was included which takes on the value of 1 if overall ESG score is equal or higher than 80, otherwise it takes on the value of 0 when below 80. Additionally, a

dummy variable (lowESG) was included which takes on the value of 1 if overall ESG score is equal or lower than 20, otherwise it takes on the value of 0 when above 20.

H4a: Companies with high ESG scores are associated with higher short-term firm performances (Being RoA)

$$RoA = \beta_0 + \beta_1 LNTOTA + \beta_2 LNEMPL - \beta_3 LNRISK + \beta_4 GROW + \beta_5 LNLIQU + D_1 HighESG + e$$

H4b: Companies with high ESG scores are associated with higher long-term firm performances (Being Tobin's Q)

$$Tobin's\ Q = \beta_0 + \beta_1 LNTOTA + \beta_2 LNEMPL - \beta_3 LNRISK + \beta_4 GROW + \beta_5 LNLIQU + D_1 LowESG + e$$

4.5. Homoscedasticity

To test for homoscedasticity, the Breusch-Pagan test was performed on the above-mentioned regression analyses. The Breusch-Pagan test tests the null hypothesis that the variance among the residuals of the regression in question is homogenous. When the p-value is above the 5% threshold, it means that the null hypothesis is . If the p-value is below the 5% threshold, it means that the null hypothesis of the test is rejected and the alternative hypothesis is accepted. These tests can be found in appendix 7. Each and every test has a p-value of 0.0000, which is below the 5% acceptance level. Therefore it must be concluded that there is heteroscedasticity. This issue will be tackled with the usage of robust testing in STATA, making a distinction between the four different countries.

5. Empirical analysis

The results of this study will be described and presented in this chapter. The chapter starts with giving an overview of the descriptive statistics on the dataset without the outliers. Continuing this subsection, the new dataset established will be tested on multicollinearity through the usage of a correlation matrix. Additionally, the heteroscedasticity will be tested through the deployment of the Breusch-Pagan test. Finally, when the OLS regression assumptions have been met, each formula stated in section 4.4 will be analyzed on which the hypotheses can be tested.

Due to the removal of 26 outliers in the dataset, new average have been calculated to fill the missing values in the original dataset. This will ensure that the current deployed dataset is not over, or underestimated based on the previously mentioned outliers.

5.1. Descriptive statistics

Before discussing the actual analysis, the descriptive statistics are presented in table 7, Within this table, the dependent, independent and control variables are shown. In total, 474 firms have been incorporated into the analyses, as can be noted from the N value.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Tobin's Q	474	1.412	1.099	0.207	9.260
Return on asset ratio	474	0.0698	0.0707	-0.155	0.387
Weighted score	474	42.82	24.62	7.407	92.62
Environmental score	474	51.90	28.67	12.07	95.19
Social score	474	49.56	29.04	7.470	96.17
Corporate governance score	474	26.99	23.34	1.530	92.26
Log of number of employees	474	9.700	1.479	2.833	13.11
Log of total assets	474	16.20	1.658	12.86	22.04
Log of risk	474	0.904	0.0947	0.454	1.271
Growth	474	0.299	3.464	-0.931	75.23
Log of liquidity	474	1.036	0.0386	0.995	1.311

Table 7: Descriptive statistics final

When looking at the two main dependent variables, it can be stated that the Tobin's Q has a mean value of 1.412, with a small standard deviation of 1.099. When compared to other researches, this mean is rather high. Normally, the mean is roughly close to 1 (Chang & Kuo, 2008). Continuing, RoA carries a mean value of 0.0698 with a standard deviation of 0.0707 and a spread which covers both the positive and the negative. However, from these variables, nothing remarkable can be noted. When looking at the independent variables, the average of the three ESG pillars is illustrated by the mean of the Weighted score, being 42.82. When looking at the three pillars, it is noted that Corporate governance score (when compared to Environmental and Social score) is rather low, only 26.99 compared to 51.90 and 49.56 respectively. Also, this variable carries the lowest minimum of the three pillars. When discussing the control variables, it must be noted that they are no longer naturally interpretable. Four out of five variables were transformed using

logarithms. Additionally, two dummy variables were created being HighESG and LowESG. HighESG has been created for companies with a weighted score above 80, which occurred 36 times. Whereas LowESG is the dummy for companies with a weighted score below 20, occurring 126 times.

5.2. Multicollinearity testing

To ensure that variables do not correlate with each other, correlation matrixes has been established. As a general rule of thumb, relations with a coefficient lower then 0.3, is considered a weak to nihil relation. When the relationship coefficient is between 0.3 and 0.7, it is considered a moderate relationship, and when above 0.7 to 1, it is a strong relationship. For the first two, no further action should be taken. However, when the relationship coefficient exceeds the 0.7, without valid reason, further testing on the multicollinearity should be conducted. When using Tobin's Q as the dependent variable, the correlation matrix can be found in table 8.

	Tobin's Q	Weighted	Environmental	Social	Governance	Log Tot. Asset	Log Employee	Log Risk	Growth	Log Liquidity
Tobin's Q	1									
Weighted	-0.1240*	1								
Environmental	-0.1466*	0.9360*	1							
Social	-0.0889*	0.9443*	0.8643*	1						
Governance	-0.1017*	0.8397*	0.6580*	0.6821*	1					
Log Tot. Asset	-0.4411*	0.2580*	0.3214*	0.1952*	0.1786*	1				
Log Employee	-0.1772*	0.2825*	0.3187*	0.2483*	0.1936*	0.5146*	1			
Log Risk	-0.2393*	0.0292	0.0303	0.0378*	0.0083	0.2115*	0.0325*	1		
Growth	-0.0355*	-0.0483*	-0.0473*	-0.0365*	-0.0494*	-0.0347*	0.0193	-0.0122	1	
Log Liquidity	0.3256*	-0.1529*	-0.1715*	-0.1275*	-0.1145*	-0.5325*	-0.2276*	-0.3878*	0.0777*	1

Table 8: Correlation matrix using Tobin's Q

From this table, certain facts can be noted. First of all, it is interesting that each variable shows a negative correlation to Tobin's Q. Whereas a majority of these relations were not expected and actually contradicting the hypotheses. Remarkably, most of the correlations are found significant which require further testing in the regression analysis of this chapter. Continuing, it is concluded that there is a high correlation between environmental score and social score, but this correlation does not extent to the corporate governance score, which might explain the lower mean value found. However, as mentioned in the formula development section, each of the three ESG pillars will be tested within the same formula, eliminating any possible correlation.

When using RoA as dependent variable, the correlation matrix will be found in the following table, table 9.

	RoA	Weighted	Environmental	Social	Governance	Log Tot. Asset	Log Employee	Log Risk	Growth	Log Liquidity
RoA	1									
Weighted	-0.0044	1								
Environmental	-0.0240	0.9360*	1							
Social	0.0317*	0.9443*	0.8643*	1						
Governance	-0.0240	0.8397*	0.6580*	0.6821*	1					
Log Tot. Asset	-0.4064*	0.2580*	0.3214*	0.1952*	0.1786*	1				
Log Employee	-0.0793*	0.2825*	0.3187*	0.2483*	0.1936*	0.5146*	1			
Log Risk	-0.2293*	0.0292	0.0303	0.0378*	0.0083	0.2115*	0.0325*	1		
Growth	0.0264	-0.0483*	-0.0473*	-0.0365*	-0.0494*	-0.0347*	0.0193	-0.0122	1	
Log Liquidity	0.4639*	-0.1529*	-0.1715*	-0.1275*	-0.1145*	-0.5325*	-0.2276*	-0.3878*	0.0777*	1

Table 9: Correlation matrix using RoA

When looking at the correlations between RoA and the rest of the variables, it is noted that certain signs change direction when comparing to Tobin's Q. Both Social score and the growth variables change from a negative to a positive relation when using the variable for the short-term effects. This is in line with the expect sign and based on the research. Again, no variables show a high correlation except the three ESG pillars. But again, since they will be separately used in the regressions, no further actions should be taken.

An extra check to test for multicollinearity is through the VIF test, or Variance Inflation Factor, where the general rule of thumb is: VIF values which are greater than 10 should be subject to testing. The VIF tests for both regressions are displayed in appendix 8. However, as a summary, no variable has a VIF value greater than 10 (the highest is 1.94 for the non-ESG variables). Therefore, it is concluded that the dataset is not subject to multicollinearity.

5.3. Empirical findings and discussion

To successfully test each of the before mentioned hypotheses and relationships between the ESG index and the firm performance variables for both the short, and long-run, multiple regression analysis were conducted. Within these analysis, the variances have been corrected by clustering the observations per country as to eliminate heteroscedasticity.

5.3.1. Environmental activity on firm performance

When looking at the relationship between environmental activity and firm performance, both short, and long-run, the first set of hypotheses have been developed. These hypotheses are stated as following:

H1a: Environmental activity has a negative effect on the short-term firm performance (being RoA)

H1b: Environmental activity has a positive effect on the long-term firm performance (being Tobin's Q)

To prove these hypotheses, The following formulas were established:

$$RoA = \beta_0 - \beta_1 ENVS + \beta_2 LNTOTA + \beta_3 LNE MPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

$$Tobin's\ Q = \beta_0 + \beta_1 ENVS + \beta_2 LNTOTA + \beta_3 LNE MPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

The results of these formulas can be found in table 10 below. The effect which the environmental score has on the short-term firm performance can be found in the first two models, where as the effect of the environmental score on the long-term firm performance can be found in the latter two models.

