Impact of Sustainability Efforts on Firm Value: Evidence from Corporate Knights' Global 100 Ranking

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Abstract

This research examines the impact of corporate sustainability performance on firm value by applying an event study methodology to Corporate Knights' Global 100 ranking. Both the impact of inclusion in the Global 100, as well as the relative sustainability performance among other listed companies on stock returns, is studied. Additionally, this study contributes to the existing literature by exploring the impact of consistency and the existence of trends over time on investors perception of sustainability performance. This thesis discovered that investors perceive inclusion in the Global 100 as positive news, resulting in significant positive abnormal returns, although not very consistent over the years. The weight investors tie to a firm's relative performance appears to be lower if inclusion is not based solely on size, which is the case in Newsweek's ranking. Thirdly, a consistent sustainability policy can further improve the benefits from third party recognition of corporate social responsibility only after three or more consecutive listings. Lastly, this study found some evidence of an increasingly positive perception of firms' sustainable practices by investors over time, although not very robust. These findings can benefit managers in shaping their future sustainability policy and provide insights into investors' reactions to sustainable investments.

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1. Introduction

Over the past decades, the link between Corporate Social Responsibility (CSR) and a firm's financial performance has been widely discussed. Results, however, remained inconclusive. In general, two approaches exist, a value-enhancing and value-destructive approach. The value-enhancing approach is based on higher revenues, lower cost and an improved brand image, resulting in a sustainable competitive advantage (Haffar and Searcy, 2017; Waddock and Graves, 1997; Mishra and Suar, 2010). Contrariwise, the value-destructive approach assumes the additional costs are not offset by the benefits from CSR due to a lack of focus on profit maximization (Lee and Faff, 2009; Barnea and Rubin, 2010).

This research will analyse the relationship between sustainability and financial performance through an event study. The event study examines the impact of the publication of Corporate Knights' Global 100 ranking on a firm's abnormal return during the event window. Prior research predominantly focused on firms' relative performance within the list and found a positive relationship between score/rank and return (Yadav, Han, and Rho, 2015; Lyon and Shimshack, 2012; Brammer, Brooks, and Pavelin, 2009). Contrary, Meric, Watson, and Meric (2012) discovered a negative relationship between Newsweek's Green score and firms' abnormal returns.

This research will add to the existing literature by studying Corporate Knights' Global 100 ranking, where inclusion is not based solely on size, as opposed to Newsweek's' Green ranking. It is therefore informative to study if investors respond positively to companies included in the Global 100, in addition to the impact of firms' relative performance within the list, as measured by rank or score. Secondly, this study also tests for an exclusion effect, contrary to the inclusion effect, for companies excluded in the present year but included last year. Thirdly, Corporate Knights' ranking is based on a different set of social and sustainability indicators, potentially holding valuable information on investor's preference for specific sustainability attributes. Fourthly, this study attempts to uncover any trends in investors' perceptions of sustainability by comparing abnormal returns over multiple time-periods. At last, this paper will analyse whether the degree

of consistency, as measured by rank improvement and consecutive listings, increases investors' perception of sustainability performance and enlarges abnormal returns.

The data is provided by Corporate Knights, which started publishing their rankings since 2005, including detailed subscores of all 100 companies for the last two years. An event study methodology is utilized to calculate the cumulative abnormal returns around the publication in order to assess the magnitude of the impact. Market data and control variables are retrieved from Datastream. The market return is proxied by Morgan Stanley Capital International's (MSCI) industry returns to account for cross-sectional correlation. In order to assess the impact over time, eight subgroups are created, each including 1, 3, or 8 years of data. Next to that, four subsamples are constructed based on the number of consecutive listings.

The main findings of this paper are that companies included in the Global 100 exhibit, on average, significant abnormal returns. However, the returns fluctuate a lot over the years and an exclusion effect does not seem to persist. The different construction method of Corporate Knights' ranking decreased investors' focus on a firm's relative performance as (sub)score(s) become insignificant, and rank is only significant under the larger event window. The degree of consistency of a firm's sustainability policy has a significant impact on investors' expectations only if a company has three or more consecutive listings. Other measures such as rank improvement and consecutive listings up to two years proved insignificant. Lastly, no clear trend could be unveiled about investors' perception of sustainability, although a significant increase in abnormal returns is observed in the second half of the data, i.e. 2013-2020, compared to the first half.

