The impact of Corporate Sustainability on Firm Value, using the Corporate Knights' Global 100 sustainable rankings

Master Thesis Finance

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Abstract

This research examines the impact of corporate sustainability and corporate sustainability improvement on firm value. The Corporate Knights' Global 100 sustainable rankings of 2013, 2014, 2015 and 2016 are used to investigate this. An event study is conducted, followed by various multivariate regression analyses. The results show that the announcement of a firm being in the Corporate Knights' Global 100 is positively received by investors, before and after the announcement. However, their reaction is not immediately reflected in the stock price. The multivariate regression analyses demonstrate that a firm's score in the Global 100 is uncorrelated to its value. Furthermore, it is found that corporate sustainability improvement has an impact. Overall, it can be concluded that corporate sustainability has a positive impact on firm value, and that firms have to improve their corporate sustainability practices to keep attracting investors.

Keywords

Corporate sustainability, corporate sustainability improvement, firm value, Corporate Knights' Global 100 sustainable rankings, event study, multivariate regression analysis

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1. Introduction

Every January during the World Economic Forum in Davos, the Corporate Knights releases the Global 100, a ranking of the most sustainable companies in the world. All sorts of companies appear in these rankings, including large well-known companies such as Adidas, Coca Cola and Unilever (Corporate Knights, 2013, 2014, 2015a, 2015b). That these firms want to highlight their corporate sustainability efforts is clear. Adidas underlines that acting as a responsible company will contribute to lasting economic success, Coca Cola mentions the importance of creating a more sustainable and better shared future, and Unilever points out that business growth should not be at the expense of people and planet (Adidas, n.d.; Coca Cola, n.d.; Unilever, n.d.). PricewaterhouseCoopers (2020) conducted a survey among CEOs globally and found that they increasingly recognize the advantages of taking action in reducing their carbon footprint. They are more and more convinced that investing in climate change initiatives results in benefits: reputation advantages among key stakeholders, new product and service opportunities, benefits due to governmental funds, or financial incentives for green investments (PricewaterhouseCoopers, 2020). This all indicates that there is the idea that corporate sustainability practices should be adopted in order to increase value and attract investors.

However, does corporate sustainability really attract investors and maximize firm value? Or is it rather detrimental to firm value to focus on something other than the traditional goal: maximizing profits for shareholders? Milton Friedman said that the only social responsibility companies have is to increase their profits, while engaging in open and free competition, without deception or fraud (Friedman, 1962). Actions in accordance with 'social responsibility' reduce returns to shareholders, raise prices to customers and lower wages of some employees: the corporate executive is spending their money when investing in social responsibility practices (Friedman, 1970). This corresponds to the famous view of Adam Smith, described in *the Wealth of Nations.* He wrote about an invisible hand, indicating that if everyone acts in their own interest, this leads to the greatest overall good to society (Smith, 1776). Accordingly, spending funds on corporate sustainability does not lead to the maximization of firm value. Moreover, companies may be pushed by investors or other market actors, such as governments, to spend more on sustainability without thinking about the economic consequences, which may harm companies (Orlitzky, 2014).

Whether corporate sustainability has an impact on firm value, and if so, whether this impact is positive or negative, has been a subject of interest. Several studies exist with respect to this topic. However, the results of these studies are different. They use a specific methodology that will be outlined in more detail in this thesis.

Contributing to existing research, this thesis investigates whether corporate sustainability affects firm value. Moreover, it will be researched whether corporate sustainability improvement has an impact. The Corporate Knights' Global 100 sustainable rankings are used to investigate this. The following research question is examined:

What is the impact of corporate sustainability on firm value?

This thesis is structured as follows: First, chapter 2 starts with the definition of corporate sustainability and explaining how it can create or destroy value, followed by a review of current literature. Then, the hypotheses are developed. Subsequently, in chapter 3, the sample selection is described, and the methodology explained. In chapter 4, the empirical results including descriptive statistics are shown. Lastly, chapter 5 consists of the conclusion.

2. Literature review and hypothesis development

In the first paragraph of this chapter corporate sustainability is defined. This is followed by the second and the third paragraph, in which the theories about corporate sustainability creating versus destructing value are described. In the fourth paragraph, the current literature on corporate sustainability, environmental performance and corporate social responsibility (CSR) is discussed. Lastly, in the fifth paragraph, the hypotheses are developed.

2.1 Corporate sustainability

What is corporate sustainability? Reviewing the different definitions over time, Montiel (2008) came to the conclusion that there are two approaches to define corporate sustainability. The first approach is to use the term 'ecological sustainability' and to identify corporate sustainability mainly with the environmental dimension of business. The second approach is to identify corporate sustainability as the construct of three dimensions: environmental, economic and social dimensions. Using this approach corporate sustainability can be defined as a business strategy that seizes opportunities and manages risks from economic, environmental and social dimensions to produce long-term shareholder value (Lo & Sheu, 2010).

The Corporate Knights produces the Global 100 sustainable rankings, which will be studied in this thesis. Hereby it uses several key performance indicators (KPI's) to rank companies, taking into account not only environmental, but also economic and social dimensions (Corporate Knights, 2013, 2014, 2015a, 2015b). Therefore, it can be concluded that the Corporate Knights uses the second approach to define corporate sustainability.

2.2 Value creation

The adoption of corporate sustainability may generate additional benefits compared to companies that do not participate in such practices. Firstly, corporate sustainability can differentiate companies' products and, in this way, create demand (Lo & Sheu, 2010; Yadav, Han, & Rho, 2016). Moreover, it can make managers focus more on long-term objectives (Rossi, 2009). This is important, because the lack of a long-term view may limit long-term growth opportunities (Yu & Zhao, 2015).

In addition to this, the stakeholder theory supports corporate sustainability creating value. According to this theory, managers should make decisions based on the interests of all stakeholders. Stakeholders are all individuals or groups that can have a significant impact on a company's success. They consist not only of financial claimants, but also of employees, customers, communities and governmental officials. Some interpretations even include the environment as a stakeholder (Jensen, 2002). Corporate sustainability can be seen as a means for the company to meet the demands of its

different stakeholder groups (Lourenço, Branco, Curto, & Eugénio, 2012). If the management's interests are aligned with those of their stakeholders, monetary and reputational losses can be prevented (Harjoto & Laksmana, 2018). Successfully implementing the demands of stakeholders for greater corporate responsibility can prevent them to withdraw support for the firm, which can result in financial benefits (Lo & Sheu, 2010; Oberndorfer, Schmidt, Wagner, & Ziegler, 2013). So, corporate sustainability can be used to meet the demands of stakeholders and may create value this way. Another theory that supports corporate sustainability increasing value is the resource-based view (RBV). According to this theory, firms can increase their stock prices by achieving and maintaining a competitive advantage (Gregory, Tharyan, & Whittaker, 2014). Companies can generate these by effectively managing their resources that are valuable, rare, cannot be perfectly imitated and for which there is no perfect substitute available. By engaging in corporate sustainability, companies can create competitive advantages, and internal and external benefits (Lourenço et al., 2012). Investments in corporate sustainability can generate internal benefits through the development of new resources and capabilities. For example, the commitment of employees can improve or new technologies for environmental activities can be created (Lourenço et al., 2012; Oberndorfer et al., 2013). The external benefits of corporate sustainability are linked with corporate reputation. If the company is known to have a good corporate sustainability performance, it can better its relationships with stakeholders (Lourenço et al., 2012). Since they control the resources, the risks related to resource acquisition can be reduced (Harjoto & Laksmana, 2018). Furthermore, better, highly skilled and thus more productive employees can be attracted due to this better reputation. The employee retention rate and loyalty of employees can increase, which can turn into better financial outcomes (Lourenço et al., 2012; Oberndorfer et al., 2013). In sum, engaging in corporate sustainability can lead to (sustainable) competitive advantages and may increase firm value.

2.3 Value destruction

Contradictory to what is described in section 2.2, engaging in corporate sustainability may be disadvantageous for firms. Firstly, the reason that companies engage in environmental and social activities can be symbolic and driven by institutional pressure. If this is true, these activities may lead to additional costs which are not directly productive. Moreover, when managers spend funds on corporate sustainability practices, they help other stakeholders at the expense of shareholders. Implementing these practices may not be cost-effective, operating costs of environmental and social activities can exceed their financial benefits. Therefore, engaging in corporate sustainability can lead to less profits, decreased firm values or competitive disadvantages (Oberndorfer et al., 2013; Meric, Watson, & Meric, 2012; Yu & Zhao, 2015). Furthermore, corporate sustainability can create contradictory objectives and develop inefficiency in decision-making. Management may not have a

clear mission, because the firm's objectives are not as clear as the traditional objective, i.e. profit maximization (Rossi, 2009). It can also be the case that investors do not act on what they say. Investors can on the one hand say they value environmentally sustainable activities, but on the other hand not act on that when making an investment decision. Moreover, there can be a time lag between corporate sustainability and it creating profits (Meric et al., 2012). While the impact of corporate sustainability on firm value can be positive in the long run, it can negatively affect cash flows in the short run (Gregory et al., 2014).

In addition to this, the agency theory supports corporate sustainability destructing value. The agency theory addresses the relationship that arises when one individual, the principal, with an economic transfer allows another individual, the agent, to act on his or her behalf. As a result, the agent's decisions now have an effect on the welfare of the principal. This welfare may not be maximized, because of the possible differences in goals and levels of risk aversion between the agent and the principal (Wright, Mukherji, & Kroll, 2001). Corporate sustainability can be seen as such a principal-agent relation between managers and shareholders. Management might want to overinvest in corporate sustainability, since this can lead to private benefits, such as developing a reputation as a good citizen or socially responsible executive (Jo & Harjoto, 2011; Li, Li, & Minor, 2016; Yu & Zhao, 2015). This better reputation of top management can lead to them having better career opportunities and more negotiation power, which in turn leads to managers being overconfident. Overconfident managers overinvest and sometimes make value-destroying investments (Jo & Harjoto, 2011; Li et al., 2016). So, according to the agency theory, managers might want to overinvest in corporate sustainability for private benefits. Consequently, this can lead to value destruction.

2.4 Current literature on corporate sustainability and firm value

Several studies exist with respect to the impact of corporate sustainability on firm value. Some studies support that it creates value (Burnett, Skousen, & Wright, 2011; Lo & Sheu, 2010; Lourenço et al., 2012; Rossi, 2009; Yu & Zhao, 2015), while Oberndorfer et al. (2013) found it destroys value. The studies of Cheung (2011) and Wagner (2010) both show no clear result. Since their results differ, this topic is researched further in this thesis. In these existing studies, the Global 100 sustainable rankings are not used to measure corporate sustainability. This thesis will thus make use of another proxy and can in this way contribute to existing research. Also, most studies exist with respect to US firms, while in this thesis firms are examined globally.

Supporting the stakeholder theory and RBV, the results of the study of Burnett et al. (2011) show that sustainable corporations create value. Only the environmental dimension of business was used to identify corporate sustainability. The following studies have similar results but use the same approach as in this thesis, namely that corporate sustainability consists of economic, environmental and social dimensions (Montiel, 2008). Lo and Sheu (2010) found that sustainable US firms are rewarded with higher valuations in the market. They substantiate this with the stakeholder theory and RBV, just as Lourenço et al. (2012), who researched Canadian and US firms. According to them, investors penalize large firms with low levels of corporate sustainability. Rossi (2009) also concluded that the adoption of sustainability policies increases firm value when researching non-financial Brazilian companies. However, this was only supported by the stakeholder theory. This is also the case in the study of Yu and Zhao (2015), who had similar results, but an international sample was used. Contradictory to all these studies, the results of the study of Oberndorfer et al. (2013) show that corporate sustainability has a negative impact on firm value. Using the event study methodology, they researched the short-term impact of the inclusion of German corporations in two sustainability stock indexes. Their result is supported by declaring investments in corporate sustainability as additional costs that exceed their financial benefits. The studies of Cheung (2011) and Wagner (2010) both show no clear result. Cheung (2011) examined the reaction of the financial market to the news that a company is added to (or deleted from) the list of leading sustainability companies in the US. Using the event study methodology, he found some indication that US investors value sustainability, but in a temporary way. Wagner (2010) investigated the link between sustainability and economic performance for US firms. He found that environmental performance has a positive impact. However, the results also show that corporate social performance only has a positive impact if there is a sufficiently high level of advertising.

2.4.1 Environmental performance and firm value

In this section, studies with respect to the impact of environmental performance on firm value are discussed. Corporate sustainability contains an environmental dimension, but also comprises of economic and social dimensions (Montiel, 2008). Rankings are used to measure environmental performance, similar to this thesis, which uses the Corporate Knights' Global 100 rankings to measure corporate sustainability. Therefore, the following studies are included.

Yadav et al. (2016) researched the impact of environmental performance on firm value for large US firms using the event study methodology, followed by a multivariate regression analysis. Newsweek's green rankings were used to measure environmental performance. The methodology of this study is followed in this thesis. According to them, environmental activities differentiate products and are an

intangible asset for the firm. They found a positive relationship between environmental performance and firm value. Moreover, they conclude that continuously improving environmental performance positively affects the market value of firms. Lyon and Shimshack (2012) did a similar research investigating the 500 largest US firms and Newsweek's green rankings of 2009. They found that highly rated firms outperform poorly rated firms. According to them, consumers are willing to pay a premium for the environmental properties of products, and a good environmental performance increases sales. Meric et al. (2012) found the opposite when they researched the effect of a company's green score computed by Newsweek magazine on its stock price. They found a significant negative relation studying the impact during the 6-month period that followed the publication. They support this by declaring corporate sustainability as unnecessary and detrimental to firm value.

2.4.2 Corporate social responsibility and firm value

Likewise, studies exist with respect to corporate social responsibility (CSR) instead of corporate sustainability. Although they have many similarities, there are differences (Montiel, 2008). The most often used definition for CSR is Carroll's (1979): CSR includes the expectations of society at a certain point in time, including economic, legal, ethical, and discretionary expectations. Corporate sustainability states that economic, social and environmental dimensions are tied to each other, while CSR recognizes the dimensions as independent components. Also, the formulation of the economic dimension is different. However, there is some overlap. Both show that firms must balance the three dimensions to achieve long-term sustainability and social responsibility (Montiel, 2008). Therefore, the studies with respect to the impact of CSR on firm value are also included.

Jo and Harjoto (2011) found that CSR engagement positively influences firm value. Li et al. (2016) concluded the same, as Harjoto and Laksmana (2018), who stated that CSR reduces excessive risk taking and risk avoidance and therefore increases firm value. Gregory et al. (2014) have similar results, but a different explanation for these. The result of their study was that markets positively value most aspects of CSR, and do so because in the long run, high CSR firms have a higher expected growth rate in their abnormal earnings. Using the event study methodology, Rudkin and Cai (2019) found that a company's return is initially higher after it appears in the Dow Jones Sustainability Index, but goes back to its usual level after some time. While the former studies investigated US firms, Singh, Sethuraman and Lam (2017) researched firms from China and Hong Kong. They found the impact of CSR practices on firm value follows an inverted U-shaped relationship over time. This indicates that the effect of CSR on firm value increases during the first years, then reaches a maximum and then decreases step-by-step. Mulyadi and Anwar (2012) researched Indonesian companies. They found no significant relationship between CSR and firm value.