The first model shows which effect environmental score directly has on RoA without taking into account the control variables, as mentioned in section 3.2. When taking this model into account, it is noted that the Environmental score, in accordance to the hypothesis, has a negative, but insignificant effect (-0.000) on RoA in 2017. Additionally, the intercept term has been found significant on a 1% significance level. When

looking at the fitness of the model, it is reported that when looking at the Environmental score solely, 0% of RoA can be explained.

	RoA	RoA	Tobin's Q	Tobin's Q
Hypothesis	1a	1a	1b	1b
Environmental score	-0.000 (0.23)	-0.000 (1.11)	-0.006 (1.25)	-0.001 (0.19)
Log of total assets		-0.014 (3.37)**		-0.263 (2.38)*
Log of number of employees		0.006 (1.62)		0.043 (1.43)
Log of risk		-0.032 (0.42)		-1.471 (1.26)
Growth		-0.000 (0.71)		-0.019 (12.68)***
Log of liquidity		0.588 (13.00)***		2.252 (0.65)
_cons	0.073 (10.11)***	-0.359 (3.96)**	1.703 (17.93)***	4.305 (0.72)
R^2	0.00	0.28	0.02	0.23
N	474	474	474	474

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 10: Regression analysis of hypotheses 1a/1b

To elaborate on this model, the control variables have been added in the second model. When adding the control variables, the coefficient of the Environmental score remains the same. However, the P-value slightly increases.

When looking at the control variables, two control variables do show to have a significant effect on the short-run performance. The log of the total assets carries a significance at the 5% level, but the sign it shows is in opposition to what was expected based on the literature research. A positive sign was expected, where as a negative relationship is present, being a coefficient of -0.014. Therefore, concluding that the companies with more assets have a lower RoA when compared to companies with less assets. A possible reason for this phenomenon can be given using the theory of optimal firm size. Where it is argued that small companies grow faster than larger companies until a MES point (minimum efficient scale) is reached. For this reason it can be that companies with lower assets tend to have a higher RoA ratio. Additionally, it is argued that smaller companies are able to utilize their assets more efficiently, as they must to survive. Therefore, lowering their Asset Turnover ratio and increasing the RoA while maintaining the same level of sales. Therefore, the size of company (when using the log of assets) can be negatively related to RoA. However, it must be noted that the coefficient reported is extremely small and could be neglected.

The log of liquidity is the second variable which has been found of significance, at a 1% level. The coefficient it carries is +0.588, which, in turn, is in line with the expected relationship. The newly established model

is able to explain roughly 28% of the behavior of RoA with a significant intercept of -0.359, thus predicting that every company starts with a negative RoA (*Ceterus paribus*).

When looking at the models focused on hypothesis 1b, it can be noted that in the third model, the similar scenario as in the first model occurs. The independent variable is insignificantly enough to explain the dependent variable directly, without control variables. The relationship shown is also opposite of what has been expected, which was a positive relationship of environmental score on the long-term performance, being Tobin's Q. However, the intercept term is shown to be significant with an intercept of 1.703 at a 1% significance level. When looking at the fitness of the model it can be stated that the model is highly unfit, only 2% of the relationship can be explained, which can be expected.

When adding the control variables, the fourth model is developed. The sign of environmental score does not change due to this addition. The relationship remains negative and insignificant, with a coefficient of -0.001. However, the negative relationship is not what was expected based on the literature review. Based on the 'value-creation approach', a positive relationship was expected. When looking at companies whom are engaged in environmental activities, it is concluded by Comier et al (2007), that they tend to be more transparent and credible, which positively affects the reputation of the company and lowering the cost of credit. However, why the relationship between Environmental score and Tobin's Q is negative in this research, can be argued by the paper of Lioui and Sharma (2012), where the relationship was found negative as well. Within their paper, the main focus is on the direct link between environmental score and financial performance (being Tobin's Q). However, when controlling for indirect effects, such as research and development as moderator, environmental score influences Tobin's Q positively. Since only the direct effect in 2017 is investigated in this paper, the relationship can show a negative sign. Again, the relationship is close to zero and insignificant.

When looking at the added control variables, again two variables show significance. Log of total assets shows significance at the 10% level with a negative coefficient of -0.263. The same argumentation can be used, as before. According to the theory of optimal firm size, smaller companies tend to grow at a faster rate. This can be translated in higher expected future firm performance and total assets are negatively related to Tobin's Q. Within this model, growth is the second variables which shows highly significant in explaining Tobin's Q with a coefficient of -0.019 at the 1% significance level. However, growth was expected to be positively related to Tobin's Q on the basis of the researches of Hirsch (1991), Konar and Cohen (2001) and Waddock & Graves (1997). According to Coad (2009), growth can negatively affect firm performance on the long-run due to the perception that managers or owner may lose control due to increased firm size. When a companies grows, it is expected that more employees will be hired and increase the hierachy level, which can also increase internal complexicty (Williamson, 1967). Since Tobin's Q is still a market-based valuation, this perception can be so strong that it actually negatively influences the market's perspective on the firm's potential future value. However, the fact that both growth and log of total assets are negatively influencing Tobin's Q, which would indicate that only small companies with low growth have higher market values when compared to bigger, fast growing companies.

Overall, due to the negative relationship between environmental score and RoA it indicates that the null hypothesis of hypothesis 1a is rejected. However, due to the insignificant relationship, the null hypothesis cannot be rejected. Overall, the negative relationship is in line with what has been expected and can be due to the fact that environmental initiatives are costly activities which, on the short-term, increase prices and lead to lower income when compared to companies which do not engage in such activities. Additionally, the negative relationship between environmental score and Tobin's Q indicate that the null hypothesis of 1b cannot be rejected. The main logic of this observation is that the analysis focusses on the direct effect of Environmental score on Tobin's Q, whereas it is more likely that an indirect effect will positively affect Tobin's Q (Lioui & Sharma, 2012).

5.3.2. Social score on firm performance

According to a majority of the research body which focused on the relationship between social performance and firm performance, a positive relationship was expected on both the short, and long-term firm performance. This relationship was expected due to the research conducted by Hillman and Keim (2001), Brammer and Millington (2008), Pava and Krasz (1996). To analyze the effect which social score has on the short, and long-term firm performance, the following set of hypotheses have been developed:

H2a: Social activity has a positive effect on the short-term firm performance (being RoA)

H2b: Social activity has a positive effect on the long-term firm performance (being Tobin's Q)

Complementing these two hypotheses, the following two formulas were developed:

$$RoA = \beta_0 + \beta_1 SOCS + \beta_2 LNTOTA + \beta_3 LNEMPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

$$Tobin's\ Q = \beta_0 + \beta_1 SOCS + \beta_2 LNTOTA + \beta_3 LNEMPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

Following these two formulas, the regressions displayed in table 11 have been developed, where model 1 and 2 focus on the effects of social score on the short-term performance. The effect which social score has on the long-term performance is illustrated in model 3 and 4.

	RoA	RoA	Tobin's Q	Tobin's Q
Hypothesis	2a	2a	2b	2b
Social score	0.000 (0.35)	0.000 (1.27)	-0.003 (0.84)	-0.000 (0.11)
Log of total assets		-0.013 (3.41)**		-0.266 (2.67)*
Log of number of employees		0.006 (1.58)		0.041 (1.41)
Log of risk		-0.034 (0.45)		-1.463 (1.22)
Growth		-0.000 (0.70)		-0.019 (9.79)**
Log of liquidity		0.593 (11.96)***		2.252 (0.65)
_cons	0.066 (9.27)***	-0.370 (4.14)**	1.578 (21.52)***	4.335 (0.75)
R^2	0.00	0.28	0.01	0.23
N	474	474	474	474

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 11: Regression analysis of hypotheses 2a/2b

When considering the first hypothesis, expecting a positive relationship of Social score on short-term firm performance. It can be noted in the first model that the direct effect of Social score on RoA is positive, although insignificant. When adding the control variables, the relationship between the independent and dependent variable does not change. The effect remains zero (let it be positive or close to negative), while being insignificant. This relationship on the short-term was expected when taking into account the research of Ferrero-Ferrer et al. (2012), where it is analyzed that companies who engage in social 'good doing' increase their visibility and subsequently, attract more customers. Improving their short-term sales while using the same number of assets. Thus, positively affecting the company's RoA.

When looking at the added control variables, it is noted that the log of total assets does have a significant influence (-0.013), at a 5% level, on RoA, which is similar to the second model of table 10. The effects of total assets could be negative when taking into account the theory of optimal firm size. When taking into account the remaining control variables, it is concluded that the log of liquidity has a significant and positive influence on RoA with a coefficient of +0.593 at a 1% significance level. According to the literature, this relationship was expected due to the fact that if the liquidity ratio increases, it means that the liabilities of a firm deteriorates. Less liabilities would result in lower firm expenditures (Waswa, Mukras, & Oima, 2018). The intercept term shifts from the 1% significance within the still accepted 5% significance level. However, the intercept switches sign, from a positive +0.055, to a negative -0.370 intercept term.