The next section provides an overview of the current state of literature and hypothesis development. Section 3 contains a description of the dataset and institutional details. Section 4 includes the empirical methodology used. Section 5 contains the results of the event study. Section 6 concludes the findings. Section 7 presents an overview of all references used. Section 8 exhibits the appendix.

2. Literature Review & Hypothesis Development

This chapter describes the current state of literature on the impact of sustainable or social investments of firms on their financial performance, both from a theoretical as well as an empirical perspective.

2.1 Corporate Social Responsibility - Theories

Alshehhi, Nobanee, and Khare (2018) present a literature analysis of the impact of corporate social performance on corporate financial performance. They present two main competing approaches: value-destroying due to a loss of focus on profitability by pleasing other stakeholders at the expense of shareholders, and value-enhancing due to a reduction in firm risk and increase in long-term value creation. Based on both accounting and market measures, they find a positive relationship between corporate sustainability and financial performance in 103 out of 132 papers. Below, an elaboration is presented of the main underlying theories and direction of the relationship between corporate social responsibility and financial performance.

2.1.1 Positive Effect – Theories

The resource-based view (RBV) as proposed by Barney (1991), is an approach to achieving a competitive advantage and can declare why companies pursue environmental and social investments. The RBV is a model that sees resources, characterized as valuable, rare, non-imitable and organized to capture value (VRIO), as key to superior performance by companies. Given that corporate social responsibility (CSR) investments, e.g. in corporate reputation or human resources, can score high on the VRIO criteria, they can give rise to a competitive advantage and improved financial performance (Haffar and Searcy, 2017).

Stakeholder theory proposes that there are other parties involved besides shareholders, such as employees, the community, consumers or suppliers, and that all stakeholders can operate in ways that hinder or aid a corporation reaching its targets (Freeman, 1994). Therefore, a firm's success depends on the management capability of serving all stakeholders in a balanced way. A firm CSR policy takes into account the needs of multiple stakeholders and improves a firm's capability of reaching its goals.

In contrast to the above two theories, slack resources theory assumes a reverse causality, where strong financial performance creates enough slack to engage in CSR investments (Surroca, Tribó, and Waddock, 2010). Moreover, Martínez-Ferrero and Frías-Aceituno (2015) found evidence of a positive bidirectional relationship between CSR and financial performance (FP), evidencing the existence of a synergistic circle.

2.1.2 Negative Effect – Theories

The value-destroying theory assumes a trade-off relationship between CSR and corporate financial performance, as opposed to a synergistic relationship argued above. Shifting a firm's focus from profit maximization to engagement in social responsibility deteriorates shareholders' investment opportunities because CSR might result in overinvestment or may be less cost-effective. Lee and Faff (2009) found that well-known corporate sustainability firms underperform the market portfolio and their lagging counterparts, suggesting a negative relationship between CSR and corporate financial performance.