2.4.3 Summary of current literature

In table 1 all current literature reviewed in section 2.4 is summarized.

Table 1: Summary of current literature

Current literature	Results	Country	Event study	Stakeholder theory	RBV	Costs exceed benefits	Agency theory
Corporate sustainability							
Burnett et al. (2011)	+	US		+	+		
Cheung (2011)	+/-	US	+				
Lo and Sheu (2010)	+	US		+	+		
Lourenço et al. (2012)	+	US and Canada		+	+		
Oberndorfer et al. (2013)	-	Germany	+	+	+	+	
Rossi (2009)	+	Brazil		+			
Wagner (2010)	+/-	US					
Yu and Zhao (2015)	+	International		+		+	+
Environmental performance							
Lyon and Shimshack (2012)	+	US	+				
Meric et al. (2012)	-	US				+	
Yadav et al. (2016)	+	US	+				
Corporate Social Responsibility							
Gregory et al. (2014)	+	US		+	+		
Harjoto and Laksmana (2018)	+	US		+			
Jo and Harjoto (2011)	+	US		+			+
Li et al. (2016)	+	US		+			+
Mulyadi et al. (2012)	+/-	Indonesia					
Rudkin and Cai (2019)	+/-	US	+	+			
Singh et al. (2017)	+/-	China and Hong Kong					

Note. Under the column 'results', a plus sign (+) is put down, when the study found a positive impact on firm value; a minus sign (-) is put down, when the study found a negative impact on firm value; a plus minus sign is put down (+/-), when the study had no clear result. Under the column 'event study', a plus sign (+) is put down, when the study used the event study methodology. When in the study, a specific theory is mentioned, a plus sign (+) is put down under the relevant column. For instance, when the stakeholder theory is mentioned in the study, a plus sign (+) is put down under the column 'Stakeholder theory'.

2.5 Hypothesis development

The goal of this thesis is to research whether corporate sustainability has an impact on firm value. As discussed in sections 2.2, 2.3 and 2.4, some studies show that corporate sustainability can create value, by meeting the demands of stakeholders and creating (sustainable) competitive advantages. Contradictory, there are some studies that indicate a negative impact or no clear result. This is supported by the agency theory and declaring that investments in corporate sustainability are additional costs exceeding their benefits. Since it not clear how corporate sustainability will be received by investors, and what impact it will have on firm value, this leads to the first hypothesis.

H1: The announcement of a company being in the Corporate Knight's Global 100 sustainable rankings has no impact on its firm value.

Each firm in the Global 100 sustainable rankings is assigned a score, based on 12 KPI's and a methodology developed by the Corporate Knights (Corporate Knights, 2013, 2014, 2015a, 2015b). The impact of this score on firm value is investigated. To test whether there is an impact of a firm's score on its value, the following hypothesis is formulated.

H2: A firm's score in the Corporate Knights' Global 100 sustainable rankings is uncorrelated to its firm value.

In this thesis it is also investigated whether corporate sustainability improvement influences firm value. Corporate sustainability activities can be seen as a form of investment: initial costs for future financial benefits. Only high investments may deliver net benefits. A low commitment may result in not being able to generate more benefits than costs. So, this results in a U-shaped relationship between corporate sustainability and financial performance (Gregory et al., 2014). This is similar to the study of Singh et al. (2017). According to them, it can take a while for corporate sustainability practices to become part of the corporate culture. So, the impact of it on firm value can take some time to be visible. Also, benefits of corporate sustainability may disappear after a while. When firms do no further improve their corporate sustainability practices, returns could decrease. In addition, Yadav et al. (2016) conclude that improving environmental performance positively affects firm value. According to them, improvement is necessary to develop expertise for high performance. Also, repeated recognition improves a firm's reputation. For all these reasons, corporate sustainability improvement can have an impact on firm value. Improvement will be investigated by examining whether a rise or fall of at least 20 or 30 places in the Global 100 has an impact. It is not clear whether this is the case. Therefore, this leads to the following hypotheses.

H3a: A rise of a minimum of 20 places by a firm in the Global 100 sustainable rankings compared to the previous year has no impact on firm value.

H3b: A fall of a minimum of 20 places by a firm in the Global 100 sustainable rankings compared to the previous year has no impact on firm value.

H4a: A rise of a minimum of 30 places by a firm in the Global 100 sustainable rankings compared to the previous year has no impact on firm value.

H4b: A fall of a minimum of 30 places by a firm in the Global 100 sustainable rankings compared to the previous year has no impact on firm value.

Improvement will be investigated further by examining whether a rise or fall of at least a quintile or quartile in the Global 100 influences firm value. Since it is not clear whether such a rise or fall has an impact, this leads to the following hypotheses.

H5a: A rise of at least a quintile by a firm in the Global 100 sustainable rankings compared to the previous year has no impact on firm value.

H5b: A fall of at least a quintile by a firm in the Global 100 sustainable rankings compared to the previous year has no impact on firm value.

H6a: A rise of at least a quartile by a firm in the Global 100 sustainable rankings compared to the previous year has no impact on firm value.

H6b: A fall of at least a quartile by a firm in the Global 100 sustainable rankings compared to the previous year has no impact on firm value.

Furthermore, it is investigated whether a firm being in the Global 100 compared to not being in the Global 100 the previous year affects firm value. In this way improvement can be researched even further. To test this, the following hypothesis is formulated.

H7: A firm being in the Global 100 sustainable rankings compared to not being in the Global 100 the previous year has no impact on firm value.

3 Sample selection and methodology

In this chapter, the sample selection and methodology are explained. In the first paragraph, the sample selection is described. Followed by the second paragraph, in which the methodology is explained.

3.1 Sample selection

3.1.1 The Corporate Knights' Global 100 sustainable rankings

The Corporate Knights in Toronto publishes the sustainable business magazine *Corporate Knights.* It has a research department that produces rankings and financial product ratings based on corporate sustainability. Each January during the World Economic Forum in Davos, they release the Global 100 sustainable rankings (Corporate Knights, 2018). These rankings are produced using a transparent methodology and are created by evaluating publicly available data in an objective and replicable way (Corporate Knights, 2019). This makes the information provided by the Corporate Knights on the sustainability of companies very reliable. Moreover, the Global 100 reaches a large number of investors. The magazine *Corporate Knights* is the world's largest circulation magazine focused on sustainable business. Every quarter it is distributed to the Washington Post, Canada's Globe and Mail, and to 30,000 influential business and political decision-makers all over the world (B Lab, n.d.).

To form the Global 100, the Corporate Knights starts with all publicly traded companies with a market capitalization of at least US$ 2 billion. From these companies, a Global 100 shortlist is created. Four screens are used to eliminate companies, which are described in table A1 in the appendix. For instance, when a company belongs to the Tobacco industry, it is taken out of the list. Global 100 companies from the previous year are also added, but only if they pass the fourth screen. There is an exception in 2013. In this year all companies from the Global 100 in 2012 were automatically added. Subsequently, each company in the Global 100 shortlist is assigned an overall score. This score is determined by a maximum of twelve KPI's, including energy productivity, safety performance and leadership diversity. These 12 KPI's are described in table A2 in the appendix. Companies are scored only on those KPI's that have been identified as "priority indicators" for their respective Global Industry Classification Standard (GICS) Industry Group. The GICS is an industry classification system, developed by the Morgan Stanley Capital International (MSCI) and S&P Global (S&P Global & MSCI, n.d.). The GICS sectors and their corresponding industry groups are displayed in table A3 in the appendix. If an indicator (from the 12 KPI's) is disclosed by at least 10% of all large companies in a GICS Industry Group, it is a priority indicator for that group. So, each company in the Global 100 shortlist is assigned an overall score, which is the average of the scores on each priority

KPI. Now the Global 100 can be formed. Companies with the top overall scores in each GICS sector are included. To match the industry mix of the financial benchmark of the Global 100, the MSCI All Country World Index (ACWI), a fixed number of reservations is assigned to each sector. For instance, if 10% of the MSCI ACWI consists of financial companies, 10 positions in the Global 100 are kept for financial companies (Corporate Knights, 2013, 2014, 2015a, 2015b).

In this thesis, the Global 100 is used to investigate corporate sustainability and corporate sustainability improvement. To test the different hypotheses in section 2.5, data is collected for the years 2013, 2014, 2015 and 2016. In these years exactly the same methodology is used, which makes them highly comparable. For each year, the rank, company, country, GICS industry and overall score are collected from the Corporate Knights' website.

3.1.2 Financial and firm-specific data

In this thesis, an event study followed by various multivariate regression analyses are conducted. An event study can be used to determine the effect of an announcement of new information on a company's value (Ball & Brown, 1968; Fama, Fisher, Jensen, & Roll, 1969). In this study, this is the announcement of the Corporate Knights' Global 100. To perform the event study and the regressions, financial information of the firms in the Global 100 is necessary.

Financial information of the firms is collected from DataStream. This information is used to calculate daily stock returns, market returns and sector returns. The daily adjusted prices for each company in the Global 100 are collected. Furthermore, the index prices of the MSCI ACWI and those of the eleven GICS sector indices are collected. An overview of the different GICS sectors and their corresponding industry groups and indices is shown in table A3 in the appendix. Stock and index prices are collected for a period ranging from -200 trading days to +20 days around the announcement of the Global 100, which is on day zero. Following the study of Yadav et al. (2016), the daily stock returns, market returns and sector returns are calculated using formula 1:

$R_t = (P_t/P_{t-1})-1$

Where

R_t: The stock/market/sector return on day t

P_t: The price of the stock/market index/sector index on day t

P_{t-1}: The price of the stock/market index/sector index on day t-1

In addition to this, firm-specific financial data is collected from DataStream. This information is needed for the multivariate regression analyses. Data is necessary for the control variables included in these regressions. Total assets, total debt and net income are collected for each company.

3.1.3 The final sample

To form the final dataset for this thesis, companies with overlapping events in the event window are removed from the sample. The event window is the period of time around the event that is investigated (Strong, 1992). Examples of such overlapping events are a merger or acquisition, an environmental disaster or an unusually high or low profit announcement (Curran & Moran, 2007). The reason for this is the impact that such overlapping events may have on the stock returns in the event window (Yadav et al., 2016). To make sure that solely the reaction of investors to the Global 100 is investigated, and not their reaction to other events, companies with overlapping events are discarded. The Factiva database is used to search for these potentially overlapping events. For each company, twenty days before and after the announcement of the Global 100 are examined.

In this thesis, a full sample and a partial are used to test the hypotheses in section 2.5. The initial sample consisted of 400 firms, a hundred each year. First, firms with missing information are removed. Second, all companies with overlapping events are discarded. This leads to a full sample consisting of 353 firms. This sample is used to test H7. Subsequently, companies that were not in the Global 100 for at least two subsequent years are taken out. This is necessary to investigate corporate sustainability improvement further, to test H3-H6. This leads to a partial sample consisting of 57, 74, 77 and 59 firms, in the years 2013, 2014, 2015 and 2016 respectively.

3.2 Methodology

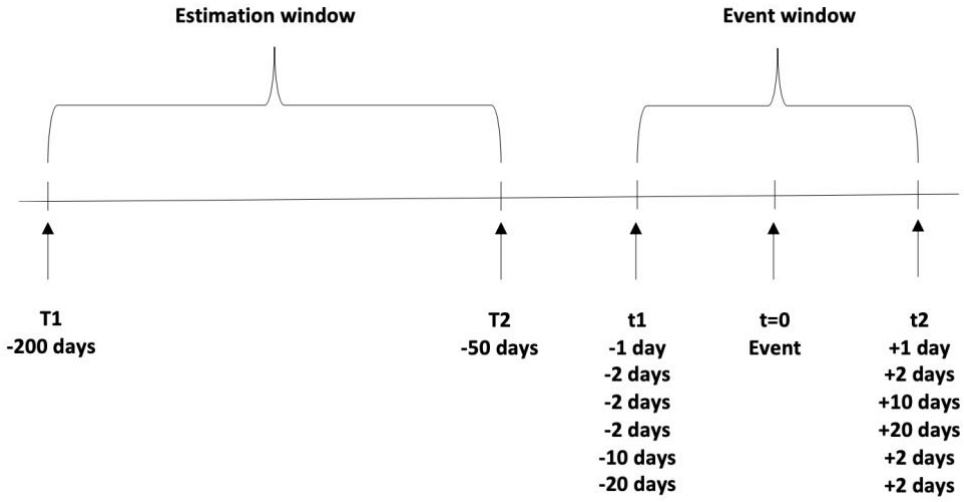
3.2.1 Event study

To test H1, an event study is performed. An event study can be used to determine the effect of an announcement of new information on the value of a company (Ball & Brown, 1968; Fama et al., 1969). The semi-strong form of efficiency is assumed: stock prices reflect all publicly available information (Malkiel & Fama, 1970). Because of this assumption, the impact of an event is almost immediately reflected in the stock price. By examining the reaction of the stock returns over a relatively short period of time around the announcement of new information, the event, the economic impact of this event can be estimated (MacKinlay, 1997; Halperin & Lusk, 2013). An event study can be summarized in three steps (Bowman, 1983).

The first step is to identify the event and its timing. In this thesis, the event is the announcement of the Corporate Knights' Global 100. The timing of the announcement of the Global 100 is known in advance, since it is always released at the end of January during the World Economic Forum (Corporate Knights, 2013, 2014, 2015a, 2015b). Therefore, investors can immediately react in the stock market or speculate on it before, since they know the publication is coming. This possible anticipation effect is taken into account when determining the length of the event window.

The second step is to specify a 'benchmark' model to estimate the normal stock returns. The economic impact of an event is measured by an abnormal stock return: the deviation of the actual market return from the normal stock return. After this, cumulative abnormal returns (CARs) can be calculated by summing up the daily abnormal returns over the event window (Yadav et al., 2016). Following the study of Yadav et al. (2016), the normal returns are estimated using the market model. The market model implies a linear relationship between the normal return and the market return on the event date (Yadav et al., 2016). The period used to estimate the parameters of market model is called the estimation window (Strong, 1992).
To calculate the normal returns, an estimation window of 200 trading days before to 50 days before the announcement of the Global 100 is used, as is shown in figure 1. While Yadav et al. (2016) use an estimation window of 251 days before to 11 days before the announcement of the green rankings, in this thesis an estimation window of 150 days is used. A reason for shortening the estimation window is to make sure that the estimation window and the event window do not overlap during the four years examined. Another reason is to investigate a possible anticipation effect (Cheung, 2011). Taking into account that investor's seek new information, short event windows are used to capture any effect from an advance notice and a late reaction to the event (Yadav et al., 2016). Motivated investors that encourage corporate sustainability can react immediately in the market, since the Global 100 is published on a pre-declared date. Consequently, in this thesis, an event window of three days (-1, +1) and an event window of five days (-2, +2) are investigated. In addition to this, two event windows of thirteen days (-2, +10; -10, +2) and two event windows of twenty-three days (-2, +20; -20, +2) are investigated to research a longer period and to detect a possible anticipation effect. Day 0 is the announcement day of the Corporate Knights' Global 100.