However, based on the presented information, it is concluded that the null hypothesis for 2a cannot be rejected. Even though the correlation sign is in accordance to what has been predicted based on the research, the result is not strong enough to fully reject the null hypothesis.

When looking at hypothesis 2b, it is expected that social performance has a positive influence on the long-term firm performance, being Tobin's Q. With, or without control variables, the relationship between the two variables is insignificant and negative for the year 2017. Although the effect became less negative when the control variables were added. The direct effect was -0.003 which changed to -0.000 after control variable addition. Moreover, the variables Log of total assets and growth show a significant relationship to Tobin's Q with a 10%, and 5% level of significance. Again, both relationships show a negative sign whereas a positive relationship was expected.

On this basis, the null hypothesis of 2b cannot be rejected, mainly due to the negative and insignificant coefficient of social score.

5.3.3. Corporate governance score on firm performance

Based on the research conducted by Holthausen and Larcker (1999), Meckling (1976), Bauer et al (2004) and supported by the phenomena called the agency problem, where agency costs arise due to bad corporate governance, a positive relationship was expected between corporate governance, and short and long-term firm performance. On this basis, the following two hypotheses have been developed:

H3a: Corporate Governance has a positive effect on the short-term firm performance (being RoA)

H3b: Corporate Governance has a positive effect on the long-term firm performance (being Tobin's Q)

Supporting, and being able to test these two hypotheses, the following two formulas have been developed:

$$RoA = \beta_0 + \beta_1 GOVS + \beta_2 LNTOTA + \beta_3 LNEMPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

$$Tobin'sQ = \beta_0 + \beta_1 GOVS + \beta_2 LNTOTA + \beta_3 LNEMPL - \beta_4 LNRISK + \beta_5 GROW + \beta_6 LNLIQU + e$$

Based on these two formulas, the regression output in table 12 was constructed. Where, once again, RoA was used for the short-term firm performance and Tobin's Q for the long-term performance. As has been concluded in the previous two sets of hypotheses, the third pillar of the ESG index has no significant influence on both the short and long-term firm performance in 2017. Corporate governance reported a negative sign (although minor), and insignificant when no control variables were added for both RoA and Tobin's Q (Models one and three). Whereas the intercept term shows high significance. When adding the control variables to both models. The effect of corporate governance on RoA shifts from negative to positive (+0.000), whereas the effect of corporate governance on Tobin's Q remains negative in the fourth model (although decreasing from -0.005 to -0.002). However, when related back to the literature review, a positive relationship was expected due to the agency problem. An agency problem occurs when both parties have a conflict of interest and maximize its own welfare. When there is lower corporate governance, this problem may increase which negatively affects firm performance. However, the findings of this paper are more in line with McWilliams and Siegel (2000), whom concluded a neutral and insignificant relationship. However, how this negative relationship is established is not yet known and should require

further investigation. In both the models including the control variables, the log of total assets shows a significant, although negative relationship. The coefficient is report as -0.013 on RoA and -0.264 on Tobin's Q.

	RoA	RoA	Tobin's Q	Tobin's Q
Hypothesis	3a	3a	3b	3b
Corporate Governance Score	-0.000 (0.37)	0.000 (0.79)	-0.005 (1.17)	-0.002 (0.44)
Log of total assets		-0.013 (3.45)**		-0.264 (2.64)*
Log of number of employees		0.007 (1.74)		0.043 (1.57)
Log of risk		-0.033 (0.43)		-1.476 (1.27)
Growth		-0.000 (0.84)		-0.019 (7.99)***
Log of liquidity		0.588 (14.47)**		2.222 (0.65)
_cons	0.072 (13.16)***	-0.366 (4.40)**	1.541 (30.66)***	4.358 (0.75)
R ²	0.00	0.27	0.01	0.23
N	474	474	474	474

* $p < 0.1$; ** $p < 0.05$; $p < 0.01$

Table 12: Regression analysis of hypotheses 3a/3b

Additionally, the relationship of log of liquidity remains significant and positive (being +0.588) when incorporating in the model of RoA. When looking at the model of Tobin's Q it is stated that Growth has a negative and significant relationship. With a value of -0.019. Both final models show a fitness of 27% and 23% respectively.

Concluding, both the null hypotheses of 3a and 3b were not rejected using the model displayed in table 12. This conclusion was drawn from the fact that both results were negative, and highly insignificant.

5.3.4. High and low ESG on firm performance

On the basis that companies which currently have low ESG scores are not able to reap the benefits of engagement in ESG activities, it could be argued that they will experience lower firm performances when compared to companies which are already engaging in high ESG activities. Continuing this line of thought, it has been argued that setting up ESG activities require substantial investments (Jensen & Meckling, 1976; Paine, 2002). Therefore, the fourth set of hypotheses have been developed. These two hypotheses are:

H4a: Companies with high ESG scores are associated with higher short-term firm performances (Being RoA)

H4b: Companies with high ESG scores are associated with higher long-term firm performances (Being Tobin's Q)

Based on these two hypotheses, the following two formulas have been developed:

$$RoA = \beta_0 + \beta_1 LNTOTA + \beta_2 LNEEMPL - \beta_3 LNRISK + \beta_4 GROW + \beta_5 LNLIQU + D_1 HighESG + e$$

$$Tobin's\ Q = \beta_0 + \beta_1 LNTOTA + \beta_2 LNEEMPL - \beta_3 LNRISK + \beta_4 GROW + \beta_5 LNLIQU + D_1 HighESG + e$$

The regression output following these formulas are presented in table 13.

	RoA	RoA	Tobin's Q	Tobin's Q
Hypothesis	4a	4a	4b	4b
Weighted score	0.000 (0.04)	0.000 (1.14)	-0.005 (0.81)	-0.001 (0.21)
HighESG	-0.005 (0.61)	-0.003 (0.81)	-0.071 (0.28)	0.020 (0.11)
Log of total assets		-0.014 (3.42)**		-0.264 (2.56)*
Log of number of employees		0.006 (1.63)		0.043 (1.47)
Log of risk		-0.033 (0.43)		-1.470 (1.26)
Growth		-0.000 (0.71)		-0.019 (12.19)***
Log of liquidity		0.592 (12.55)***		2.229 (0.65)
_cons	0.070 (10.38)***	-0.369 (4.39)**	1.638 (14.25)***	4.351 (0.75)
R^2	0.00	0.28	0.02	0.23
N	474	474	474	474

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 13: Regression analysis of hypotheses 4a/4b

When looking at the models presented in the above located table, it is noted that both the weighted score and the dummy variable for companies with an $weis > 80$, are insignificantly related to both RoA and Tobin's Q. However, when looking at HighESG, it is noted that it shows a negative relationship to RoA, but a positive relationship with Tobin's Q when incorporating the before-mentioned control variables. This indicates that when companies have a high ESG score, it negatively influences the short-term firm performance when compared to companies without a high ESG scores. As has been mentioned before, the reason for this effect could be that, in order to achieve high ESG scores, a substantial amount of money must be invested. This investment has a negative influence on the short-term performance due to increased prices. But could have a positive effect due to a better reputation and awareness among consumers. However, looking at the long-term, the effect of having a high ESG score positively affects firm performance. The correlation between a High ESG and Tobin's Q is positive with +0.020. But it positively influences the long-term firm performance variable being Tobin's Q. This change of effect can be attributed to the positive perception of the market-

based valuation when firms engage in Environmental, Social or Corporate Governance initiatives. As has been stated by Pava and Krasz (1996), investors consider social criteria when allocating funds to companies, thus social active companies have their credit ratings improved. Moreover, according to Cormier et al. (2007), environmental responsible companies are often found to be more transparent and credible, which lowers their cost of credit and have increased profitability in the future (Dowell et al., 2000; Jayachandran et al., 2013; Jacobs et al., 2010).

However, as must be noted, the relationships are insignificant at any level. when comparing this model to the previous three models, nothing has changed regarding the control variables' signs or significance.

When looking at the hypotheses to be tested, it is concluded that the null hypothesis of 4a cannot be rejected. Additionally, hypothesis 4b cannot be rejected due to the insignificance level of HighESG, although the relationship sign is in accordance to the expected relationship.

6. Robustness Check

To test whether the above-mentioned results are correctly based, and to try to understand why the results are insignificant, robustness tests will be conducted where each country will be investigated individually. This was done to investigate whether the individual country characteristics might influence the pooled regressions. Additionally, an additional control variable, which has been argued by Dowell, Hart and Yeoung (2000), Garcia-Castro et al. (2008), Surroca et al. (2010) is considered crucial for investigations regarding CSR on firm performance is included.