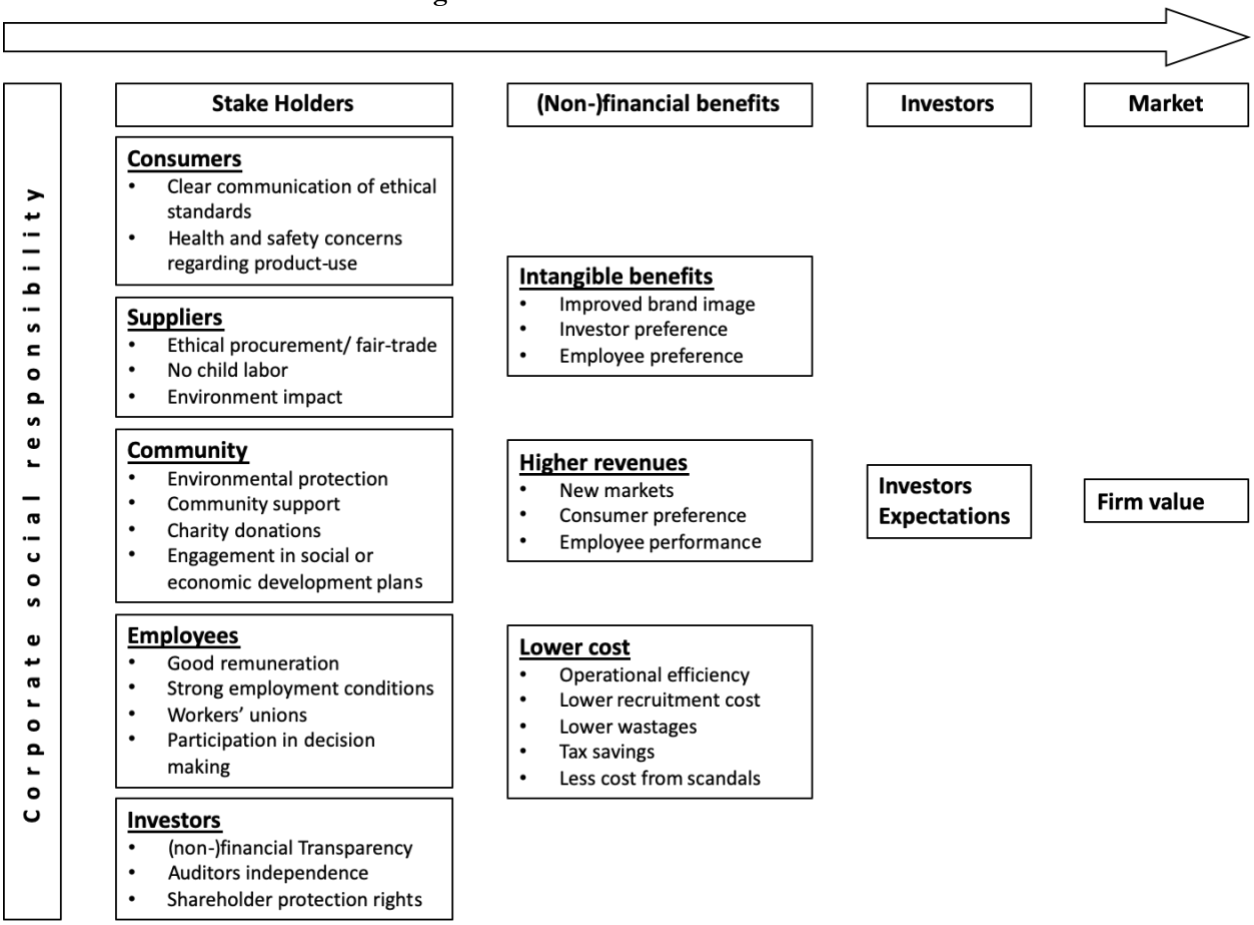
Contrary to the stakeholder perspective, Friedman (1970) takes on a shareholder perspective and sees CSR as an agency problem. He argues that CSR harms a firm's financial performance because it entails extra costs for the shareholders. Invoking agency cost theory, Brown, Helland, and Smith (2006) indicate that managers tend to benefit themselves through corporate philanthropy while shareholders incur a loss by spending on charity. Barnea and Rubin (2010) similarly highlight agency cost theory and suggest that managers tend to overinvest in social, responsible projects for their own benefit to the extent that it enhances their image as good global citizens. Based on 3000 American corporations, they concluded that insiders (managers and large blockholders) induce firms to overinvest in social, responsible projects when they bear little of the cost in the process.

2.2 Value Creation - Mechanisms

This thesis will focus on value-enhancing theories. The different mechanisms through which CSR can improve a firm's financial performance is best illustrated by assessing how CSR impacts each stakeholder and their actions. This thesis reviews the five most common stakeholders, i.e.

employees, consumers, community, investors and suppliers. An overview of the value creation mechanisms is presented in figure 1.

Figure 1: Value creation mechanisms



Employees – A firm employee-related CSR policy on topics such as employees' participation in decision making, workers' unions, remuneration and employment conditions can improve companies' financial performance. By scoring high on the above issues, employees' satisfaction will rise, resulting in boosted motivation and higher productivity (Berman 1999, p 488). Next to that, a strong CSR commitment strengthens a firms' capability of attracting the most skilful applicants and retaining their current workers, reducing staff training and recruitment costs (Turnab, Greening, 1997, p 558). Overall, the accumulation off human capital through the above practices provides ground for a sustainable competitive advantage and increased financial performance.

Consumers – A well-organized CSR policy towards consumers is based on clear communication of a company's ethical values and consumer safety and well-being concerns with respect to product consumption. Such a clear policy generates positive signals toward consumers highlighting a company's responsible attitude. As a result, the improved perception of product safety and quality by the consumer can serve as a competitive advantage and increase product revenues and firm performance (Waddock and Graves, 1997). Besides, satisfied consumers tend to be more loyal and are more willing to pay a premium for products.