Figure 1: Estimation window and event windows



So, the market model is used to estimate the normal stock returns. The market returns in the market model are retrieved from the MSCI ACWI index, a financial benchmark for the Corporate Knights' Global 100 (Corporate Knights, 2018).

Although the market model is used to predict the normal returns, it has some disadvantages. Since the announcement of the Global 100 is on the same day for all companies every year, there is clustering of events in the event window. There is a clustering bias, i.e. cross-sectional dependence among the abnormal stock returns of the different companies. To solve this problem, standard cumulative abnormal returns (SCARs) can be used, like Yadav et al. (2016) do to solve this. SCARs are calculated by dividing CARs by their respective standard deviations (Yadav et al., 2016). However, standardizing CARs results in them not reflecting the real economic effects, and therefore they are not useful for further analysis besides testing for statistical significance (Boehmer, 1991). Because of this, the cluster bias is solved in another way: extending the market model with sector returns. If it is assumed that sector dependence drives the possible cluster bias, redefining normal returns per sector solves the bias, because there is now accounted for the degree to which firms are dependent on their sector (Strong, 1992).

In addition to this, calendar time effects can be a problem when using the market model. On Monday returns are lower and on Friday returns are higher. Therefore, the abnormal returns may be biased, if events are clustered on one of these days. To solve this, calendar dummies, i.e. day-of-the-week dummies, can be included in the market model (de Jong, Kemna & Kloek, 1992). Since in the year 2013 the Global 100 is announced on a Monday, calendar dummies are included.

So, the market model is extended to solve for a cluster bias and calendar time effects. To estimate the normal returns, formula 2 is used:

$$NR_{it} = \alpha_i + \beta_1 R_{mt} + \beta_2 R_{st} + \beta_3 DD + \varepsilon_{it}$$

Where

NR_{it}: The normal return of company i on day t

R_{mt}: The market return on day t

R_{st}: The sector return on day t

DD: The day-of-the-week dummies

The third step is to calculate and analyze abnormal returns around the event date. The impact of the event is measured by the abnormal stock return and is calculated with formula 3:

$$AR_{it} = R_{it} - NR_{it}.$$

Where

AR_{it}: The abnormal return of company i on day t

R_{it}: The actual return of company i on day t

NR_{it}: The normal return of company i on day t.

Subsequently, the CARs are calculated by summing up the daily abnormal returns over the event window, using formula 4:

$$CAR_i = \sum_{t=t1}^{t2} AR_{it}.$$

Where

CAR_i: The cumulative abnormal return of company i

AR_{it}: The abnormal return of company i on day t, where t_1 is the start of the event period and t_2 is the end of the event period; in this thesis, t_1 is -1 and t_2 is +1 or t_1 is -2 and t_2 is +2 or t_1 is -2 and t_2 is +10 or t_1 is -10 and t_2 is +2 or t_1 is -2 and t_2 is +20 or t_1 is -20 and t_2 is +2

Thereafter, the CARs are put together to obtain the cumulative average abnormal returns (CAARs). The CAARs are calculated with formula 5:

$$CAAR = \frac{1}{n} \sum_{t=1}^{N} CAR_i$$

Where

CAAR: The cumulative average abnormal return

CAR_i: The cumulative abnormal return of company i with N the number of companies in the Global 100

The CAARs are used to test H1 described in section 2.5. This hypothesis can be reformulated using the CAAR, which leads to the following hypothesis.

H1: The CAAR of the companies in the Corporate Knights' Global 100 sustainable rankings is not significantly different from zero.

3.2.2 Multivariate regression analyses

The CARs of the event study are used further in the multivariate regression analyses. These regressions contain various dependent variables, independent variables and control variables.

Dependent variables

Following the study of Yadav et al. (2016), the CARs of the three-day and five-day event window around the announcement of the Global 100 are used as dependent variables. CAR (-1, +1) and CAR (-2, +2) are included to investigate the impact of a firm' score and potential improvement on firm value. Moreover, to investigate a longer period and to detect a possible anticipation effect, CAR (-2, +10), CAR (-10, +2), CAR (-2, +20) and CAR (-20, +2), are used as dependent variables.

Independent variables

Score: The first independent variable is 'Score', the overall score of a company in the Global 100. This percentage score is determined by the Corporate Knights, as described in section 3.1. This variable is included to test H2. This hypothesis can be reformulated using CARs.

H2: A firm's score in the Corporate Knights' Global 100 sustainable rankings is uncorrelated to its CAR.

XRise & XFall: To investigate whether improvement has an impact on firm value, several dummy variables are included. The dummy variables 'XRise' and 'XFall' are included to test whether a rise or fall of at least X places affect a firm's value. The dummy variable 'XRise' is equal to 1 if a company rose a minimum of X places in the Global 100 compared to the previous year and zero otherwise. The dummy variable 'XFall' is equal to 1 if a company fell a minimum of X places in the Global 100 compared to the previous year and zero otherwise. A rise and fall of at least 20 places and 30 places are investigated. If a company experiences a significant difference in its CAR after rising or falling, improvement has an impact. The accompanying hypotheses can be reformulated using CARs.

H3a: A rise of a minimum of 20 places by a firm in the Global 100 sustainable rankings compared to the previous year is uncorrelated to the firm's CAR.

H3b: A fall of a minimum of 20 places by a firm in the Global 100 sustainable rankings compared to the previous year is uncorrelated to the firm's CAR.

H4a: A rise of a minimum of 30 places by a firm in the Global 100 sustainable rankings compared to the previous year is uncorrelated to the firm's CAR.

H4b: A fall of a minimum of 30 places by a firm in the Global 100 sustainable rankings compared to the previous year is uncorrelated to the firm's CAR.

YRise and YFall: To further examine whether corporate sustainability improvement has an impact, other dummy variables are included. The dummy variables 'YRise' and 'YFall' are added to test whether a rise or fall of Y influences firm value. The dummy variable 'YRise' is equal to 1 if a company rose with at least Y in the Global 100 compared to the previous year and zero otherwise. The dummy variable 'YFall' is equal to 1 if a company fell with at least Y in the Global 100 compared to the previous year and zero otherwise. A rise and fall of at least a quintile and quartile are researched. For instance, if a firm rises at least a quartile, it rises from rank 76-100 to at least rank 51-75 (or higher). Or another example, if a firm falls at least a quintile, it falls from 0-20 to at least 21-40 (or lower) or from 21-40 to at least 41-60 (or lower), etc. Improvement has an impact, if a firm experiences a significant increase or decrease in its CAR after such a rise or fall. The corresponding hypotheses can be reformulated using CARs.

H5a: A rise of at least a quintile by a firm in the Global 100 sustainable rankings compared to the previous year is uncorrelated to the firm's CAR.

H5b: A fall of at least a quintile by a firm in the Global 100 sustainable rankings compared to the previous year is uncorrelated to the firm's CAR.

H6a: A rise of at least a quartile by a firm in the Global 100 sustainable rankings compared to the previous year is uncorrelated to the firm's CAR.

H6b: A fall of at least a quartile by a firm in the Global 100 sustainable rankings compared to the previous year is uncorrelated to the firm's CAR.

First in: Corporate sustainability improvement is researched further by including the dummy variable 'First in'. This variable is included to test whether a company being in the Global 100 compared to not being in the rankings the former year affects firm value. The dummy variable 'First in' is equal to 1 if a company is in the Global 100 compared to not being in the Global 100 the previous year and zero otherwise. The accompanying hypothesis can be reformulated using CARs.

H7: A firm being in the Global 100 sustainable rankings compared to not being in the Global 100 the previous year is uncorrelated to the firm's CAR.

Control variables

In addition, several control variables are added. A country's regulation, firm size, and more can all affect the impact of environmental performance on firm value (Schaltegger & Synnestvedt, 2002). Since this is stated about environmental performance, the impact of corporate sustainability on firm value may also be affected by firm-level characteristics. Consequently, several control variables are included in the regressions.

Firm size: Firstly, 'Firm size' is added as control variable. Yadav et al. (2016) found a significant negative correlation between firm size and the SCARs. Therefore, it is possible that firm size also has an effect in this thesis. 'Firm size' is the natural logarithm of total assets (Yadav et al., 2016). The natural logarithm is used, because the coefficients on the natural-log scale are easier to interpret, namely as proportional differences (Gelman & Hill, 2007).

Debt: To control for the effect of the capital structure, 'Debt' is included as control variable. 'Debt' is a firm's total debt ratio: total debt divided by total assets (Yadav et al., 2016). In the study of Yadav et al. (2016) capital structure has no significant impact. However, a firm's capital structure can possibly affect abnormal returns. Studying the impact of a firm's debt ratio on abnormal returns, Muradoğlu and Sivaprasad (2012) found a significant negative correlation. Therefore, debt is still included as control variable.

Return on assets (ROA): 'ROA', the ratio of net income to total assets, is used to control for profitability (Yadav et al., 2016). Yadav et al. (2016) found a significant negative correlation between profitability and the SCARs. Therefore, it is likely that profitability also has a significant impact in this thesis. Consequently, 'ROA' is included as control variable.

Year dummies: Yadav et al. (2016) examined only one year. However, in this thesis, four years are examined. The macroeconomic situation of a country changes over time. For instance, the adoption of taxes on investors can change (Rossi, 2009). To control for variation in conditions over time, year dummies are included (Rudkin & Cai, 2019). The year dummy is equal to 1 if it is a certain year and zero otherwise.

Country dummies: Yadav et al. (2016) examined only US firms. However, in this thesis firms are examined globally. The relationship between corporate environmental performance and financial performance, measured with investor returns, is influenced significantly by the country of residence (Abertini, 2013). For instance, Albertini (2013) found that the correlation between corporate environmental performance and financial performance is stronger in the US and Canada than in Europe. Therefore, this may also be the case for corporate sustainability. Moreover, Xiao, Wang, van der Vaart and van Donk (2018) found that the relationship between corporate sustainability performance and corporate financial performance is negatively moderated by the country-level sustainability performance. So, country effects must be controlled for. Consequently, country dummies are included. The country dummy is equal to 1 if a company originates from a certain country and zero otherwise.

Finally, this leads to the following regression analyses to investigate the impact of corporate sustainability and corporate sustainability improvement on firm value. Firstly, the dummy variables 'XRise' and 'XFall' are added to the multivariate regression analysis. This regression is tested using the partial sample. This leads to formula 6:

$$CAR_i(t_1, t_2) = \alpha + \beta_1 Score + \beta_2 XRise + \beta_3 XFall + \beta_4 SIZE + \beta_5 DEBT + \beta_6 ROA + \beta_7 YD + \beta_8 CD + \varepsilon$$

Where

CAR_i:	The cumulative abnormal return of company i, where t_1 is the start of the event period and t_2 is the end of the event period
Score:	Score
XRise:	The dummy variable 'XRise'. X is replaced by 20 or 30
XFall:	The dummy variable 'XFall'. X is replaced by 20 or 30
SIZE:	Firm Size
DEBT:	Total debt ratio
ROA:	Return on assets
YD:	The year dummies
CD:	The country dummies

Second, the dummy variables 'YRise' and 'YFall' are added. Hereby, the partial sample is also used. This leads to formula 7 for the following multivariate regression analysis:

$$CAR_i(t_1, t_2) = \alpha + \beta_1 Score + \beta_2 YRise + \beta_3 YFall + \beta_4 SIZE + \beta_5 DEBT + \beta_6 ROA + \beta_7 YD + \beta_8 CD + \varepsilon$$

Where

CAR_i:	The cumulative abnormal return of company i, where t_1 is the start of the event period and t_2 is the end of the event period
Score:	Score
YRise:	The dummy variable 'YRise'. Y is replaced by quintile or quartile
YFall:	The dummy variable 'YFall'. Y is replaced by quintile or quartile
SIZE:	Firm Size
DEBT:	Total debt ratio
ROA:	Return on assets
YD:	The year dummies
CD:	The country dummies

Third, the dummy variable 'First in' is included in the multivariate regression analysis. This regression is tested using the full sample. This leads to formula 8:

$$CAR_i(t_1, t_2) = \alpha + \beta_1 Score + \beta_2 Firstin + \beta_3 SIZE + \beta_4 DEBT + \beta_5 ROA + \beta_6 YD + \beta_7 CD + \varepsilon$$

Where

CAR_i:	The cumulative abnormal return of company i, where t_1 is the start of the event period and t_2 is the end` of the event period
Score:	Score
First in:	The dummy variable 'First in'
SIZE:	Firm Size
DEBT:	Total debt ratio
ROA:	Return on assets
YD:	The year dummies
CD:	The country dummies

4 Results

In this chapter the results are shown. The descriptive statistics are displayed in the first paragraph. In the second paragraph, the results of the event study are presented. Followed by the third paragraph, in which the results of the multivariate regression analyses are shown. Lastly, in the fourth paragraph, the robustness tests of the multivariate regression analyses are described.

4.1 Descriptive statistics

The descriptive statistics of the partial sample are displayed in tables 2, 3, and 4. Table 2 shows the mean, standard deviation, median, minimum and maximum, and 2.5% and 97.5% percentiles for the dependent, independent and control variables in the multivariate regression analyses. Table 3 displays the descriptive statistics of the dummy variables. Lastly, table 4 presents Pearson's correlation coefficients.

Table 2 displays the means of all CARs. The mean CARs become increasingly positive in the period following the announcement of the Global 100. From a mean CAR of 0.22% in the three-day event window (-1, +1) to a mean CAR of 1.44% in the twenty-three-day event window (-2, +20). Since the mean CARs are positive, this could indicate that investors react positive to a firm's appearance in the Global 100. Moreover, the values of the CARs are dispersed. For instance, the dependent variable CAR (-2, +10) has a minimum of -21.45% and a maximum of 24.30%, while the 2.5% and 97.5% percentiles show values of 8.57% and 12.64%. Therefore, this is taken into account when testing for robustness in section 4.4.