6.1. Individual country testing

As can be expected, each country investigated has its own characteristics regarding the firms located within those countries and how each of the sub-variables might influence the firm performance. However, in the results presented in the results chapter of this paper, the 474 companies were pooled together while being clustered. However, due to the imbalance of the dataset, it could be that the effects of the analyses are biased due to the higher influence of an individual country, negating the effect the other countries might have. Where the effects of the ESG index is significant in one country, it can be offset by insignificance in one or more of the other three countries. To test whether this is the case, the four countries will be analyzed individually. Therefore, regressions analysis has been conducted using each of the three different pillars of the ESG index, as well as the overall weighted score. These independent variables have been tested using both the long, and short-term firm performance measure being RoA and Tobin's Q. In the tables below, the regression analysis of Brazil, China, India and Russia will be illustrated (following this order). As explained, the regressions on the following page illustrate the effects of the ESG index and Weighted score on RoA and Tobin's Q for Brazil individually.

	RoA	Tobin's Q	RoA	Tobin's Q	RoA	Tobin's Q	RoA	Tobin's Q
Model	1a	1b	2a	2b	3a	3b	4a	4b
Environmental	-0.000 (0.70)	-0.002 (0.85)						
Social			-0.000 (0.96)	-0.003 (1.06)				
Corporate Governance					-0.000 (0.50)	0.001 (0.31)		
Weighted							-0.000 (0.87)	-0.002 (0.68)
Log of tot. Assets	0.000 (0.06)	-0.104 (1.92)*	0.000 (0.06)	-0.106 (2.10)**	-0.001 (0.14)	-0.132 (2.62)**	0.001 (0.11)	-0.110 (2.06)**
Log of num. of employees	-0.002 (0.35)	0.064 (1.43)	-0.002 (0.40)	0.062 (1.38)	-0.002 (0.38)	0.064 (1.40)	-0.002 (0.38)	0.063 (1.40)
Log of risk	0.509 (2.87)***	0.777 (0.58)	0.500 (2.83)***	0.720 (0.54)	0.515 (2.90)***	1.085 (0.81)	0.497 (2.79)***	0.784 (0.58)
Growth	-0.000 (0.08)	-0.008 (1.12)	-0.000 (0.10)	-0.008 (1.14)	-0.000 (0.02)	-0.007 (0.94)	-0.000 (0.11)	-0.008 (1.09)
Log of liquidity	0.820 (2.42)**	-0.547 (0.21)	0.789 (2.31)**	-0.788 (0.31)	0.828 (2.44)**	-0.206 (0.08)	0.800 (2.35)**	-0.583 (0.23)
_cons	-1.219 (2.45)**	2.112 (0.56)	-1.169 (2.33)**	2.509 (0.66)	-1.222 (2.45)**	1.735 (0.46)	-1.188 (2.38)**	2.213 (0.58)
R ²	0.15	0.13	0.16	0.13	0.15	0.12	0.15	0.13
N	74	74	74	74	74	74	74	74

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 14: Individual regression analysis for Brazil

In accordance to the results which were established using the pooled and clustered analysis. Each of the ESG index has an insignificant effect on both RoA and Tobin's Q in Brazil. However, what is remarkable in Brazil is that for each of the models trying to explain RoA, the control variable of Log of the risk level has a positive and significant effect. This was not the case when looking at the main analysis, where none of the models reported a significant relationship of Risk to RoA or Tobin's Q. However, the positive relationship is highly contradicting the expected relationship established by Dowell, Hart, & Yeung (2000), and by Yazdanfar and Öhman (2015). Within their research papers a negative and significant relationship was established. The main argument used is that higher levels of debt and risk ratio, higher agency costs of external debt are expected. Additionally, when a company is riskier, the attractiveness for (foreign) investors decreases, making it less likely to attract needed capital to stimulate growth. This argument is mainly drafted from the fact that the risk ratio illustrates the risk of default, and therefore, not being able to make obliged payments of their debts (Webb & Neilling, 2009). However, when looking at the research by Jensen & Meckling (1976) and Munter and Kren (1995), an argument for this relationship can be found in the finding that companies with higher risk levels, tend to have lower incentive compensation and use more variable pay rather than higher fixed pay. Therefore, in stages of high risk levels, able to reduce their amount of fixed costs. However, this argument does not justify the large influence of the log of growth on RoA in this sample. Additional arguments could not be found unfortunately.

When looking at the individual analysis of the effects of ESG-scores in China, which can be found in the following table. Highly differentiating results can be found when comparing to the previous results.

	RoA	Tobin's Q	RoA	Tobin's Q	RoA	Tobin's Q	RoA	Tobin's Q
	1a	1b	2a	2b	3a	3b	4a	4b
Environmental	-0.000 (0.23)	-0.004 (2.30)**						
Social			0.000 (0.47)	-0.003 (1.78)*				
Corporate Governance					-0.000 (0.97)	-0.006 (3.31)***		
Weighted							-0.000 (0.27)	-0.005 (2.73)***
Log of tot. Assets	-0.007 (2.65)***	-0.130 (4.09)***	-0.007 (2.88)***	-0.140 (4.48)***	-0.007 (2.77)***	-0.144 (4.79)***	-0.007 (2.72)***	-0.133 (4.29)***
Log of num. of employees	0.004 (1.63)	0.064 (1.95)	0.004 (1.41)	0.061 (1.82)*	0.005 (1.82)*	0.068 (2.10)**	0.004 (1.64)	0.070 (2.12)**
Log of risk	-0.076 (2.14)**	-1.745 (3.85)***	-0.076 (2.14)**	-1.730 (3.81)***	-0.078 (2.20)**	-1.810 (4.03)***	-0.076 (2.15)**	-1.764 (3.91)***
Growth	0.023 (2.97)***	0.282 (2.85)***	0.023 (2.96)***	0.279 (2.81)***	0.023 (3.01)***	0.293 (2.99)***	0.023 (2.97)***	0.285 (2.89)***
Log of liquidity	0.545 (5.17)***	2.523 (1.88)	0.538 (5.09)***	2.511 (1.86)*	0.544 (5.18)***	2.277 (1.72)*	0.545 (5.17)***	2.525 (1.89)*
_cons	-0.375 (2.56)**	1.837 (0.99)	-0.360 (2.46)**	1.989 (1.06)	-0.375 (2.59)***	2.314 (1.27)	-0.375 (2.57)**	1.855 (1.00)
R ²	0.35	0.35	0.35	0.35	0.35	0.37	0.35	0.36
N	264	264	264	264	264	264	264	264

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 15: Individual regression analysis for China

Comparing each model to the previous conclusions, it is found that every pillar of the ESG index, as well as the weighted score is significantly affecting Tobin's Q for companies located in China. Moreover, a higher number of control variables show a significant relationship which has not been seen before. When discussing the independent variables individually, the signs illustrated are still opposite as what has been expected based on the literature review. The Environmental (-0.004), Social (-0.003), Corporate Governance (-0.006), and Weighted score (-0.005) each illustrate a negative relationship ranging between 10% and 1% significance level. However, this clearly illustrates (when comparing to Brazil for example), that individual country characteristics might have influenced the relationship in the clustered regressions. This influence could have resulted in the fact that the coefficients of the independent variables were insignificant, leading to the inability to reject the null hypotheses.

Moreover, for each of the model, three to five control variables show a significant relationship to either RoA or Tobin's Q. Confirming that the chosen control variables play have a significant effect on the firm performance in China. A possible reason for this occurrence is that the sample representing companies in China is almost half (264 companies) of the full dataset (474 companies). Therefore, this analysis can establish higher significant relationships as compared to the other countries. Which could also indicate a

major flaw in the current design of the research, that countries are underrepresented in the overall regression and the dataset must be increased in order to obtain valid and significant relations.

Following alphabetical ordering, India will be analyzed following China. The regression analyses of India can be found in the table below.

	RoA	Tobin's Q	RoA	Tobin's Q	RoA	Tobin's Q	RoA	Tobin's Q
	1a	1b	2a	2b	3a	3b	4a	4b
Environmental	0.000 (1.86)*	-0.001 (0.36)						
Social			0.000 (1.67)*	-0.002 (0.59)				
Corporate Governance					0.000 (0.61)	-0.000 (0.07)		
Weighted							0.000 (1.64)	-0.001 (0.39)
Log of tot. Assets	-0.010 (2.14)**	-0.338 (5.10)***	-0.009 (2.09)**	-0.334 (5.05)***	-0.008 (1.79)*	-0.343 (5.28)***	-0.009 (2.08)**	-0.337 (5.09)***
Log of num. of employees	0.004 (1.40)	0.100 (2.13)**	0.005 (1.49)	0.101 (2.17)**	0.005 (1.72)*	0.097 (2.09)**	0.005 (1.49)	0.100 (2.13)**
Log of risk	-0.027 (0.54)	-0.435 (0.60)	-0.021 (0.42)	-0.459 (0.63)	-0.026 (0.51)	-0.440 (0.60)	-0.026 (0.53)	-0.435 (0.60)
Growth	0.035 (1.66)*	0.228 (0.74)	0.032 (1.55)	0.230 (0.75)	0.029 (1.38)	0.243 (0.79)	0.032 (1.52)	0.236 (0.77)
Log of liquidity	1.022 (5.93)***	3.277 (1.29)	1.029 (5.96)***	3.335 (1.32)	1.053 (6.03)***	3.172 (1.25)	1.024 (5.91)***	3.296 (1.29)
_cons	-0.872 (3.62)***	3.024 (0.85)	-0.890 (3.69)***	2.978 (0.84)	-0.918 (3.76)***	3.176 (0.90)	-0.879 (3.63)***	3.010 (0.85)
R ²	0.58	0.43	0.57	0.43	0.56	0.43	0.57	0.43
N	92	92	92	92	92	92	92	92

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 16: Individual regression analysis of India

When looking at the effects of the independent variables on the dependent variables in India, Environmental and Social scores are the two variables which have a positive effect on RoA (at a 10% significance level). Where the effect of the Environmental score is contradicting the expected relationship, which was negative. When comparing to the original analysis, both Log of Assets and log of liquidity carry the same effect. However, a remarkable effect takes place in India. Where the size of a firm as measured by assets, is negatively related to both RoA and Tobin's Q, but when measuring the size of a firm through the number of employees, it has a positive effect. This would suggest that companies with low assets, but a high number of employees should have higher firm performances. However, this effect is then contradicting the effect of liquidity on firm performance. Where a higher liquidity ratio might mean either more assets, or lower liabilities. Overall, the fitness of the current model is highest of the models previously investigated, being able to explain 56-58% of RoA and 43% of Tobin's Q.