Community – CSR towards the community can come in many forms such as philanthropic donations, environmental protection, community support or engagement in economic or social advancement plans. These donations or investments act as a means for enriching brand image, improving operational efficiency and creating moral capital. Owen and Scherer (1993) studied the impact of environmental protection as a CSR strategy toward the local community on a firm's profitability. Their results indicated both higher revenues due to consumers' preference for environmentally proactive companies, as well as reduced cost from environmental crises, inefficient production processes and wastages of raw materials. At last, investments in community development can generate a competitive advantage for companies arising from a diminished regulatory burden or tax savings (Waddock and Graves, 1997).

Investors – CSR towards investors relates to the quality of corporate governance standards such as auditors' independence, shareholders protection rights, transparency of financial and non-financial disclosures, such as management's remuneration or policies against insider trading. After corporate governance debacles such as the Enron scandal in the US, more importance is given to the corporate governance codes protecting the rights of investors. Mishra and Suar (2010) investigated the relationship between corporate governance standards and a firm's financial performance and suggested a positive relationship. They argued that commitment of the management towards strict control mechanisms, stimulating ethical and social behaviour, can act as a competitive advantage. Also, investors are willing to provide capital at lower interest rates to companies with strong corporate governance (Coombes and Watson, 2000). These factors result in less risky corporate behaviour and long-term growth.

Suppliers – Over the past decade, the importance of suppliers' issues such as ecological impact, elimination of child labour or ethical acquisition of primary commodities, has grown. By ensuring adherence of suppliers to these social and ethical standards, firms can portray their commitment towards CSR and improve its image and competitiveness. The findings of a study conducted by Mishra and Suar (2010) concur that CSR towards suppliers can be a definite source of competitive advantage and enhanced returns.

Based on the provided financial benefits, i.e. higher revenues and lower costs, investors positively adjust their expectations of a firm's future performance, increasing the share price. In addition to these financial benefits, non-financial benefits such as investors' or employees' preference for sustainable companies positively influence investors' expectations and a firm's share price.

2.3 Publication and Stock Returns

Research concerning the impact of CSR announcements on stock returns can be divided into two categories, CSR implementation and CSR recognition. Below, the main focus will be on third-party recognition of CSR, given that Corporate Knights' ranking falls within this category. Furthermore, the impact of CSR can be broken down into the effect of list inclusion, and the effect of the relative rank or (sub)score within this list on stock returns.

Brammer, Brooks, and Pavelin (2009) examined the impact of the publication of the annual survey by Business Ethics on stock prices of the 100 Best Corporate Citizens of America. Firms are rated based on a handful of facets relevant to the stakeholder groups affected by the firms' actions. Both long- and short-term effects were analysed. In the short run, they detect positive abnormal returns for firms present in the top 100. However, over the year following the publication, top 100 companies generate abnormal negative returns of around 3% compared to the S&P 500. This negative effect does not hold for newly added firms in the top 100. These new firms exhibit positive abnormal returns over the following year.

Jones and Murrell (2001) performed an event study on newly added companies in Working Mother magazine's list of most family-friendly companies. They suggest that third-party recognition of excellent social performance of companies can act as a positive signal of an

organisation's future performance. Positive abnormal returns after publication confirmed their hypothesis.

Amato and Amato (2012) examine the impact of Newsweek's Green rankings, a ranking consisting of America's 500 largest companies, on stock returns by sorting the rankings into five quintiles and testing for a significant impact on stock returns within these quintiles. They found a significant positive impact on stock value for the top quintile while no significant effect on stock value was found for the lowest quintile.

Studies conducted by Yadav, Han, and Rho (2015) and Lyon and Shimshack (2012) indicate a positive relationship between Newsweek's Green ranking and stock returns. Yadav, Han, and Rho (2015) also found that consecutive improvements of Green scores, indicating a long-term commitment and vision, achieved significantly higher cumulative abnormal returns (CARs) compared to companies which decreased their performance. Both Yadav, Han, and Rho (2015) and Lyon and Shimshack (2012) find a significant impact of the policy subscore on the CAR but not for other subscores, illustrating the relative importance of the individual factors.