Table 2 also shows that 'Score', the overall score of a company in the Global 100, ranges from a minimum of 41% to a maximum of 80%, with a mean of 59%. Furthermore, table A4 in the appendix displays the number of companies, mean, standard deviation, minimum and maximum, and 2.5% and 97.5% percentiles for the independent variables, excluding the dummy variables, for each year separately. It can be deduced from table A4 that the years 2013 and 2016 have less observations compared to 2014 and 2015. This is because there were less firms in 2013 and 2016 that were in the Global 100 for at least two subsequent years, and thus more firms were removed from the sample. Moreover, table A4 shows that the mean score grew from 59% in 2013 to 64% in 2016. The minimum and maximum score also increased over the years, from 41% to 49%, and from 74% to 80%. So, on average firms are improving their corporate sustainability practices. A reason may be that companies are increasingly convinced that participating in corporate sustainability and improving it is important. Like PricewaterhouseCoopers (2020) found in their survey: CEOs globally increasingly recognize the advantages of investing in corporate sustainability.

Furthermore, table 2 displays the values of the control variables: 'Firm size', 'Debt' and 'ROA'. 'Firm size', the natural logarithm of total assets, has a mean of 17.3. It is stable over the years, which can be derived from table A4 in the appendix. 'Debt', total debt to total assets, is 25% on average, and ranges from 0 to 62%. Therefore, most firms in the Global 100 have positive debt to asset ratios. 'ROA', net income to total assets, is 5% on average, with a minimum of -33% and a maximum of 41%. So, on average firms perform well. The 2.5% and 97.5% percentiles show that the minimum and maximum are outliers: the 2.5% percentile shows a ROA of -6% and the 97.5% percentile shows a ROA of 21%. Overall, table 2 shows that the values of the control variables are dispersed, which is taken into account when testing for robustness in section 4.4.
Table 3 displays the descriptive statistics of the dummy variables. It shows that more companies fell 20 or 30 places in the Global 100 than rose, but the difference is not that large. Moreover, the same number of firms rose at least a quintile as fell, namely 22%. The number of companies rising or falling at least a quartile is almost equal: 21% of the companies rose at least a quartile and 22% fell. Moreover, in the full dataset, 34% of the firms was in the Global 100 compared to not being in the rankings the previous year.

The number of companies per country in the Global 100 over the years 2013-2016 is shown in table A5 in the appendix. Most companies are from the United States, France and Canada. Switzerland has the lowest mean score, 51.42%, and Denmark has the highest mean score, 69.28%. Furthermore, table A6 in the appendix displays the number of companies per sector. Most firms in the Global 100 are from the sectors: financials, consumer staples, IT and industrials. All sectors and their accompanying industry groups are displayed in table A3 in the appendix. The Corporate Knights follows the MSCI ACWI and includes a fixed number of firms per industry in the Global 100 (Corporate Knights, 2013, 2014, 2015a, 2015b). Therefore, the number of companies per sector varies, but this is not due to corporate sustainability performance. The average scores of the sectors do not differ much. The lowest mean score is 57.35% in the IT sector and the highest mean score is 63.48% in the utilities sector.

Table 4 displays Pearson's correlation coefficients between the variables 'Rank', 'Score', 'Firm size', 'Debt' and 'ROA'. The table shows a negative linear correlation between 'Rank' and 'Score', that is strongly significant. This correlation is as expected, a higher score leads to a lower rank number. For example, a firm with rank number 25 has a higher score than a firm with rank 50 (number 1 has the highest score). Table 4 also shows a significant negative correlation between 'ROA' and 'Firm size'. This indicates that smaller firms have a higher ROA. Moreover, 'ROA' and 'Debt' are significantly negatively correlated. So, firms with a lower debt ratio experience a higher ROA.

Table 2: Descriptive statistics

Variable	Mean	SD	Median	Min	Max	Percentile 2.5%	Percentile 97.5%
CAR (-1, +1)	0.22	2.969	-0.04	-7.88	19.45	-5.04	6.23
CAR (-2, +2)	0.69	3.381	0.54	-16.12	19.53	-5.16	9.11
CAR (-2, +10)	1.21	5.547	0.82	-21.45	24.30	-8.57	12.64
CAR (-2, +20)	1.44	7.646	0.77	-25.79	51.35	-13.02	17.02
CAR (-10, +2)	0.87	5.761	0.37	-37.82	31.74	-8.28	10.95
CAR (-20, +2)	0.34	6.648	-0.31	-34.72	39.48	-10.91	14.74
Score	59.13	7.709	58.90	41.10	80.10	44.92	74.08
Firm Size	17.329	1.676	17.122	11.868	21.601	14.187	20.407
Debt	24.53	13.936	23.86	0	61.76	0.35	52.38
ROA	5.34	7.176	4.34	-33.01	41.02	-5.73	21.17

Note. Descriptive statistics of the independent variables of the multivariate regression analysis. For each variable the mean, standard deviation, median, minimum and maximum, and 2.5% and 97.5% percentiles are reported. All CARs, Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets.

Table 3: Descriptive statistics of the dummy variables

Variable	Mean	SD
Dummy 20 Rise	0.12	0.320
Dummy 20 Fall	0.16	0.372
Dummy 30 Rise	0.08	0.270
Dummy 30 Fall	0.09	0.287
Dummy Quintile Rise	0.22	0.418
Dummy Quintile Fall	0.22	0.413
Dummy Quartile Rise	0.21	0.405
Dummy Quartile Fall	0.20	0.400
Dummy First in	0.34	0.477

Note. Descriptive statistics of the dummy variables of the multivariate regression analyses. For each variable the mean and standard deviation are reported.

Table 4: Pearson's correlation coefficients

	Rank		Score		Firm size		Debt ratio		ROA
Rank	1.00								
Score	-0.8803***	(0.000)	1.0000						
Firm Size	0.0697	(0.256)	-0.0157	(0.799)	1.0000				
Debt	-0.0961	(0.117)	0.0693	(0.259)	-0.0836	(0.173)	1.0000		
ROA	-0.0906	(0.140)	0.0653	(0.287)	-0.2964***	(0.000)	-0.2151***	(0.000)	1.000

Note. An overview of Pearson's correlation coefficients between Rank, Score, Firm size, Debt and ROA. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

4.2 Event study results

The results of the event study to determine the impact of the announcement of the Global 100 on firm value can be found in table 5. The full sample contains all firms, firms that were not in the Global 100 for at least two subsequent years included. Firms with overlapping events were removed from the sample. For instance, on 23 January 2015, two days after the announcement of the Global 100, Adidas announced it would sell Rockport, which led to a 3.8% increase in its share price. Or another example, on 22 January 2014, the day of the announcement of the Global 100, ASML announced its Q4 sales and intention to increase dividend, increasing its share price with 7%. The partial sample contains only those firms that were in the Global 100 for at least two subsequent years and have no overlapping events.

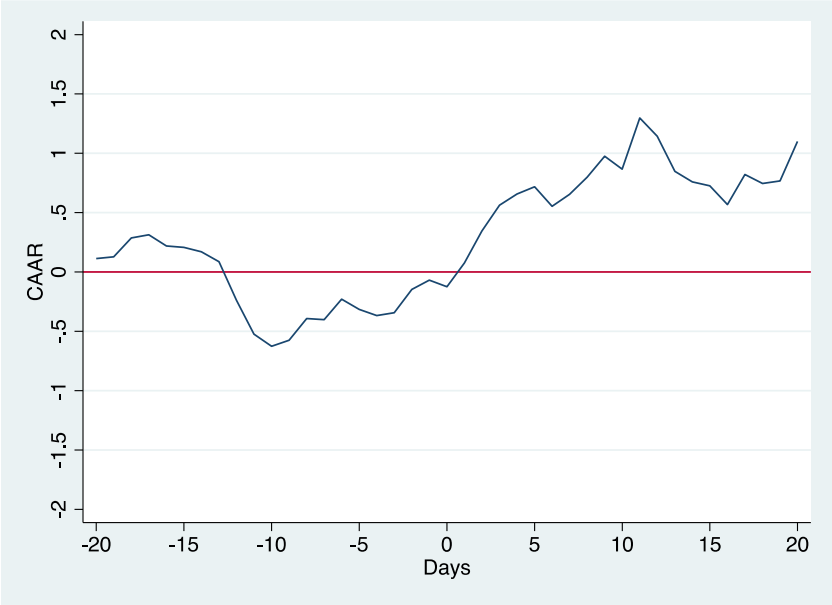
Figure 2 shows the CAAR in the forty-one-day event window (-20, +20) from the full sample. Figure 3 displays the CAAR in the forty-one-day event window (-20, +20) from the partial sample. From both figures can be deduced that the CAAR increases from day -10 until day +20. This is clearer in figure A1 in the appendix, that shows the CAAR in the twenty-one-day event window (-10, +10) from the full sample and figure A2 in the appendix, that displays the CAAR in the twenty-one-day event window (-10, +10) from the partial sample. Overall, from these four figures can be concluded that the CAAR increases from day -10 and then continues to increase. The rise before the announcement shows that investors are speculating on the Global 100, in a positive way. After the announcement of the Global 100, the CAAR increases even more, indicating that a firm's appearance in the Global 100 has a positive effect on its value. Also, the CAAR rises more after the announcement than before. This shows that the anticipation effect is smaller than the effect after the announcement. Overall, it can be concluded that investors react positively to a company being in the Global 100, since the CAAR is positive and increasing from day -10 until day +20.

In addition, from the four graphs can be derived that the full sample shows a slightly higher CAAR than the partial sample. However, this difference is small.

Figure 2: Full Sample CAAR from day -20 to day +20

Note. An overview of the CAAR in the forty-one-day event window (-20, +20) from the full sample. The y-axis displays the CAAR in percentages. The x-axis displays the days. The CAAR for the -18th day means the sum of average abnormal return from -20th day to -18th day and similarly for the rest of the days.

Figure 3: Partial Sample CAAR from day -20 to day +20



Note. An overview of the CAAR in the forty-one-day event window (-20, +20) from the partial sample. The y-axis displays the CAAR in percentages. The x-axis displays the days. The CAAR for the -18th day means the sum of average abnormal return from -20th day to -18th day and similarly for the rest of the days.

Table 5 displays the event study results. It shows that the companies in the partial sample experience no significant CAAR in the three-day event window (-1, +1) around the announcement of the Global 100. However, in the five-day event window (-2, +2) around the announcement the firms experience a positive CAAR of 0.6876%. Furthermore, the thirteen-day event window (-2, +10) shows a higher CAAR of 1.2092%, and the twenty-three-day event window (-2, +20) displays a CAAR of 1.4435%. All these CAARs are statistically significant at the 99% confidence level. So, the CAAR rises in the days following the announcement of the Global 100. Therefore, it can be concluded that a firm's value increases over time as a response to it appearing in the rankings. The thirteen-day event window (-10, +2) and twenty-three-day event window (-20, +2) were included to detect a possible anticipation effect. The CAAR in the thirteen-day event window (-10, +2) is 0.8687% and significantly different from zero at the 95% confidence level. However, the twenty-three-day event window (-20, +2) shows a CAAR not significantly different from zero. Consequently, there is an anticipation effect. However, this effect starts only short before the announcement of the Global 100.

The full sample shows slightly higher CAARs. However, the CAARs of the full sample and partial sample show almost no difference in significance. The only difference is that the CAAR in the thirteen-day event window (-10, +2) is statistically significant at the 99% confidence level in the full sample, but statistically significant at the 95% confidence level in the partial sample. The companies in the full sample experience a CAAR of 0.7730% in the five-day event window (-2, +2), 1.3583% in the thirteen-day event window (-2, +10) and 1.4913% in the twenty-three-day event window (-2, +20). These CAARs are all statistically significant at the 99% confidence level. Likewise, the CAARs in the three-day event window (-1, +1) and twenty-three-day event window (-20, +2) are not statistically different from zero. The differences between the CAARs of the full sample and the partial sample are also displayed in table 5. To test the difference between samples, a t-test is done. The null hypothesis: the difference between the CAARs is zero. This hypothesis is not rejected, so it can be concluded that there are no large differences between samples.

On the one hand, the CAARs in the five-day (-2, +2), thirteen-day (-2, +10; -10, +2) and twenty-three-day (-2, +20) event windows around the announcement of the Global 100 reject H1: The CAAR of the companies in the Corporate Knights' Global 100 is significantly different from zero. So, the announcement of the Global 100 has an impact on firm value, and this impact is positive. On the other hand, the CAARs in the three-day (-1, +1) and twenty-three-day event (-20, +2) windows around the announcement of the rankings do support H1. They suggest that there is no impact on firm value. The insignificant CAAR in the three-day event window (-1, +1) indicates that the market is not semi-strong efficient, since the impact of the event is not immediately reflected in the stock

price. The announcement of the Global 100 leads to abnormal returns, but after the announcement, not immediately. Moreover, the CAAR in the twenty-three-day event window shows no anticipation effect. However, the thirteen-day event window (-10, +2) before the announcement does. So, investors do speculate on the Global 100, but only short before.

Table 5: Event study results

	Full sample (N=353)	**Partial sample (N=267)**	**Difference**
CAAR (-1, +1)	0.2597	0.2223	0.0374
	(0.106)	(0.222)	(0.878)
CAAR (-2, +2)	0.7730***	0.6876***	0.0854
	(0.000)	(0.001)	(0.755)
CAAR (-2, +10)	1.3583***	1.2092***	0.1491
	(0.000)	(0.000)	(0.742)
CAAR (-2, +20)	1.4913***	1.4435***	0.0478
	(0.000)	(0.002)	(0.938)
CAAR (-10, +2)	0.9506***	0.8687**	0.0819
	(0.002)	(0.014)	(0.860)
CAAR (-20, +2)	0.3777	0.3447	0.0330
	(0.282)	(0.398)	(0.951)

Note. Cumulative average abnormal returns (CAARs) are reported from the full and partial sample for six different event windows. The table displays the CAARs in percentages. Difference is the difference between the full sample CAAR and the partial sample CAAR. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

4.3 Results multivariate regression analyses

After conducting the event study, various multivariate regression analyses are performed. The event study is used to test whether the appearance of companies in the Global 100 has an impact on their firm value. Now, the multivariate regression analyses are used to find out whether the CARs, derived from the event study, are related to the overall score of a company in the Global 100, or to company specific control variables. Moreover, it is investigated whether corporate sustainability improvement has an impact by including various dummy variables.

The CARs from the partial sample are used as dependent variables: CAR (-1, +1), CAR (-2, +2), CAR (-2, +10), CAR (-2, +20), CAR (-10, +2) and CAR (-20, +2). However, to test H7, the CARs from the full sample are added as dependent variables. The full sample is used, so the dummy variable 'First in' contains as many observations as possible.

The variable 'Score', the overall score of a company in the Global 100, is used as independent variable.