Concluding with the final country incorporated in this research paper, table 17 represents the regression analyses for Russia.

	RoA	Tobin's Q	RoA	Tobin's Q	RoA	Tobin's Q	RoA	Tobin's Q
	1a	1b	2a	2b	3a	3b	4a	4b
Environmental	-0.000 (0.57)	-0.001 (0.40)						
Social			0.000 (0.30)	0.002 (0.41)				
Corporate Governance					0.000 (0.05)	0.000 (0.15)		
Weighted							-0.000 (0.08)	0.000 (0.06)
Log of tot. Assets	-0.034 (3.21)***	-0.152 (2.73)**	-0.037 (3.37)***	-0.170 (2.92)***	-0.036 (3.53)***	-0.161 (3.01)***	-0.036 (3.32)***	-0.161 (2.85)***
Log of num. of employees	0.024 (2.11)**	0.094 (1.55)	0.023 (2.02)*	0.088 (1.50)	0.023 (2.00)*	0.087 (1.46)	0.023 (2.01)*	0.088 (1.47)
Log of risk	-0.090 (0.42)	1.452 (1.28)	-0.120 (0.51)	1.249 (1.02)	-0.095 (0.43)	1.413 (1.23)	-0.089 (0.40)	1.425 (1.22)
Growth	-0.040 (0.75)	-0.689 (2.49)**	-0.044 (0.81)	-0.720 (2.52)**	-0.041 (0.76)	-0.700 (2.47)**	-0.039 (0.73)	-0.694 (2.46)**
Log of liquidity	0.451 (1.26)	-4.716 (2.50)**	0.376 (1.07)	-5.064 (2.74)**	0.397 (1.14)	-4.907 (2.69)**	0.400 (1.14)	-4.938 (2.68)**
_cons	0.062 (0.13)	6.294 (2.44)**	0.200 (0.40)	6.995 (2.66)**	0.147 (0.31)	6.634 (2.68)**	0.135 (0.28)	6.646 (2.59)**
R ²	0.47	0.60	0.46	0.60	0.46	0.60	0.46	0.60
N	26	26	26	26	26	26	26	26

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 17: Individual regression analysis for Russia

What must be noted about Russia, is that it is the country with (by far) the lowest representation in the dataset. With only 26 companies included in the analysis, it has 48 companies less than the number two, being Brazil. However, when looking at the independent variable coefficients, no significant relationship can be reported, and each coefficient is approximately zero. However, it must be noted that the same effect in Russia occurs as has occurred in India, where the Log of total assets negatively influence RoA and Tobin's Q, but the number of employees carries a positive effect. What is also note worthy is that the model established for explaining Tobin's Q, is the highest established, being able to explain Tobin's Q for 60%. This is highly doubtful taking into account that only 26 companies are included in the analysis.

Overall, it is proven that without taking into account the individual country characteristics, the results can be biased due to the reporting of significant coefficient for china, whereas Brazil reports insignificant coefficients for the independent variables. Additionally, some counterintuitive effects take place in both India and Russia, where the size of the firm measured in total assets, is negatively related to firm performance. But the size of the firm as measured in number of employees, has a positive effect. Overall, the coefficients do not deviate strongly from zero so no real effect can be established for each individual country using the individual country robustness test.

6.2. Research and Development intensity

When looking at the previous body of research, one important control variable has been left out in the analyses established in this paper due to scarce availability of this variable for companies located in the BRIC countries. According to Dowell, Hart and Yeoung (2000), Garcia-Castro et al. (2008), and Surroca et al. (2010), one of the main control variables which must be included in research trying to explain firm performance, is the Research and Development activity of the firm. In most cases, including this variable ensured a significant relationship was established between the independent variable and dependent variable for their research. However, as mentioned, R&D activity information is scarcely available. When incorporating the variable, only 242 companies can be taking into analyses, which eliminates almost half of the dataset. However, as argued by McWilliams and Siegel (2000), R&D can have a strong influence on CSR investments, as most CSR investments are either product innovation, process innovation, or both. However, when including R&D intensity into the analyses, it can be noted from table 18, that each of the independent variables' coefficient, is unchanged when comparing to the main analysis. However, when looking at Research and Development as a control variable, it is highly significant when trying to explain RoA, but insignificant for Tobin's Q. However, this difference is not according to what the reader might expect. Innovation might take time to show its influence on firm performance, and are generally considered costly investments which, like Environmental initiatives, would harm the short run performance due to increased prices (McWilliams & Siegel, 2000). However, continuing this line of thought, innovation would benefit a company on the long run, and should improve its perspective of the stakeholders for future valuation, thus positively influencing Tobin's Q. These effects do not hold in the current model regarding the influence of R&D on firm performance.

	RoA	Tobin's Q	RoA	Tobin's Q	RoA	Tobin's Q	RoA	Tobin's Q
	1a	1b	2a	2b	3a	3b	4a	4b
Environmental	0.000 (1.24)	0.004 (0.80)						
Social			0.000 (2.14)	0.003 (0.92)				
Corporate Governance					0.000 (0.81)	-0.000 (0.12)		
Weighted							0.000 (1.49)	0.003 (0.67)
Log of tot. assets	-0.016 (1.79)	-0.508 (2.60)*	-0.015 (1.74)	-0.503 (2.67)*	-0.014 (1.64)	-0.491 (2.68)*	-0.015 (1.72)	-0.500 (2.62)*
Log of num. of employees	0.003 (0.55)	0.069 (1.00)	0.003 (0.54)	0.069 (1.06)	0.003 (0.53)	0.079 (1.01)	0.003 (0.50)	0.068 (0.97)
Log of risk	-0.140 (6.28)***	-1.766 (1.19)	-0.138 (5.91)***	-1.755 (1.17)	-0.144 (5.32)**	-1.846 (1.21)	-0.140 (5.78)***	-1.777 (1.18)
Growth	0.023 (3.31)**	0.088 (0.35)	0.023 (2.72)*	0.081 (0.30)	0.020 (1.78)	0.054 (0.18)	0.022 (2.67)	0.073 (0.27)
Log of liquidity	0.627 (17.27)***	3.784 (0.91)	0.628 (15.94)***	3.773 (0.91)	0.613 (27.59)***	3.622 (0.83)	0.624 (18.38)***	3.723 (0.88)
Research and Development Intensity	-0.370 (15.75)***	-0.422 (0.15)	-0.374 (12.93)***	-0.503 (0.15)	-0.408 (6.49)***	-0.902 (0.24)	-0.380 (13.58)***	-0.598 (0.18)
_cons	-0.242 (2.55)*	6.450 (0.73)	-0.250 (2.69)*	6.387 (0.73)	-0.236 (2.25)	6.521 (0.71)	-0.243 (2.48)*	6.459 (0.73)
R ²	0.35	0.32	0.35	0.32	0.33	0.32	0.35	0.32
N	242	242	242	242	242	242	242	242

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 18: Cluster analysis including Research and Development Intensity

7. Conclusion

When looking at the previous body of research focusing on the relationship between sustainability and firm performance, it was noted that the results have been widely spread and diverse regarding what the exact relationship is. Where a substantial body of researchers concluded a positive linear relationship (Moskowitz, 1972; Bragdon and Marlin, 1972; Bowman and Haire, 1975; Parket and Eilbert, 1975; Moskowitz, 1975; Belkaoui, 1976; Anderson and Frankle, 1980; Ingram, 1987), an increasingly amount of research proved an insignificant, negative, or neutral relationship using multiple proxies for sustainability, firm performance, and a wide collection of control variables (Amaeshi & Amao, 2009; Mishra & Suar, 2010). To contribute to this debate, the aim of this thesis was to test the relationship of the ESG index on firm performance in developing countries in 2017. Data in this research consisted of 474 companies spread over four different countries, also known as the BRIC countries. More specifically, the most recent data available was used to determine what the effects was of the ESG index on RoA and Tobin's Q. Based on this, the following research (Sub)-questions was developed and will be answered in this chapter. The main research question stated in this thesis is:

"What is the effect of CSR on firm performance in the BRIC countries?"

To help answering this research question, a sub-question is established:

"What is the effect of CSR on the short run and long run firm performance?"

To help answer these questions, a total set of eight hypotheses were developed based on the expected effect of each of the ESG pillars, which was used as proxy for CSR, on two indicator variables of firm performance. These hypotheses were developed based on prior research, where mostly a positive relationship was expected between the two indicating variables. However, when taking the results of this research paper into account, the opposite relationship has been found. Concluding that ESG negatively influences firms in the BRIC countries in the year 2017. However, as noted from the analyses, each and every relation between E, S and G to RoA, and Tobin's Q was opposite of what has been found in the existing research body, and more importantly, the effects were found to be insignificant.

Where this difference might come from, is due to the fact that a majority of the research body focusses on companies in developed countries (Donaldson and Preston 1995; and Porter and Kramer, 2006; Surroca et la., 2010; Garcia-Castro et al., 2010). Whereas this research focusses on the developing countries. When investigating the research conducted by Donaldson (1995), and Porter and Kramer (2006), it was expected that evolving a companies CSR initiatives futher, would develop a more competitive advantage of the firm. And according to Baron (2008), this advantage comes from the fact that firms are able to attract a wider range of customers. Mainly, customers whom are social conscious about the behavior of firms. however, it is known that in developed countries, consumers are much more focussed on sustainability when compared to consumers from developing countires, which might explain why the effects of ESG activities are insignificant, and negative. Additionally, as stated by Jensen and Meckling (1976) and Paine (2002), ESG activities tend to be costly investments which yield no direct addition to the firm's current or future

cash flow. Actually decreasing the short run firm performance due to it. Additionally, higher ESG scores would, according to Brown (1998), Inoue (2010) and Pava and Krasz (1996), result in higher ratings for credit and lower costs of receiving credits but this might only be the case for companies in developed countries, and not for the companies which are located in the BRIC countries.

To test whether the same insignificant results would hold when investigating each country individually, it was found that ESG has a highly significant effect (although negative) on the long run firm performance for companies located in China, and only moderately (and negatively) affecting the short run firm performance in India. However, the control variables Log of total assets, log of number of employees, log of risk, growth, log of liquidity and R&D intensity were found to have a significant effect on both RoA and Tobin's Q, confirming previous research that the control variables must be added to explain firm performance, even for companies located in the BRIC countries.

Going back to the research questions developed, the research question will be answered as following: The effects of CSR activity, as indicated by using the ESG-index of ASSET4, on the short-term firm performance was generally found positive, although highly insignificant. Zooming in, the pillars of Social score and Corporate governance score carried a positive coefficient, which was close to 0 and the pillar of Environmental score carried a negative coefficient, also close to 0 while being insignificant. The effects of the ESG-index on long-term firm performance was found negative, additionally being close to zero and insignificant.

Taking it a step further, it was noted by Jensen and Meckling (1976) and Paine (2002), that companies would only be able to reap the benefits of sustainability once they have achieved a certain level of sustainability. Therefore, the effects of a high ESG score were analyzed. Concluding that companies which have a high weighted score on the ESG-index experienced lower short-term performance, but higher long-term performance. The reasoning for this could be that firms whom are more focused on the long-term performance, would benefit from engaging in such activities due to a changed perceived perspective of investors in institutions, although these initiatives are considered costly investments, negatively influencing prices on the short run. These institutions and investors might rate the company better when compared to companies who do not engage in such activities. These arguments are also found in the research conducted by Pava and Krasz (1996), and Brown (1998), where a shift in investor behavior was found. This shift mainly entailed that investors take social activity into account when allocating funds and assessing risks. Due to the improved credibility of firms with high ESG scores, the credit rating could be changed, in the positive perspective for future growth.

Overall, the effects of the CSR initiatives on the firm performance of companies located in the BRIC countries were negatively related, but statistically insignificant. To try to explain why the findings of this paper were insignificant, and often not in accordance to the previously investigated research body, a number of limitations were identified which could have skewed the results.

7.1. Limitations of the research

There is a number of limitations which might have contributed to the insignificant results which were found in this research. These limitations might influence the overall model established, or could contribute to more precise allocation of the effects of the coefficients.

When looking at the variables used, a major flaw which has been experienced in this analysis, is the fact that one major control variable was not included. According to Dowell, Hart and Yeoung (2000), Garcia-Castro et al. (2008), Surroca et al. (2010), including a proxy for R&D activity of the firm into the analysis as a control variable, carried a significant effect on firm performance, and in most cases ensured a significant relationship was found between the independent variable and the dependent variable. When looking at the robustness test incorporating this variable, it is shown to have a high significant influence on firm performance for both the short and long run. However, due to information scarcity of R&D activity of firms located in the BRIC countries, a variable illustrating this activity could not be incorporated into the final analysis. When incorporated this effect, it might influence the coefficients and significance levels of the independent variables used in this research paper, possibly transforming the relationship.

Additionally, as seen from the robustness check regarding individual country analysis, it is established that the effects of the ESG index and the control variables vary greatly between the different countries. This illustrates that country specific characteristics are of great influence on the relationship and the performance of firms. However, within this research paper, these country specific characteristics are not identified or taken into account sufficiently enough to ensure an accurate and unbiased analysis. Continuing this area, it has been proposed that this difference can also be attributed to the fact that the data sample used (the 474 companies) are unbalanced over the four analyzed countries. Which might have resulted in the fact that the relationship was significant for China, but insignificant for Brazil, India and Russia.

What was the major difference between this research paper and the research conducted by Bragdon and Marlin (1972), Fogler and Nutt (1975), Chen and Metcalf (1980), Waddock & Graves (1997), McWilliams & Siegel (2000), Callan and Thomas (2009), Garcia-Castro et al (2010), is that this paper used the ESG index as a proxy for sustainability, instead of the CEP or KLD index. However, to distinguish between the different pillars of the ESG index, the old methodology was used. However, using the new ESG index might give more accurate estimations and cover more years than the old methodology of the ESG index. Although the drawback is that the different scores for the building pillars were not present in the database used in this paper, therefore leaving it invaluable to be included.

Following the limitation of the usage of the old ESG index, it must be addressed that the information regarding ESG performance of companies located in the BRIC countries were very limited and only covered one or two years fully. Therefore, only the most recent year could be used in this analyses, eliminating the incorporation of the time-varying variables effects, such as lagged version of ESG and R&D variables. As has been concluded by McWilliams and Siegel (2000), and Callan and Thomas (2009), sustainability often affect

firm performance in the following time periods, whereas in this research, only the direct effects in 2017 could be studied. This finding, immediately challenges the credibility of this research paper by not being able to illustrate the effects on the coming years for companies.

7.1.1. Future research

Following the limitations of this research paper, a number of future research areas can be identified to further understand the effects of the ESG index on firm performance for countries located in the BRIC countries. As has been mentioned, including the right control variables is crucial for a solid model to be established. In accordance to this research paper, the control variables the control variables: log of total assets, log of number of employees, log of risk, growth, log of liquidity and R&D intensity were found to be statistically significantly related to firm performance. Additionally, country specific characteristics must be taken into account when conducting analysis regarding the BRIC countries, as the results can vary greatly when looking at companies located in China, or when looking at companies located in India. These characteristics were not taken into account and might have resulted in insignificant results. Combining this fact with the fact that CSR, and R&D might not have an influence in the same year, panel data analysis is highly recommended when looking at trying to explain firm performance, as it might give a much more valuable insight into the effects. Moreover, investigations which include more companies, and a better balanced panel is highly recommended when analysis firm-level effects.

8. Appendices

8.1. Appendix 1: ESG index score methodology

Scores Calculation Methodology

The ASSET4 ESG framework allows to rate and compare companies against approximately 700 individual data points, which are combined into over 250 key performance indicators (KPIs). These KPI scores are aggregated into a framework of 18 categories grouped within 4 pillars that are integrated into a single overall score. (see diagram below)

What is the calculation method of your ratings?

Indicators, Categories, Pillars and Overall Score are calculated by equally weighting and z-scoring all underlying data points and comparing them against all companies in the ASSET4 universe. The resulting percentage is therefore a relative measure of performance, z-scored and normalized to better distinguish values and position the score between 0 and 100%.

What is a Z-Score?

A Z Score, or "standard score" is a relative measure comparing one company with a given benchmark. It expresses the value in units of standard deviation of that value from the mean value of all companies. Among other things, this allows to create more distinction between values that otherwise might be very close together.

How are "Yes/No" values translated into a score?

Yes/No = 1 or 0 – these are converted into % using z-scoring. The % will depend on the number of companies that share the same value. Example: If having "Yes" is positive, it is worth a very high score if only few companies have a "Yes". If most companies have "Yes", it will only provide an average score.