Moreover, multiple dummy variables are included to test whether improvement has an impact. First, the dummy variables 'XRise' and 'XFall' are added to test whether a rise or a fall of a minimum of X places has an impact. Second, the dummy variables 'YRise' and 'YFall' are included to find out whether a rise or fall of at least Y affects firm value. Finally, the dummy variable 'First in' is included to test whether companies that are in the Global 100 compared to not being in the rankings the previous year experience significantly different CARs.
Several control variables are added: 'Firm size', 'Debt' and 'ROA'. 'Firm size' is the natural logarithm of total assets. 'Debt' is the debt ratio, total debt divided by total assets. Finally, 'ROA', the ratio of net income to total assets. These variables are added to test whether the effects are solely due to the score of a company. Furthermore, year dummies and country dummies are included.
The regression coefficients obtained from the multivariate regression analyses are displayed in tables 6-10. Model 1 uses the CARs of the three-day event window (-1, +1) as dependent variable, model 2 uses the CARs of the five-day event window (-2, +2), model 3 and 5 use the CARs of the thirteen-day event windows (-2, +10; -10, +2), and model 4 and 6 use the CARs of the twenty-three-day event windows (-2, +20; -20, +2).
Table 6 and 7 display the multivariate regression analyses with the dummy variables 'XRise' and 'XFall'. Table 6 includes '20Rise' and '20Fall' and table 7 includes '30Rise' and '30Fall'. Table 8 and 9 display the multivariate regression analyses with the dummy variables 'YRise' and 'YFall'. Table 8 includes 'Quintile rise' and 'Quintile fall' and table 9 includes 'Quartile rise' and 'Quartile fall'. Table 10 displays the multivariate regression analysis with the dummy variable 'First in'.

All tables show that, in the first four models, there is no statistically significant correlation between the score and CAR of a company. Additionally, in table 10, model 5 and 6 also show no correlation. No correlation suggests that the score of a company does not matter to investors. If a company's score increases, investors do not react positive or negative to this. Only model 5 and 6 show a statistically significant negative correlation in tables 6-9. For instance, in table 7, if 'score' increases with 1%, a company's CAR decreases with 0.1184% in model 5 and 0.1480% in model 6, ceteris paribus. These are statistically significant at the 95% confidence level. The other multivariate regression models also show a significant negative correlation between a company's score and CAR, but these correlations are statistically significant at different confidence levels.
A possible explanation for this negative impact may be that investors react negative to firms with a higher score in the Global 100. However, in the time period investigated in models 5 and 6, with CAR (-10, +2) and CAR (-20, +2) as dependent variables, the score is not yet known by investors for most of the time, since the Global 100 is not published yet. Therefore, investors could not react to the score, but only speculate on it. Furthermore, there can be another reason. Multiple years are

investigated, and as shown in section 4.1, the mean, minimum and maximum scores increased over the years. So, it could be that over the years a company's score increases, but it drops in the rankings. Therefore, in section 4.4, when testing for robustness, rank is included as independent variable instead of score, to test whether the rank of a company has an (negative) impact on its CAR. Since most models show no significant correlation between a firm's score and CAR, H2 is supported: a firm's score in the Corporate Knights' Global 100 sustainable rankings is uncorrelated to its CAR. Thus, a company's score has no impact on its firm value.

It can be deduced from table 6 and 7 that the dummy variables '20Rise', '20Fall', '30Rise' and '30Fall' show no significant correlation with the CARs in all models. Therefore, investors do not mind about an increase or decrease of a minimum of 20 or 30 places in the Global 100. So, H3a, H3b, H4a and H4b are supported. A rise or fall of a minimum of 20 or 30 places by a firm in the Global 100 compared to the previous year is uncorrelated to the firm's CAR, and it has no impact on its value.

Table 8 shows that, in model 1, if a company fell at least a quintile, the company's CAR is 1.1459% lower, ceteris paribus. This correlation is statistically significant at the 95% confidence level. In model 2, a company's CAR is 0.9546% lower, and in model 3, a company's CAR is 1.5883% lower, ceteris paribus. Both these correlations are statistically significant at the 90% confidence level. As a result, H5a is supported and H5b is rejected. A fall of at least a quintile by a firm in the Global 100 compared to the previous year has an impact on its firm value. It is negatively received by investors. Furthermore, it can be derived from table 9 that in model 4, if a company fell at least a quartile, its CAR is 2.3457% lower, ceteris paribus. This correlation is statistically significant at the 90% confidence level. Since investors do not mind about a rise of at least a quartile, H6a is supported. Contradictory, H6b is rejected, since it is found that investors do mind about a fall of a least a quartile. A fall of at least a quartile by a firm in the Global 100 compared to the previous year is significantly negatively correlated to the firm's CAR, and it has a negative impact on its value.

Table 10 displays the multivariate regression analysis including the dummy variable 'First in'. If a company is in the Global 100 compared to not being in the Global 100 the previous year, the company's CAR is 1.9390% higher in model 4, ceteris paribus, and statistically significant at the 95% confidence level. This shows that investors do care about a company appearing in the Global 100 compared to the previous year. Therefore, H7 can be rejected: A firm being in the Global 100 compared to not being in the Global 100 the previous year is significantly positively correlated to the firm's CAR, and it has a positive impact on its value.

In all regression analyses, 'Firm size' shows no significant correlation with the CARs. This is contradictory to the study of Yadav et al. (2016). They found that a firm's size is significantly negatively correlated to its SCAR.
However, 'Debt' shows a significant impact. A higher debt ratio leads to a higher CAR. This is contradictory to the study of Yadav et al. (2016), who found no correlation. But this is similar to the study of Muradoğlu and Sivaprasad (2012). A possible reason for this correlation can be that investors require a higher return. Firms with higher debt ratios have a higher financial risk and are thus riskier to invest in, leading to investors requiring a higher return (Hamada, 1969). In addition, firms with higher debt ratios will have creditors that monitor their performance closely. There is scrutiny by banks on the management. As a result, higher debt ratios can prompt the management to do better. It can make management more competitive and more aggressive, because they cannot run the risk of bankruptcy (Berk & DeMarzo, 2016). Since higher debt ratios can make firms perform better, this can be an explanation for higher debt ratios leading to higher CARs.
Furthermore, in most regression analyses, 'ROA' shows a positive correlation with the CARs. This is the opposite of what Yadav et al. (2016) found. A reason for this can be that a higher ROA shows that the achievements of a company become better. Since ROA is a measure of efficiency, it presents how well a company manages its assets. If the ratio is higher, this can increase the interest of investors to buy shares, since this indicates that a company is managing its assets better. In turn, this higher demand for shares of a firm can lead to increased stock prices (Manoppo, 2015; Warrad & Omari, 2013; Zulkarnaen, Syamsun & Maulana, 2016).

Finally, from tables 6-10 can be concluded that the R-squares of the different multivariate regression analyses are relatively low. For instance, in table 6, model 4 has an R-squared of 15.03%. This means that only 15.03% of the variance in the CARs is explained by the model. If the R-squared can be increased, this gives a more complete model explaining the impact of a firm's score on its CAR. This could be taken into account in future research.

Table 6: Results of the multivariate regression analysis with dummy variables '20Rise' and '20Fall'

	Model 1 **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-3.2411	-4.9429	-1.6415	3.9315	2.3729	6.8632
	(0.352)	(0.214)	(0.794)	(0.658)	(0.719)	(0.374)
Score	-0.0010	-0.0075	0.0122	-0.0214	-0.1136*	-0.1474**
	(0.975)	(0.836)	(0.831)	(0.775)	(0.061)	(0.038)
Dummy 20 Rise	0.2786	0.2357	-0.2776	-0.8853	0.8707	0.5267
	(0.644)	(0.724)	(0.792)	(0.553)	(0.433)	(0.685)
Dummy 20 Fall	-0.6099	-0.3396	-0.9261	-2.0468	-0.7416	-1.2671
	(0.275)	(0.583)	(0.343)	(0.139)	(0.470)	(0.292)
Firm Size	0.1531	0.2583	0.0723	0.0798	0.1652	0.0170
	(0.299)	(0.114)	(0.779)	(0.826)	(0.542)	(0.957)
Debt	0.0296*	0.0410**	0.0689**	0.0962**	0.0588*	0.0828**
	(0.082)	(0.029)	(0.021)	(0.022)	(0.060)	(0.024)
ROA	0.0793**	0.1058***	0.2085***	0.3070***	0.1758***	0.1414*
	(0.023)	(0.006)	(0.001)	(0.000)	(0.006)	(0.059)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
F-statistic	0.66	1.16	1.86***	1.39*	1.63**	1.37
Prob>F	0.9150	0.2708	0.0059	0.0920	0.0256	0.1039
R^2	0.0772	0.1282	0.1915	0.1503	0.1712	0.1482

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table 7: Results of the multivariate regression analysis with dummy variables '30Rise' and '30Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-3.0999	-4.5166	-2.5712	2.3801	3.2316	7.3303
	(0.384)	(0.252)	(0.681)	(0.788)	(0.621)	(0.339)
Score	-0.0010	-0.0108	0.0195	-0.0107	-0.1184**	-0.1480**
	(0.975)	(0.759)	(0.727)	(0.893)	(0.044)	(0.032)
Dummy 30 Rise	0.2649	0.4025	0.2587	-0.2441	1.1862	0.6584
	(0.716)	(0.617)	(0.839)	(0.893)	(0.375)	(0.674)
Dummy 30 Fall	-1.0981	-0.8015	-0.3606	-1.3692	-1.7338	-2.1966
	(0.125)	(0.311)	(0.774)	(0.441)	(0.187)	(0.154)
Firm Size	0.1414	0.2472	0.0885	0.1046	0.1389	-0.0050
	(0.337)	(0.130)	(0.732)	(0.775)	(0.607)	(0.987)
Debt	0.0274	0.0393**	0.0706**	0.0978**	0.0550*	0.0788**
	(0.108)	(0.037)	(0.019)	(0.021)	(0.079)	(0.032)
ROA	0.0757**	0.1029***	0.2101***	0.3085***	0.1687***	0.1343*
	(0.030)	(0.008)	(0.001)	(0.000)	(0.009)	(0.073)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
F-statistic	0.70	1.19	1.83***	1.32	1.68**	1.41*
Prob>F	0.8827	0.2358	0.0072	0.1309	0.0181	0.0865
R^2	0.0813	0.1358	0.1888	0.1438	0.1762	0.1515

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table 8:

Results of the multivariate regression analysis with dummy variables 'Quintile Rise' and 'Quintile Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-2.0498	-3.5948	-0.2121	3.2268	3.5104	8.3648
	(0.568)	(0.367)	(0.973)	(0.719)	(0.598)	(0.281)
Score	-0.0136	-0.0208	-0.0032	-0.0177	-0.1226**	-0.1653**
	(0.677)	(0.566)	(0.955)	(0.829)	(0.044)	(0.020)
Quintile Rise	0.1155	0.0784	-0.3751	-0.7661	0.5881	0.8839
	(0.819)	(0.889)	(0.672)	(0.543)	(0.529)	(0.418)
Quintile Fall	-1.1459**	-0.9546*	-1.5883*	-1.5446	-1.0855	-1.4780
	(0.028)	(0.098)	(0.082)	(0.233)	(0.258)	(0.188)
Firm Size	0.1273	0.2329	0.0484	0.0916	0.1355	-0.0129
	(0.385)	(0.152)	(0.851)	(0.802)	(0.617)	(0.968)
Debt	0.0291*	0.0402**	0.0700**	0.1014**	0.0573*	0.0823**
	(0.083)	(0.031)	(0.018)	(0.016)	(0.065)	(0.023)
ROA	0.0744**	0.1012***	0.2019***	0.3039***	0.1714***	0.1380*
	(0.032)	(0.009)	(0.001)	(0.001)	(0.008)	(0.065)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
F-statistic	0.80	1.26	1.95***	1.36	1.66**	1.43*
Prob>F	0.7634	0.1779	0.0033	0.1096	0.0208	0.0741
R^2	0.0923	0.1376	0.1987	0.1472	0.1742	0.1543

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table 9:

Results of the multivariate regression analysis with dummy variables 'Quartile Rise' and 'Quartile Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-2.9569	-4.6593	-0.6646	4.5402	2.1163	6.4534
	(0.411)	(0.242)	(0.916)	(0.609)	(0.749)	(0.405)
Score	-0.0027	-0.0071	0.0055	-0.0246	-0.1039*	-0.1409**
	(0.935)	(0.843)	(0.923)	(0.759)	(0.084)	(0.045)
Quartile Rise	0.0713	-0.1152	-0.5611	-1.2067	1.1315	0.4021
	(0.887)	(0.836)	(0.523)	(0.331)	(0.887)	(0.424)
Quartile Fall	-0.7796	-0.5470	-1.4560	-2.3457*	-0.6949	-0.8961
	(0.134)	(0.342)	(0.109)	(0.068)	(0.469)	(0.424)
Firm Size	0.1388	0.2453	0.0447	0.0508	0.1522	0.0132
	(0.347)	(0.134)	(0.862)	(0.889)	(0.576)	(0.967)
Debt	0.0308*	0.0418**	0.0725**	0.1043**	0.0594*	0.0851**
	(0.068)	(0.026)	(0.014)	(0.013)	(0.056)	(0.020)
ROA	0.0795**	0.1053***	0.2086***	0.3089***	0.1751***	0.1434*
	(0.022)	(0.006)	(0.001)	(0.000)	(0.007)	(0.056)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
F-statistic	0.69	1.17	1.94***	1.44*	1.60**	1.35
Prob>F	0.8872	0.2535	0.0036	0.0708	0.0299	0.1136
R^2	0.0807	0.1298	0.1974	0.1550	0.1688	0.1465

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table 10: Results of the multivariate regression analysis with dummy variable 'First in'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	1.7335	1.0874	3.6641	5.8437	1.8603	3.2423
	(0.538)	(0.720)	(0.470)	(0.390)	(0.713)	(0.581)
Score	-0.0137	0.0019	0.0288	0.0283	-0.0628	-0.0902
	(0.615)	(0.948)	(0.557)	(0.666)	(0.198)	(0.113)
First in	-0.0480	0.1204	0.6233	1.9390**	0.8183	0.7016
	(0.895)	(0.760)	(0.344)	(0.029)	(0.212)	(0.358)
Firm Size	-0.0681	-0.0914	-0.2205	-0.1200	0.0189	0.0166
	(0.559)	(0.469)	(0.295)	(0.478)	(0.928)	(0.946)
Debt	0.0291**	0.0239	0.0211	0.0241	0.0443*	0.0559**
	(0.033)	(0.103)	(0.389)	(0.462)	(0.069)	(0.049)
ROA	0.0407	0.0549*	0.1508***	0.1200***	0.0896*	0.0405
	(0.171)	(0.088)	(0.005)	(0.006)	(0.094)	(0.515)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	353	353	353	353	353	353
F-statistic	0.69	1.47*	1.44*	1.64**	1.96***	1.76***
Prob>F	0.8967	0.0563	0.0664	0.0195	0.0022	0.0093

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

4.4 Robustness checks of the multivariate regression analyses

To check the results of the multivariate regression analyses, robustness checks are done. First, an alternative regression model is used to test whether rank has an impact on the CARs. Second, clustered standard errors are obtained to check the results. Lastly, winsorization is used to deal with outliers.

4.4.1 Alternative regression model

In section 4.3 was found that in some multivariate regression analyses, with CAR (-10, +2) and CAR (-20, +2) as dependent variables, there is a significant negative correlation between 'Score' and the CARs. However, in this time period investigated, a company's score is not yet known by investors. A negative correlation could indicate that investors are speculating that companies with a higher score in the Global 100 are going to do worse. Also, as shown in section 4.1, the mean, minimum and maximum scores increased over the years. So, it could be that a company has a higher score compared to a former year, but it falls in the rankings. Therefore, 'Rank' is included as independent variable instead of 'Score' to test whether the rank of a company has an (negative) impact on its CAR. Yadav et al. (2016) also repeated their multivariate regression analyses using green rank as independent variable instead of green score. They found similar results. The multivariate regression analyses with 'Rank' as independent variable are displayed in tables A7-A11 in the appendix. Compared to the multivariate regression analyses in tables 6-10 in section 4.3, there are differences in sign and significance. Instead of the significant negative correlation between 'Score' and the CARs in models 5 and 6, the alternative regressions show a significant positive correlation between 'Rank' and the CARs. However, this indicates the same, since a higher rank number means the company has a lower score, as explained in section 4.3. In section 4.3 is found that firms with a better score (lower rank number) have lower CARs, and in this section is found that firms with a lower score (higher rank number) have higher CARs. Moreover, some models that showed a correlation between 'Score' and the CARs, show no significant correlation between 'Rank' and the CARs. Therefore, H2 is supported rightfully, since in most models there is still no significant correlation.

4.4.2 Clustered standard errors

OLS standard errors can be biased, under- or overestimating the true variability of the estimates of the coefficients. The residuals are assumed to be identically distributed, homoscedastic, and independent, the covariance between the residuals is zero. Generally, there are two forms of dependence. Firstly, time series dependence, i.e. the unobserved firm effect. The residuals of a given firm are then correlated across years for a given firm. The firm effect is assumed to be a constant, it does not decay over time. However, in practice, the firm effect may decay. The correlation between

residuals can change as the time between them increases. Second, cross-sectional dependence, i.e. the time effect. The residuals of a given year are then correlated across different firms. However, these assumptions are often violated when using panel data. When this happens, and there is a fixed firm effect, the OLS standard errors can be biased (Petersen, 2009).

To solve this, clustered standard errors can be used. If the residuals are heteroskedastic and there is a firm effect, the clustered standard error estimates are robust to this (Hoechle, 2007). Standard errors clustered by firm assume that the correlation of the residuals within the cluster may not be equal to zero. Moreover, when clustering by firm, it must be assumed that there is no time effect. However, to absorb this time effect, dummy variables can be included for each year. Then, by clustering by firm, the two forms of correlation are accounted for. If the time effect is fixed, the dummy variables completely remove the correlation between firms in the same year (Petersen, 2009). In this thesis is assumed that the time effect is fixed.

Tables A12-A16 in the appendix show all the multivariate regression analyses using clustered standard errors. The results are the largely the same. However, there are some differences in significance levels and magnitude of the coefficients. There is an exception in table A13 model 1. The dummy variable '30Fall' now is statistically significant at the 95% confidence level. If a company falls a minimum of 30 places compared to the previous year, its CAR is 1.0981% lower, ceteris paribus. Therefore, H4b was not rightfully supported, and a fall of a minimum of 30 places has an impact on firm value. Consequently, H4b is rejected.

4.4.3 Winsorization

As shown in section 4.1, the values of the dependent and independent variables are dispersed. There are outliers. Winsorization is a method of handling outliers. Using this method, the outliers are replaced by the highest or lowest value that is not considered as an outlier. For example, if the CARs in the dataset are 1%, 2%, 3%, and 10%, then winsorization would replace the 10% by 3%. In this way, the outliers are reduced in magnitude to a value that is still at the high end of the distribution, but not as extreme (Reifman & Keyton, 2010). In this thesis, the bottom 2.5% and the top 2.5% are winsorized. This is equal to 5% winsorization.

Tables A17-A21 in the appendix show all multivariate regression analyses with 5% winsorization. Clustered standard errors are used. There are no large differences compared to the regressions in section 4.3. However, in table A18 model 1, the dummy variable '30Fall' now is statistically significant at the 95% confidence level. If a company falls a minimum of 30 places compared to the previous year, its CAR is 1.1285% lower, ceteris paribus. Therefore, H4b is rightfully rejected in section 4.4.2. Moreover, in table A19 model 2, the dummy variable 'Quintile fall' is not significant anymore. However, there is still a significant correlation in models 1 and 3. Therefore, H5b is still rejected.

5 Conclusion

The goal of this thesis is to answer the following question: *What is the impact of corporate sustainability on firm value?* To investigate this, an event study is used, followed by various multivariate regression analyses. For the years 2013, 2014, 2015 and 2016, data is collected for the companies in the Corporate Knights' Global 100 sustainable rankings, a ranking of the most sustainable companies in the world. This data is used to measure corporate sustainability and corporate sustainability improvement, and to examine their impact on firm value.

Seven hypotheses are tested. H1 is rejected. The CAAR of the companies in the Corporate Knights' Global 100 sustainable rankings is significantly different from zero. Investors react positively to a company appearing in these rankings, before and after the announcement. This shows that investors have a positive view of corporate sustainability. Moreover, it demonstrates that they are speculating on the Global 100. However, no immediate effect is found. Since investors' reactions are not immediately shown in the share price, this could indicate the market is not semi-strong efficient.

Then, various multivariate regression analyses are performed. H2 is supported: A firm's score in the Corporate Knights' Global 100 is uncorrelated to its CAR. Moreover, it can be concluded that corporate sustainability improvement has an impact on firm value. The results show that a fall of a minimum of 30 places in the Global 100 is negatively received by investors. Furthermore, it is found that investors react negatively to a fall of at least a quintile or quartile compared to the previous year. Lastly, it can be concluded that a firm being in the Global 100 compared to not being in the Global 100 the previous year has a positive impact on firm value. Overall, firms have to improve their corporate sustainability practices to keep attracting investors. This is similar to the study of Singh et al. (2017), who stated that firms may need to improve their corporate sustainability performance to sustain and increase benefits. Since corporate sustainability practices are improving over the years, as shown in the descriptive statistics in section 4.1, firms have to keep up to stay ahead or stay at the same level of their competitors, and to keep attracting investors.

So, the results show that investors react positively to a firm being in the Global 100. The research question can be answered: corporate sustainability positively affects firm value. This supports the studies that found that corporate sustainability creates value (Burnett et al., 2011; Lo & Sheu, 2010; Lourenço et al., 2012; Rossi, 2009; Yu & Zhao, 2015). Furthermore, it can be concluded that corporate sustainability improvement has an impact. Investors react negative to firms decreasing in the Global 100 compared to the previous year. Moreover, investors react positive to firms being in the Global 100 compared to not being in the Global 100 the previous year.

There are some limitations to this thesis. To investigate the impact of corporate sustainability on firm value, the event study methodology is used. Markets may be inefficient, so that the observed stock prices may not fully and immediately reflect all publicly available information. Moreover, the model used to estimate normal returns, the market model, may determine the magnitude and significance of the abnormal returns. These can be different using another model. Furthermore, for some firms in the Global 100 information was missing, and some firms had overlapping events in the event window. This caused a smaller sample.

In this thesis only large public companies with a market capitalization over US$ 2 billion are examined. Future research could investigate the impact of corporate sustainability on firm value using smaller or private companies. Also, it could be investigated which corporate sustainability practices are the most effective in increasing firm value. In this thesis, there was no data available for the performance of companies on the separate KPI's used by the Corporate Knights to assign a score to companies. Managers might be interested in knowing what corporate sustainability practices help best in attracting investors and increasing firm value. Moreover, the descriptive statistics show differences in corporate sustainability performance across countries. Investors may value corporate sustainability more in some countries. It can be researched in which countries it is most value increasing to adopt corporate sustainability practices.

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7 Appendix

7.1 Corporate Knights' Screens

Table A1: Corporate Knights' Screens

Screen number	Screen name	Description
Screen 1	Sustainability disclosure	Companies that do not disclose at least 75% of the priority indicators of their GICS Industry Group are removed.
Screen 2	F-Score	Nine individual tests are done. Each test scores one if the company passes and zero otherwise. An example of such a test: net profit is positive. Companies have to score at least 5 to pass this screen.
Screen 3	Product category	Companies with the GICS Sub-Industry classification "Tobacco" are eliminated. Companies with a GICS Sub-Industry classification "Aerospace & Defense" are eliminated, only if the majority of its revenue is from its Defense business group.
Screen 4	Sanctions	The amount companies have paid in sustainability-related fines, penalties or settlements. If this amount as a percentage of total revenue is in the bottom quartile compared to the GICS Industry Group peers, the company is removed.

Source: Corporate Knights (2013, 2014, 2015a, 2015b)

7.2 Corporate Knights' Key Performance Indicators

Table A2: Corporate Knights' Key Performance Indicators

Number	KPI	Description	Formula/ Measurement
1	Energy productivity	Amount of revenue companies can generate out of every unit of energy they use	Revenue/ Energy use
2	Carbon productivity	How much companies are exposed to the Greenhouse gas (GHG) emissions environment	Revenue/ Greenhouse gas emissions
3	Water productivity	How well-positioned companies are to respond to water scarcity challenges	Revenue/ Water withdrawal
4	Waste productivity	Helps to identify companies that are managing their waste intelligently	Revenue/ non-recycled/reused waste generated
5	Innovation capacity	The amount of money invested in R&D as percentage of their revenue	R&D expenses/ Revenue
6	Percentage tax paid	The amount of tax that companies pay out as a percentage of their EBITDA	Cash tax/EBITDA (for financial services companies, operating income)
7	CEO to average worker pay	Compares total CEO compensation to average employee compensation	Total CEO compensation/ (Total wage bill/Number of employees)
8	Pension fund status	The performance of corporate pension plans	(Defined benefit pension plan assets – defined benefit pension plan obligations) / total assets OR defined contribution expense / total assets
9	Safety performance	To identify companies with best-in-class health & safety performance	Number of fatalities (absolute) and number of lost time incidents (per 200,000 employee hours)
10	Employee turnover	The rate at which companies lose their employees	Number of departures/ Average total employees
11	Leadership diversity	The gender diversity of a company's board of directors and senior management team	Female representation on the Board of Directors and Executive Management team
12	Clean capitalism pay link	To identify companies that incentivize management support of sustainability commitments and performance targets	Mechanisms that link Executive Management compensation to corporate sustainability performance

Source: Corporate Knights (2013, 2014, 2015a, 2015b)

7.3 Market and Sector Indices

Table A3: Market and Sector Indices

Market/ Sector	Accompanying Industry Groups	Index
Global		MSCI ACWI Index
Communication Services	Telecommunication services and media & entertainment	MSCI ACWI Communication Services Index
Consumer Discretionary	Automobiles & components, consumer durables & apparel and consumer services & retailing	MSCI ACWI Consumer Discretionary Index
Consumer Staples	Food & staples retailing, food, beverage & tobacco and household & personal products	MSCI ACWI Consumer Staples Index
Energy	Energy	MSCI ACWI Energy Index
Financials	Banks, diversified financials and insurance	MSCI ACWI Financials Index
Health Care	Health care equipment & services and pharmaceuticals, biotechnology & life sciences	MSCI ACWI Health Care Index
Industrials	Capital goods, commercial & professional services and transportation	MSCI ACWI Industrials Index
Information Technology	Software & services, technology hardware & equipment and semiconductors & semiconductor equipment	MSCI ACWI Information Technology Index
Materials	Materials (for instance, chemicals or metals)	MSCI ACWI Materials Index
Real Estate	Real Estate	MSCI ACWI Real Estate Index
Utilities	Utilities (for instance, gas or electric utilities)	MSCI ACWI Utilities Index

Source: MSCI (n.d)

7.4 Descriptive statistics for each year separately

Table A4: Descriptive statistics for each year separately

Variables	Observations	Mean	SD	Min	Max	Percentile 2.5%	Percentile 97.5%
Year 2013							
Score	57	54.82	8.429	41.10	74.08	43.63	73.78
Firm size	57	16.972	1.680	11.868	20.407	14.143	20.397
Debt	57	24.74	13.526	0	53.68	0.54	51.94
ROA	57	5.57	6.346	-12.54	26.67	-7.39	20.08
Year 2014							
Score	74	57.68	7.716	42.40	76.50	45.70	75.30
Firm size	74	17.293	1.707	11.919	20.603	14.117	20.447
Debt	74	23.41	13.393	0	56.45	0.38	50.74
ROA	74	5.82	6.013	-4.59	27.23	-4.53	21.17
Year 2015							
Score	77	60.08	5.689	48.20	73.50	49.90	69.20
Firm size	77	17.495	1.650	14.132	21.601	14.181	20.674
Debt	77	24.94	14.646	0	60.29	0.16	58.48
ROA	77	4.32	8.808	-33.01	41.02	-22.57	25.04
Year 2016							
Score	59	63.87	6.449	48.60	80.10	51.00	75.70
Firm size	59	17.503	1.651	14.187	21.534	14.253	20.336
Debt	59	25.17	14.313	0.15	61.76	0.24	55.37
ROA	59	5.85	6.938	-5.73	39.98	-2.78	23.24

Note. Descriptive statistics of the independent variables of the multivariate regression analysis, dummy variables excluded. For each variable the number of observations, mean, standard deviation, median, minimum and maximum, and 2.5% and 97.5% percentiles are reported. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets.

7.5 Number of companies per country

Table A5: Number of companies and mean score per country

Country	Frequency	Percentage	Mean score
Australia	6	6.12	60.15
Belgium	2	2.04	62.45
Brazil	1	1.02	64.82
Canada	12	12.24	55.04
China	1	1.02	57.75
Denmark	2	2.04	69.28
Finland	2	2.04	68.67
France	11	11.22	59.83
Germany	6	6.12	62.45
Hong Kong & China	1	1.02	54.23
Ireland	1	1.02	59.1
Japan	3	3.06	52.82
Netherlands	3	3.06	58.92
Norway	3	3.06	65.78
Portugal	1	1.02	59.58
Singapore	3	3.06	58.79
South Korea	4	4.08	58.33
Spain	2	2.04	62.41
Sweden	5	5.10	58.26
Switzerland	3	3.06	51.42
United Kingdom	9	9.18	59.05
United States	17	17.35	57.86

Note. An overview of the number of companies in the Corporate Knights' Global 100 per country. For each country the frequency, percentage and mean score are reported. Mean score is in percentages.