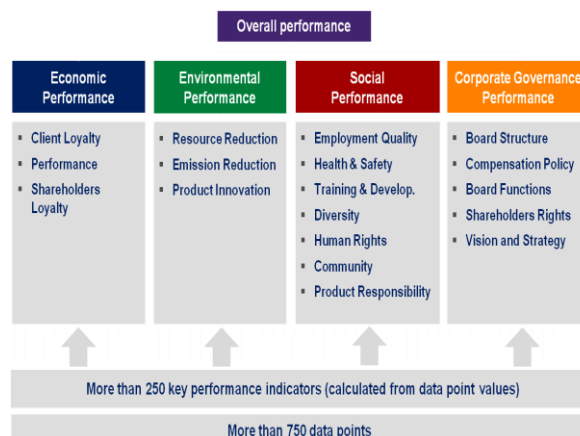


Table 19: Datastream ESG glossary

8.2. Appendix 2: Literature review overview

Study	Social Performance	Financial Performance	Accounting based	Market Based	Control variables
Positive					
Anderson and Frankle (1980)	Disclosure of social performance	Market		Returns of portfolio's	none
Belkaoui (1976)	Pollution control expenditures in Ars (SA/P/O)	Market		Excess market return of stocks	
Bowman and Haire (1975)	Disclosure of social	Accounting	ROE		
Bragdon and Marlin (1972)	CEP evaluation	Accounting	EPS growth, ROE, ROA		
Callan and Thomas (2009)	KLD Controversial Business	Accounting & Market	ROS, ROA	Tobin's Q	
			RoE used but unsuccessful		
Donaldson and Preston					
Dowell, Hart & Yeung (2000)	IRRC evaluation of environmental performance	Market		Tobin's Q	R&D, advertising, leverage and multi-nationality, assets
Garcia-Castro et al. (2010)	KLD evaluation	Accounting & Market	ROA, MVA	Tobin's Q	R&D expenses over sales, Size, Industry, Risk Effects and leverage ratio
Ingram (1987)	Disclosure of social performance	Market		Average monthly portfolio returns	
King and Lenox (2002)	Total emissions of firm	Accounting & Market	ROA	Tobin's Q	Size, growth, capital intensity, leverage, R&D intensity, Regional wages, Regulatory Stringency, Permits
Konar and Cohen (2001)	TRI and environmental lawsuits	Accounting & Market		Tobin's Q	Intangible asset value, replacement value of assets, log of the replacement value of assets, Sales growth, imports of domestic consumption, R&D intensity, number of patents, advertising expenditures, market share, age of assets, capital expenditures, environmental lawsuits,
Margolis and Walsh (2003)	Meta-analysis				
McWilliams & Siegel (2000)	KLD evaluation	Accounting	ROA		R&D to sales ratio, Firm size, Risk of Firm, Industry Dummies
Moskowitz (1972)	Observations of charitable contributions, consumer protection, disclosure, equal employment opportunity, human resource practices,	Personal assessment			
Moskowitz (1975)					
Orlitzky et al. (2003)	Meta-analysis				
Parket and Eilbert (1973)	Survey on minority hiring and training, ecology, contributions	Accounting	Net Income, ROS, ROE, EPS		
Porter and Kramer (2006)					
Roman et al. (1999)	Meta Analysis				
Surroca et al. (2010)	Sustainalytics Platform consisting of five stakeholder groups: employees, customers, suppliers, community and	Market		Tobin's Q	Innovation, Human Capital, Reputation, Culture, Physical resources, leverage, financial resources, size, risk, industry country, and year
Wu (2006)	Meta Analysis				
Negative					
Aras et al. (2010)	Number of sentences related to Corporate Social Responsibility disclosed in the	Accounting	ROE, ROA, ROS		Size, Risk, Innovation
Chen and Metcalf (1980)	CEP rating	Accounting	Profitability, P/E ratio		
Gonzales-Benito and					
Kedia and Kuntz (1981)	5 measures of actual CSP	Accounting	ROA		
Vance (1975)	Moskowitz ratings of social responsiveness	Market based		Change in Share prices	
Waddock & Graves (1997)	KLD evaluation	Accounting & Market	ROA, ROE, ROS		Size, Risk, Industry
Inconclusive					
Alexander and Buchholz (1978)	Reputation ratings	Accounting	Market return on security		
Fogler and Nutt (1975)	CEP evaluation	Accounting	P/E ratio		
Fry and Hock (1976)	Disclosure of social	Accounting			
Chen & Metcalf (1980)	CEP evaluation	Accounting	Profitability, P/E ratio		
Hickman, Teets and Kohls	Mutual fund screens	Market			
Margolis and Walsh (2003)					
U-shaped					
Brammer and Millington (2008)					
Mittal et al. (2008)					
Nollet, Filis and Mitroostas (2016)	Bloomberg's ESG index	Account and Market based	Return on Assets, Return on Capital	Excess Stock Returns	
	Finding: U shaped relationship between CFP and Accounting based measures (not for				
Positive but influenced by					
Cheng and War (2008)					

Table 20: Research overview

8.3. Appendix 3: Graph matrixes

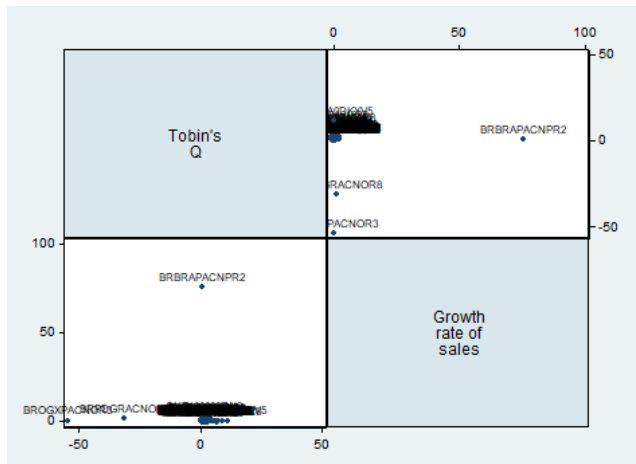


Table 21: Graph matrix Tobin's Q and Growth

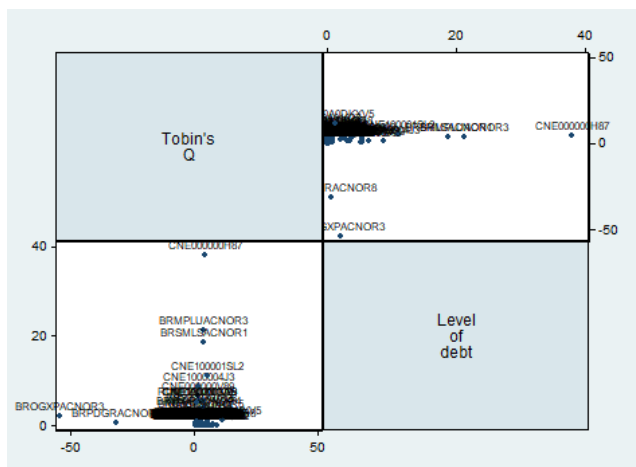


Table 22: Graph matrix Tobin's Q and Risk

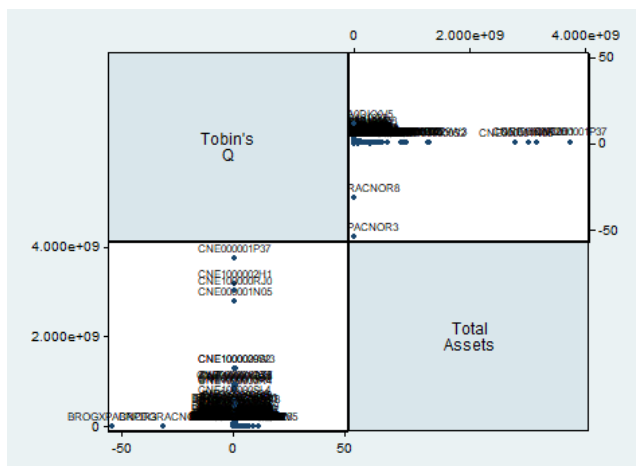
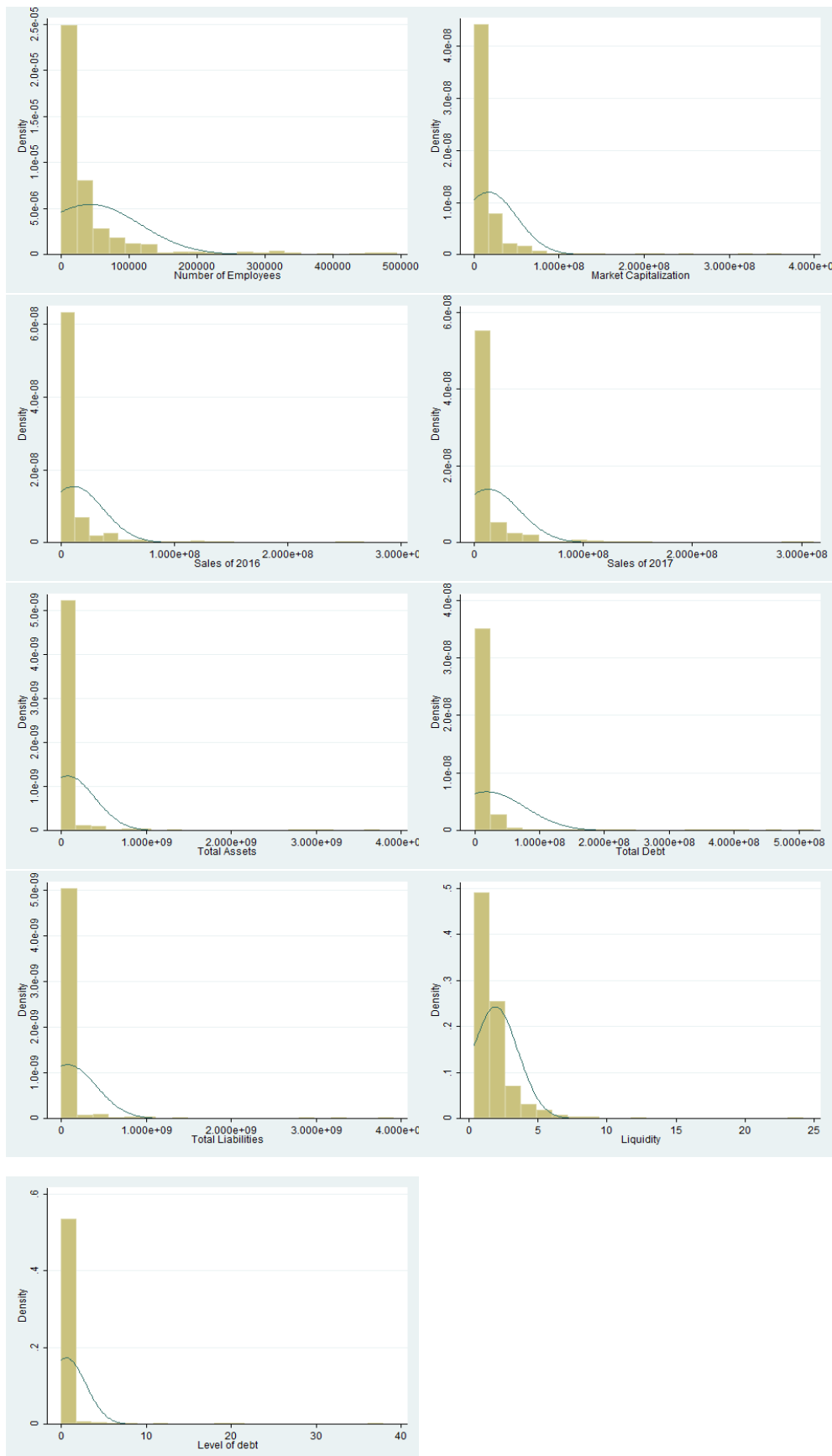
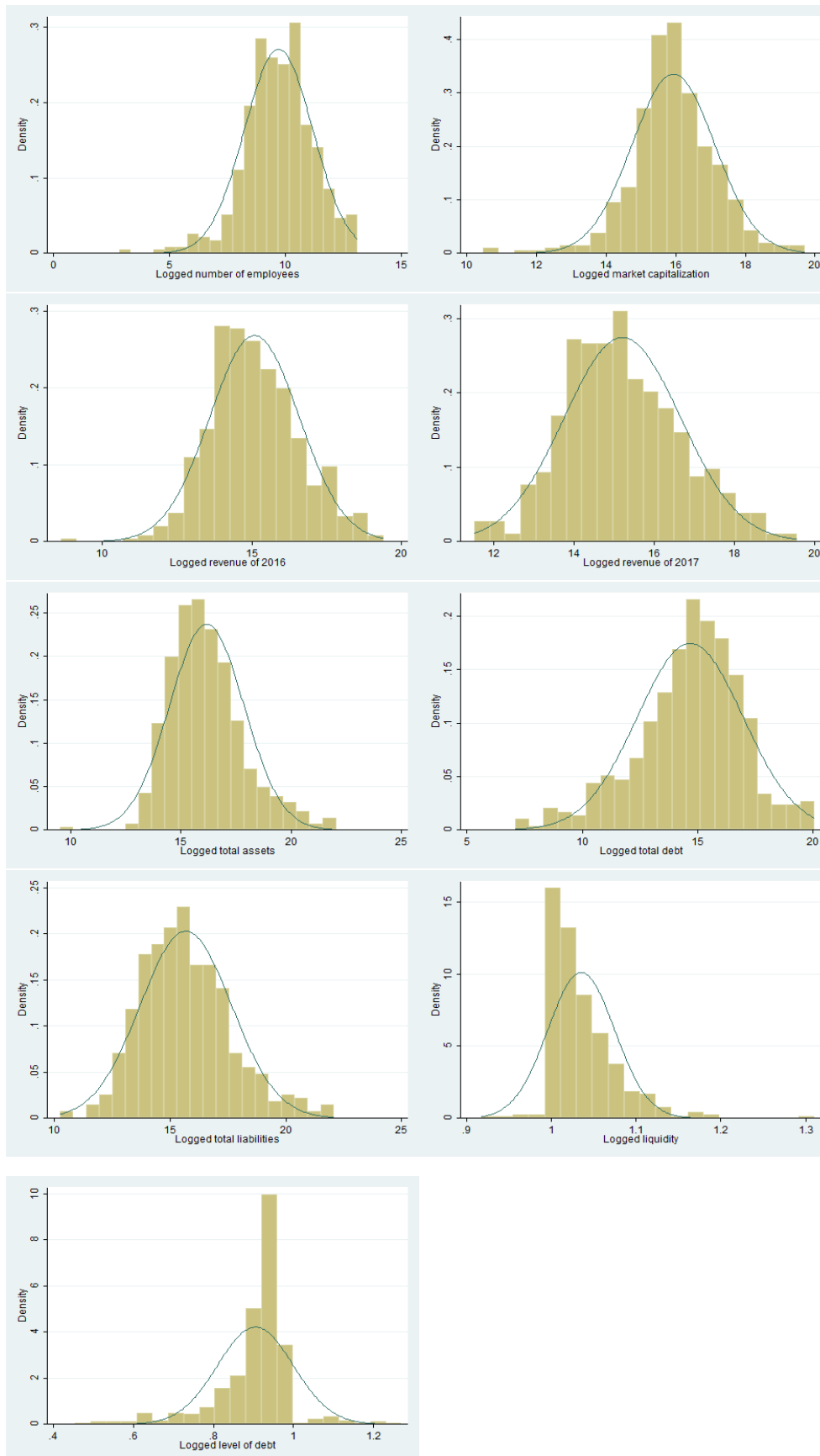


Table 23: Graph matrix Tobin's Q and Total assets

8.4. Appendix 4: Normal distributions of the variables



8.5. Appendix 5: Normal distributions of the logged independent variables



8.6. Appendix 6: Outlying firms

	isin	r
48.	BRMPLUACNOR3	2.035511
60.	BRRSIDACNOR8	6.312631
64.	BRSMLSACNOR1	2.309051
114.	CNE000000H87	2.4687
162.	CNE0000014W7	3.655077
178.	CNE0000018R8	2.779833
208.	CNE000001KK2	5.22691
267.	CNE100000B81	2.118736
285.	CNE100000PM8	3.146711
290.	CNE100000SF6	2.912178
322.	CNE100001SL2	4.053277
357.	INE016A01026	2.170022
360.	INE021A01026	3.526713
363.	INE030A01027	7.915962
372.	INE066A01013	4.571845
400.	INE196A01026	4.545443
406.	INE239A01016	5.388481
414.	INE280A01028	2.071333

8.7. Appendix 7: Breusch-Pagan test for heteroscedasticity

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of roar
```

```
chi2(1)      =    120.17
Prob > chi2   =    0.0000
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of tobq
```

```
chi2(1)      =    221.35
Prob > chi2   =    0.0000
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of roar
```

```
chi2(1)      =    125.63
Prob > chi2   =    0.0000
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of tobq
```

```
chi2(1)      =    222.27
Prob > chi2   =    0.0000
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of roar
```

```
chi2(1)      =    121.30
Prob > chi2   =    0.0000
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of tobq
```

```
chi2(1)      =    226.00
Prob > chi2   =    0.0000
```

```
. estat hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of roar
```

```
chi2(1)      =    121.57
Prob > chi2   =    0.0000
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of tobq
```

```
chi2(1)      =    218.01
Prob > chi2   =    0.0000
```

8.8. Appendix 8: VIF analysis

Variable	VIF	1/VIF
Environmental score	4.56	0.219373
Social score	4.50	0.222396
Corporate governance score	1.94	0.515183
Log of total assets	1.92	0.521060
Log of liquidity	1.58	0.631625
Log of number of employees	1.43	0.700359
Log of risk	1.19	0.840894
Growth	1.01	0.989082
Mean VIF	2.27	

Table 24: VIF analysis using Tobin's Q

Variable	VIF	1/VIF
Environmental score	4.56	0.219373
Social score	4.50	0.222396
Corporate governance score	1.94	0.515183
Log of total assets	1.92	0.521060
Log of liquidity	1.58	0.631625
Log of number of employees	1.43	0.700359
Log of risk	1.19	0.840894
Growth	1.01	0.989082
Mean VIF	2.27	

Table 25: VIF analysis using RoA

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