7.6 Number of companies per sector

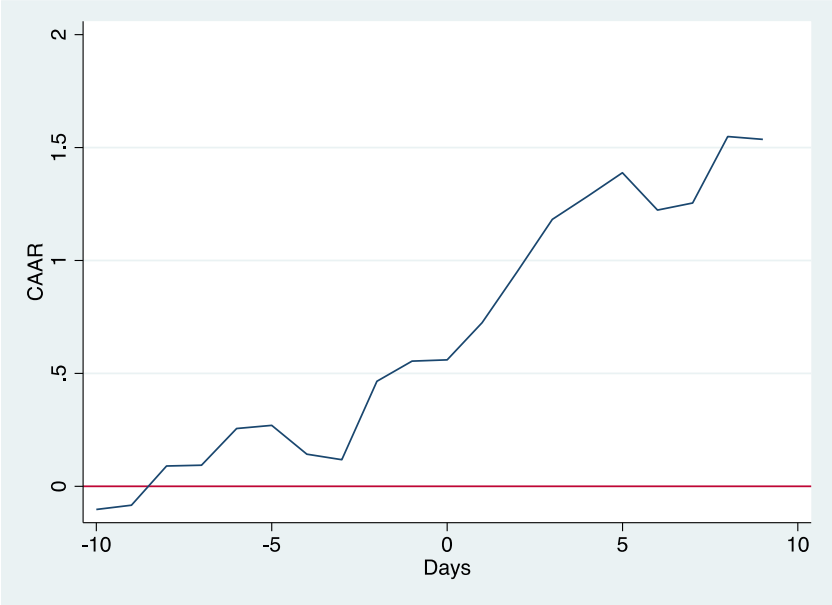
Table A6: Number of companies and mean score per sector

Sector	Frequency	Percentage	Mean Score
Communication Services	5	5.10	57.87
Consumer Staples	11	11.22	58.28
Consumer Discretionary	7	7.14	60.79
Energy	9	9.18	58.35
Financials	17	17.35	58.68
Health Care	9	9.18	58.49
IT	15	15.31	57.35
Industrials	11	11.22	62.42
Materials	6	6.12	62.91
Real Estate	5	5.10	55.23
Utilities	3	3.06	63.48

Note. An overview of the number companies in the Corporate Knights' Global 100 per sector. For each sector the frequency, percentage and mean score are reported. Mean score is in percentages.

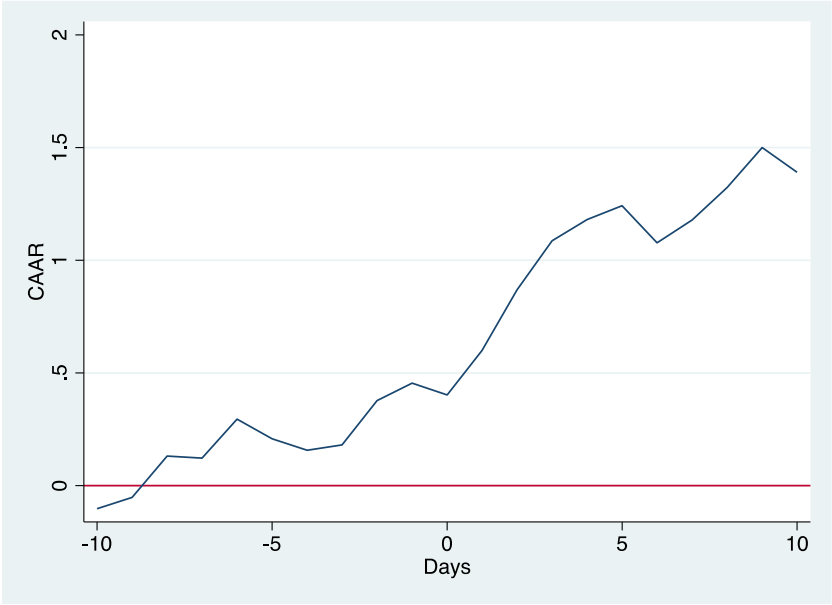
7.7 Graphs CAAR full and partial sample

Figure A1: Full Sample CAAR from day -10 to day +10



Note. An overview of the CAAR in the twenty-one-day event window (-10, +10) from the full sample. The y-axis displays the CAAR in percentages. The x-axis displays the days. The CAAR for the -8th day means the sum of average abnormal return from -10th day to -8th day and similarly for the rest of the days.

Figure A2: Partial Sample CAAR from day -10 to day +10



Note. An overview of the CAAR in the twenty-one-day event window (-10, +10) from the partial sample. The y-axis displays the CAAR in percentages. The x-axis displays the days. The CAAR for the -8th day means the sum of average abnormal return from -10th day to -8th day and similarly for the rest of the days.

7.8 Results of the alternative multivariate regression analyses

Table A7: Results of the multivariate regression analysis with dummy variables '20Rise' and '20Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-3.4221	-5.4767	-0.8024	2.2655	-5.1014	-2.8345
	(0.260)	(0.104)	(0.880)	(0.763)	(0.362)	(0.665)
Rank	0.0006	0.0028	-0.0037	0.0094	0.0244	0.0317*
	(0.939)	(0.751)	(0.792)	(0.636)	(0.101)	(0.069)
Dummy 20 Rise	0.2869	0.2631	-0.3044	-0.7864	0.9159	0.5857
	(0.639)	(0.697)	(0.776)	(0.603)	(0.416)	(0.657)
Dummy 20 Fall	-0.6180	-0.3628	-0.9072	-2.1340	-0.6989	-1.2121
	(0.271)	(0.559)	(0.356)	(0.125)	(0.499)	(0.317)
Firm Size	0.1528	0.2572	0.0733	0.0761	0.1642	0.0156
	(0.300)	(0.116)	(0.776)	(0.834)	(0.545)	(0.961)
Debt	0.0297*	0.0413**	0.0684**	0.0974**	0.0612*	0.0861**
	(0.082)	(0.028)	(0.022)	(0.021)	(0.051)	(0.019)
ROA	0.0795**	0.1063***	0.2081***	0.3086***	0.1753***	0.1408*
	(0.023)	(0.006)	(0.001)	(0.000)	(0.007)	(0.061)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
F-statistic	0.66	1.16	1.86***	1.40*	1.59**	1.33
Prob>F	0.9149	0.2684	0.0058	0.0902	0.0311	0.1264
R^2	0.0772	0.1284	0.1916	0.1508	0.1683	0.1445

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A8: Results of the multivariate regression analysis with dummy variables '30Rise' and '30Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-3.1891	-5.2747	-1.2664	1.5546	-4.5511	-2.3851
	(0.292)	(0.116)	(0.811)	(0.836)	(0.413)	(0.714)
Rank	0.0011	0.0041	-0.0052	0.0069	0.0271*	0.0334**
	(0.894)	(0.636)	(0.706)	(0.725)	(0.063)	(0.050)
Dummy 30 Rise	0.2839	0.4498	0.2218	-0.1361	1.3103	0.8043
	(0.700)	(0.581)	(0.864)	(0.941)	(0.334)	(0.612)
Dummy 30 Fall	-1.1214	-0.8525	-0.3281	-1.4981	-1.8053	-2.2743
	(0.123)	(0.288)	(0.796)	(0.406)	(0.176)	(0.146)
Firm Size	0.1405	0.2451	0.0900	0.0996	0.1343	-0.0102
	(0.340)	(0.133)	(0.728)	(0.786)	(0.620)	(0.974)
Debt	0.0275	0.0397**	0.0701**	0.0985**	0.0575*	0.0819**
	(0.107)	(0.036)	(0.020)	(0.020)	(0.067)	(0.026)
ROA	0.0759**	0.1034***	0.2100***	0.3098***	0.1683***	0.1336*
	(0.030)	(0.008)	(0.001)	(0.000)	(0.009)	(0.075)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
F-statistic	0.70	1.20	1.83***	1.33	1.66**	1.37
Prob>F	0.8821	0.2309	0.0072	0.1283	0.0210	0.1012
R^2	0.0813	0.1319	0.1888	0.1442	0.1741	0.1487

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A9:

Results of the multivariate regression analysis with dummy variables 'Quintile Rise' and 'Quintile Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-2.9697	-5.0118	-0.4125	1.9614	-4.5769	-2.5446
	(0.323)	(0.133)	(0.938)	(0.794)	(0.411)	(0.696)
Rank	0.0039	0.0063	0.0002	0.0079	0.0269*	0.0370**
	(0.629)	(0.481)	(0.990)	(0.696)	(0.073)	(0.035)
Quintile Rise	0.1384	0.1190	-0.3817	-0.6913	0.6630	0.9965
	(0.787)	(0.834)	(0.671)	(0.589)	(0.485)	(0.370)
Quintile Fall	-1.1582**	-0.9802*	-1.5767*	-1.6152	-1.0377	-1.4277
	(0.027)	(0.090)	(0.085)	(0.214)	(0.282)	(0.205)
Firm Size	0.1260	0.2305	0.0490	0.0865	0.1335	-0.0164
	(0.390)	(0.157)	(0.849)	(0.813)	(0.623)	(0.959)
Debt	0.0295*	0.0409**	0.0700**	0.1024**	0.0598*	0.0859**
	(0.079)	(0.029)	(0.018)	(0.015)	(0.055)	(0.019)
ROA	0.0747**	0.1018***	0.2017***	0.3052***	0.1713***	0.1381*
	(0.032)	(0.008)	(0.001)	(0.000)	(0.008)	(0.066)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
F-statistic	0.80	1.26	1.95***	1.36	1.63**	1.40*
Prob>F	0.7605	0.1728	0.0033	0.1074	0.0256	0.0901
R^2	0.0925	0.1383	0.1987	0.1476	0.1712	0.1508

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A10:

Results of the multivariate regression analysis with dummy variables 'Quartile Rise' and 'Quartile Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-3.1417	-5.1548	-0.2745	2.8073	-4.7012	-2.8149
	(0.300)	(0.126)	(0.959)	(0.707)	(0.402)	(0.667)
Rank	0.0009	0.0025	-0.0022	0.0092	0.0251	0.0300*
	(0.909)	(0.780)	(0.872)	(0.639)	(0.145)	(0.083)
Quartile Rise	0.0776	-0.0977	-0.5798	-1.1355	0.1647	0.4598
	(0.879)	(0.862)	(0.514)	(0.366)	(0.861)	(0.676)
Quartile Fall	-0.7846	-0.5613	-1.4387	-2.4076*	-0.6346	-0.8299
	(0.133)	(0.331)	(0.114)	(0.062)	(0.510)	(0.461)
Firm Size	0.1385	0.2443	0.0458	0.0466	0.1526	0.0128
	(0.348)	(0.136)	(0.859)	(0.898)	(0.576)	(0.968)
Debt	0.0309*	0.0421**	0.0722**	0.1055**	0.0613**	0.0878**
	(0.068)	(0.025)	(0.015)	(0.012)	(0.050)	(0.017)
ROA	0.0797**	0.1056***	0.2082***	0.3104***	0.1743***	0.1426*
	(0.022)	(0.006)	(0.001)	(0.000)	(0.007)	(0.058)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
F-statistic	0.69	1.17	1.94***	1.45*	1.56**	1.31
Prob>F	0.8870	0.2520	0.0036	0.0690	0.0365	0.1370
R^2	0.0808	0.1299	0.1975	0.1555	0.1658	0.1429

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A11: Results of the multivariate regression analysis with dummy variable 'First in'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	0.7916	1.1906	5.6590	7.7367	-2.3172	-2.7489
	(0.733)	(0.635)	(0.176)	(0.168)	(0.578)	(0.571)
Rank	0.0040	0.0003	-0.0087	-0.0064	0.0137	0.0193
	(0.537)	(0.967)	(0.455)	(0.681)	(0.237)	(0.152)
First in	-0.0488	0.1123	0.6281	1.9228**	0.8591	0.7637
	(0.893)	(0.774)	(0.337)	(0.029)	(0.188)	(0.315)
Firm Size	-0.0689	-0.0921	-0.2186	-0.2004	0.0203	0.0188
	(0.555)	(0.465)	(0.299)	(0.478)	(0.923)	(0.939)
Debt	0.0295**	0.0241	0.0200	0.0236	0.0454*	0.0574**
	(0.030)	(0.102)	(0.416)	(0.474)	(0.064)	(0.044)
ROA	0.0409	0.0551*	0.1504***	0.1998***	0.0892*	0.0398
	(0.169)	(0.087)	(0.005)	(0.006)	(0.096)	(0.522)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	353	353	353	353	353	353
F-statistic	0.69	1.47*	1.45*	1.64**	1.95***	1.74**
Prob>F	0.8928	0.0563	0.0636	0.0196	0.0023	0.0104
R^2	0.0626	0.1240	0.1225	0.1368	0.1588	0.1437

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

7.9 Results of the multivariate regression analyses with clustered standard errors

Table A12: Results of the multivariate regression analysis with dummy variables '20Rise' and '20Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-3.2411	-4.9429	-1.6415	3.9315	2.3739	6.8632
	(0.288)	(0.185)	(0.812)	(0.637)	(0.655)	(0.260)
Score	-0.0010	-0.0075	0.0122	-0.0214	-0.1136*	-0.1474*
	(0.967)	(0.792)	(0.832)	(0.761)	(0.097)	(0.053)
Dummy 20 Rise	0.2786	0.2357	-0.2776	-0.8853	0.8707	0.5267
	(0.516)	(0.638)	(0.782)	(0.527)	(0.267)	(0.546)
Dummy 20 Fall	-0.6099	-0.3396	-0.9261	-2.0468	-0.7416	-1.2671
	(0.352)	(0.634)	(0.375)	(0.114)	(0.544)	(0.326)
Firm Size	0.1531	0.2583	0.0723	0.0798	0.1652	0.0170
	(0.253)	(0.112)	(0.791)	(0.815)	(0.580)	(0.957)
Debt	0.0296**	0.0410***	0.0689***	0.0962**	0.0588**	0.0828***
	(0.016)	(0.009)	(0.009)	(0.014)	(0.041)	(0.009)
ROA	0.0793**	0.1058**	0.2085***	0.3070***	0.1758	0.1414
	(0.032)	(0.014)	(0.003)	(0.000)	(0.161)	(0.265)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Clustered standard errors are used. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A13: Results of the multivariate regression analysis with dummy variables '30Rise' and '30Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10,+2)**	**Model 6** **CAR (-20, +2)**
Constant	-3.0999	-4.5166	-2.5712	2.3801	3.2316	7.3303
	(0.304)	(0.205)	(0.705)	(0.837)	(0.553)	(0.235)
Score	-0.0010	-0.0108	0.0195	-0.0107	-0.1184*	-0.1480**
	(0.965)	(0.671)	(0.717)	(0.894)	(0.073)	(0.040)
Dummy 30 Rise	0.2649	0.4025	0.2587	-0.2441	1.1862	0.6584
	(0.618)	(0.505)	(0.841)	(0.863)	(0.189)	(0.507)
Dummy 30 Fall	-1.0981**	-0.8015	-0.3606	-1.3692	-1.7338	-2.1966
	(0.027)	(0.223)	(0.774)	(0.513)	(0.320)	(0.237)
Firm Size	0.1414	0.2472	0.0885	0.1046	0.1389	-0.0050
	(0.297)	(0.130)	(0.748)	(0.841)	(0.635)	(0.987)
Debt	0.0274**	0.0393***	0.0706***	0.0978***	0.0550*	0.0788**
	(0.016)	(0.010)	(0.009)	(0.003)	(0.052)	(0.012)
ROA	0.0757**	0.1029**	0.2101***	0.3085***	0.1687	0.1343
	(0.045)	(0.016)	(0.003)	(0.008)	(0.160)	(0.272)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Clustered standard errors are used. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A14:

Results of the multivariate regression analysis with dummy variables 'Quintile Rise' and 'Quintile Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-2.0498	-3.5948	-0.2121	3.2268	3.5104	8.3648
	(0.483)	(0.306)	(0.976)	(0.790)	(0.500)	(0.168)
Score	-0.0136	-0.0208	-0.0032	-0.0177	-0.1226*	-0.1653**
	(0.587)	(0.490)	(0.957)	(0.841)	(0.070)	(0.029)
Quintile Rise	0.1155	0.0784	-0.3751	-0.7661	0.5881	0.8839
	(0.784)	(0.872)	(0.660)	(0.522)	(0.446)	(0.289)
Quintile Fall	-1.1459**	-0.9546*	-1.5883*	-1.5446	-1.0855	-1.4780
	(0.025)	(0.084)	(0.096)	(0.239)	(0.250)	(0.167)
Firm Size	0.1273	0.2329	0.0484	0.0916	0.1355	-0.0129
	(0.320)	(0.135)	(0.857)	(0.861)	(0.645)	(0.967)
Debt	0.0291**	0.0402***	0.0700***	0.1014***	0.0573**	0.0823***
	(0.013)	(0.006)	(0.007)	(0.002)	(0.040)	(0.008)
ROA	0.0744**	0.1012**	0.2019***	0.3039***	0.1714	0.1380
	(0.034)	(0.016)	(0.004)	(0.010)	(0.171)	(0.279)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Clustered standard errors are used. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A15:

Results of the multivariate regression analysis with dummy variables 'Quartile Rise' and 'Quartile Fall'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	-2.9569	-4.6593	-0.6646	4.5402	2.1163	6.4534
	(0.323)	(0.195)	(0.924)	(0.706)	(0.695)	(0.299)
Score	-0.0027	-0.0071	0.0055	-0.0246	-0.1039	-0.1409*
	(0.915)	(0.797)	(0.925)	(0.779)	(0.121)	(0.057)
Quartile Rise	0.0713	-0.1152	-0.5611	-1.2067	1.1315	0.4021
	(0.844)	(0.787)	(0.469)	(0.215)	(0.860)	(0.623)
Quartile Fall	-0.7796	-0.5470	-1.4560	-2.3457*	-0.6949	-0.8961
	(0.137)	(0.384)	(0.141)	(0.079)	(0.512)	(0.440)
Firm Size	0.1388	0.2453	0.0447	0.0508	0.1522	0.0132
	(0.290)	(0.125)	(0.869)	(0.923)	(0.609)	(0.967)
Debt	0.0308***	0.0418***	0.0725***	0.1043***	0.0594**	0.0851***
	(0.007)	(0.004)	(0.005)	(0.001)	(0.034)	(0.006)
ROA	0.0795**	0.1053**	0.2086***	0.3089***	0.1751	0.1434
	(0.031)	(0.014)	(0.003)	(0.009)	(0.168)	(0.265)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Clustered standard errors are used. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A16: Results of the multivariate regression analysis with dummy variable 'First in'

Variables	**Model 1** **CAR (-1, +1)**	**Model 2** **CAR (-2, +2)**	**Model 3** **CAR (-2, +10)**	**Model 4** **CAR (-2, +20)**	**Model 5** **CAR (-10, +2)**	**Model 6** **CAR (-20, +2)**
Constant	1.7335	1.0874	3.6641	5.8437	1.8603	3.2423
	(0.493)	(0.708)	(0.481)	(0.519)	(0.689)	(0.535)
Score	-0.0137	0.0019	0.0288	0.0283	-0.0628	-0.0902*
	(0.573)	(0.932)	(0.523)	(0.667)	(0.159)	(0.076)
First in	-0.0480	0.1204	0.6233	1.9390**	0.8183	0.7016
	(0.898)	(0.747)	(0.328)	(0.039)	(0.178)	(0.344)
Firm Size	-0.0681	-0.0914	-0.2205	-0.1200	0.0189	0.0166
	(0.544)	(0.476)	(0.257)	(0.607)	(0.934)	(0.948)
Debt	0.0291*	0.0239	0.0211	0.0241	0.0443*	0.0559**
	(0.061)	(0.117)	(0.349)	(0.513)	(0.057)	(0.039)
ROA	0.0407	0.0549	0.1508**	0.1200**	0.0896	0.0405
	(0.216)	(0.129)	(0.016)	(0.029)	(0.337)	(0.675)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	353	353	353	353	353	353

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Clustered standard errors are used. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

7.10 Results of the multivariate regression analyses with winsorization

Table A17: Results of the multivariate regression analysis with dummy variables '20Rise' and '20Fall'

Variables	**Model 1** **wCAR (-1, +1)**	**Model 2** **wCAR (-2, +2)**	**Model 3** **wCAR (-2,+10)**	**Model 4** **wCAR (-2,+20)**	**Model 5** **wCAR(-10,+2)**	**Model 6** **wCAR (-20,+2)**
Constant	-4.0950	-5.4431	-3.3157	0.7342	-0.2524	5.4425
	(0.172)	(0.115)	(0.621)	(0.940)	(0.954)	(0.336)
w Score	-0.0042	-0.0133	0.0103	-0.0176	-0.0693*	-0.1030*
	(0.861)	(0.627)	(0.847)	(0.839)	(0.082)	(0.053)
Dummy 20 Rise	0.2855	0.1882	-0.1752	-0.7395	0.6201	0.2637
	(0.481)	(0.698)	(0.855)	(0.542)	(0.350)	(0.729)
Dummy 20 Fall	-0.7229	-0.3839	-0.9265	-2.0548	0.0870	-0.5691
	(0.185)	(0.543)	(0.333)	(0.143)	(0.913)	(0.561)
w Firm Size	0.2091	0.3111**	0.1753	0.3078	0.1705	-0.0475
	(0.128)	(0.048)	(0.503)	(0.461)	(0.405)	(0.855)
w Debt	0.0164	0.0264**	0.0593***	0.0764***	0.1706*	0.0732***
	(0.124)	(0.050)	(0.005)	(0.007)	(0.059)	(0.009)
w ROA	0.0859**	0.1060**	0.2274***	0.2914**	0.1186*	0.0663
	(0.037)	(0.028)	(0.004)	(0.020)	(0.083)	(0.407)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
R^2	0.0794	0.1157	0.1798	0.1559	0.1756	0.1546

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Clustered standard errors are used. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A18: Results of the multivariate regression analysis with dummy variables '30Rise' and '30Fall'

Variables	**Model 1** **wCAR (-1, +1)**	**Model 2** **wCAR (-2, +2)**	**Model 3** **wCAR (-2, +10)**	**Model 4** **wCAR (-2, +20)**	**Model 5** **wCAR(-10,+2)**	**Model 6** **wCAR (-20, +2)**
Constant	-4.0329	-5.0112	-4.0939	-2.1340	0.5616	5.9797
	(0.179)	(0.143)	(0.539)	(0.821)	(0.903)	(0.300)
w Score	-0.0022	-0.0170	0.0170	-0.0063	-0.0768*	-0.1073**
	(0.921)	(0.502)	(0.735)	(0.936)	(0.051)	(0.033)
Dummy 30 Rise	0.2722	0.3156	0.2138	-0.1727	0.9657	0.4254
	(0.589)	(0.595)	(0.866)	(0.903)	(0.244)	(0.643)
Dummy 30 Fall	-1.1285**	-0.9019	-0.5713	-1.6073	-0.5024	-1.2563
	(0.020)	(0.125)	(0.621)	(0.400)	(0.605)	(0.341)
w Firm Size	0.1999	0.3008*	0.1873	0.3298	0.1552	-0.0612
	(0.153)	(0.059)	(0.480)	(0.428)	(0.454)	(0.815)
w Debt	0.0146	0.0247*	0.0602***	0.0773***	0.0448*	0.0710***
	(0.148)	(0.059)	(0.005)	(0.007)	(0.063)	(0.010)
w ROA	0.0819**	0.1027**	0.2280***	0.2920**	0.1148*	0.0617
	(0.050)	(0.034)	(0.004)	(0.019)	(0.095)	(0.444)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
R^2	0.0833	0.1209	0.1770	0.1487	0.1780	0.1572

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Clustered standard errors are used. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A19:

Results of the multivariate regression analysis with dummy variables 'Quintile Rise' and 'Quintile Fall'

Variables	**Model 1 wCAR (-1, +1)**	**Model 2 wCAR (-2, +2)**	**Model 3 wCAR (-2, +10)**	**Model 4 wCAR (-2, +20)**	**Model 5 wCAR(-10,+2)**	**Model 6 wCAR (-20, +2)**
Constant	-3.1149	-4.6458	-2.1109	-1.2169	0.6838	6.7269
	(0.267)	(0.166)	(0.752)	(0.901)	(0.875)	(0.235)
w Score	-0.0154	-0.0220	-0.0046	-0.0160	-0.0776*	-0.1212**
	(0.530)	(0.456)	(0.934)	(0.862)	(0.058)	(0.027)
Quintile Rise	0.2640	0.1246	-0.1999	-0.5294	0.4179	0.8616
	(0.495)	(0.789)	(0.807)	(0.641)	(0.484)	(0.331)
Quintile Fall	-1.0370**	-0.7026	-1.4458*	-1.6117	-0.3197	-0.8616
	(0.022)	(0.147)	(0.097)	(0.178)	(0.642)	(0.331)
w Firm Size	0.1912	0.2969*	0.1579	0.3179	0.1503	-0.0640
	(0.148)	(0.054)	(0.539)	(0.442)	(0.642)	(0.805)
w Debt	0.0167*	0.0264**	0.0609***	0.0817***	0.1446*	0.0729***
	(0.098)	(0.040)	(0.004)	(0.004)	(0.064)	(0.009)
w ROA	0.0859**	0.1054**	0.2257***	0.2918**	0.1180*	0.0693
	(0.034)	(0.029)	(0.004)	(0.019)	(0.085)	(0.393)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
R^2	0.0961	0.1221	0.1868	0.1523	0.1761	0.1598

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Clustered standard errors are used. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A20:

Results of the multivariate regression analysis with dummy variables 'Quartile Rise' and 'Quartile Fall'

Variables	**Model 1 wCAR (-1, +1)**	**Model 2 wCAR (-2, +2)**	**Model 3 wCAR (-2, +10)**	**Model 4 wCAR (-2, +20)**	**Model 5 wCAR(-10,+2)**	**Model 6 wCAR (-20, +2)**
Constant	-3.9284	-5.3432	-2.4194	-0.3553	-0.4760	5.0304
	(0.175)	(0.113)	(0.721)	(0.971)	(0.915)	(0.380)
w Score	-0.0037	-0.0104	0.0046	-0.0156	-0.0603	-0.0970*
	(0.878)	(0.701)	(0.932)	(0.852)	(0.135)	(0.062)
Quartile Rise	0.1674	-0.1344	-0.4051	-0.9927	-0.0369	0.1866
	(0.610)	(0.737)	(0.580)	(0.291)	(0.951)	(0.788)
Quartile Fall	-0.7138	-0.4644	-1.2492	-2.1413*	0.0503	-0.2785
	(0.127)	(0.405)	(0.138)	(0.078)	(0.947)	(0.766)
w Firm Size	0.1978	0.2993*	0.1476	0.2790	0.1608	-0.0470
	(0.142)	(0.054)	(0.570)	(0.499)	(0.431)	(0.858)
w Debt	0.0178*	0.0273**	0.0626***	0.0839***	0.0453*	0.0741***
	(0.074)	(0.035)	(0.003)	(0.003)	(0.059)	(0.008)
w ROA	0.0865**	0.1048**	0.2264***	0.2910**	0.1156*	0.0672
	(0.035)	(0.029)	(0.004)	(0.021)	(0.090)	(0.403)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	267	267	267	267	267	267
R^2	0.0806	0.1164	0.1854	0.1591	0.1738	0.1536

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Clustered standard errors are used. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.

Table A21: Results of the multivariate regression analysis with dummy variable 'First in'

Variables	**Model 1** **wCAR (-1, +1)**	**Model 2** **wCAR (-2, +2)**	**Model 3** **wCAR (-2, +10)**	**Model 4** **wCAR (-2, +20)**	**Model 5** **wCAR(-10,+2)**	**Model 6** **wCAR (-20,+2)**
Constant	-0.0532	-0.7534	1.5728	0.5229	0.4310	2.0676
	(0.982)	(0.793)	(0.780)	(0.947)	(0.923)	(0.678)
w Score	-0.0079	-0.0013	0.0277	0.0396	-0.0441	-0.0651
	(0.713)	(0.950)	(0.524)	(0.501)	(0.247)	(0.138)
First in	-0.0545	-0.0624	0.4540	1.3586*	0.6065	0.0325
	(0.846)	(0.849)	(0.459)	(0.070)	(0.259)	(0.886)
w Firm Size	0.0212	-0.0332	-0.1052	0.0667	0.0643	0.0325
	(0.846)	(0.793)	(0.615)	(0.836)	(0.736)	(0.886)
w Debt	0.0186	0.0158	0.0208	0.0181	0.0297	0.0427*
	(0.124)	(0.238)	(0.335)	(0.519)	(0.141)	(0.066)
w ROA	0.0632*	0.0827**	0.1951***	0.2510***	0.0696	0.0067
	(0.080)	(0.033)	(0.008)	(0.010)	(0.229)	(0.928)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	353	353	353	353	353	353
R^2	0.0487	0.1056	0.1221	0.1362	0.1487	0.1371

Note. The results of the multivariate regression analysis are reported. The constant, regression coefficients, F-statistic and R-squared. Clustered standard errors are used. Score, Debt and ROA are in percentages. Firm size is the natural logarithm of total assets. The p-values are in parenthesis. The significance levels are denoted by ***, **, * for 1%, 5% and 10% respectively.