Meric, Watson, and Meric (2012) also studied Newsweek's Green Rankings but found a significant negative correlation between a company's Green score and stock price in 2010. They suggest that the cost of keeping green adversely affects profitability, causing a price drop of the firm's stock after the publication.

Keele and DeHart (2011) found no or negative significant returns after the announcement of a partnership with the United States Environmental Protection Agency (USEPA), depending on the length of the event window. While their results suggest joining the USEPA does not have a positive impact in de short-run, their practices might still bode well in the long run after reducing their greenhouse gas emission.

Almost all CSR research is performed on a national or continental level. Murguia and Lence (2015) are one of the few scientists who incorporate a global dimension by examining the impact of Newsweek's Global 100 ranking on stock returns in 2010. First, they analysed the returns of an equally weighted portfolio of the top 100 companies. The portfolio return was not affected by

the publication, because the presence of firms in the G100 list is only defined by their size. They did find a significant change in relative stock prices, i.e. moving one position up in the G100 increased stock price by 0.1%, seven times the daily average in the estimation period. In addition, they found a more robust relationship for non-US-traded stocks and non-heavy sectors compared to US stock and heavy sectors.

2.4 Sustainability Concerns Over Time

Over the past decades, there has been a marked change in the awareness of social and environmental issues in the public sphere and corporate world. This change was to a high degree facilitated by increasing media coverage on television, radio, newspapers and social media. Holt and Barkemeyer (2012) studied the coverage of climate change and sustainable development topics by 112 worldwide newspapers from 1990 - 2009. They used models based on issue-attention cycles and punctuated equilibriums to detect temporal as well as general shifts in media coverage. They detected a punctuated positive change in sustainability coverage from 2000 - 2005. Similarly, they found a considerable increase in climate change coverage starting in 2003 until 2007. However, there appears to be a decrease in coverage on both topics in 2008-2009. This is likely explained by the global financial crisis, during which sustainability and environmental topics are deprioritised.

Doluca, Holzner, and Wagner (2018) researched how sustainable and environmental efforts by manufacturing companies have evolved in Germany and the United Kingdom. Utilising survey data, they compared the percentage of companies engaging in environmental and sustainable activities between 2001 and 2016. Their 15-year comparison showed an overall increase in efforts regarding environmental concerns, although there are some exceptions of activities which are less widely diffused than they were in 2001.

Harrison and Berman (2015) examine the effect of GDP growth on Corporate Social performance. They find that the performance of companies on corporate social concern areas such as pollution, tax violation, and legal suits declines during economic downturns compared to upturns. This decrease is linked to lower concerns on sustainability/social topics and cost-cutting in economic downturns, resulting in neglect of corporate social performance.

To summarise, current literature has not reached a consensus on the impact of environmental or social performance on firm value. Possible explanations for this inconclusiveness might be the different methodologies used by researchers, the use of alternative in- or output variables in models, the time period covered by the research or the inclusion of the initiating factors at the firm, industry or country level.

2.5 Hypotheses

The novelty of the information to investors could be questioned as the Global 100 ranking is constructed based on publicly-disclosed data such as financial filings and sustainability reports. While the lack of new information might be a problem, previous research has shown that investors still respond to rankings as novel information, due to a more comprehensible and distilled format (Lyon and Shimshack, 2015). Moreover, informed investors can revise their expectations about future financial performance if they think the newly disclosed information will be novel to other stakeholders such as employees or consumers (Lyon and Shimshack, 2015).

Listed firms are valued by their share price in the market, as it is the most accurate, unbiased appraisal of its intrinsic value. Any variation in stock prices arises from changes in investors' expectations of a firm's future performance and, therefore, its present value. Yadav, Han, and Rho (2015) argue that in efficient markets, stock prices immediately incorporate any new information as soon as it is made known or public to investors. As an independent assessor, Corporate Knights provides a highly reliable assessment of a firm's sustainable performance. Besides, Corporate Knights' ranking is not size-related as opposed to Newsweek's ranking. Inclusion is, therefore, highly desired and considered a great achievement by investors.

Given the dominant outcome of previous research on the impact of CSR on financial performance (Alshehhi, Nobanee, and Khare, 2018) and the (non-)financial benefits from participation in CSR as presented in figure 1, a positive relationship is expected between list inclusion and firm value. To measure the impact of list inclusion, the following hypothesis is used.

Hypothesis 1: Firms included in Corporate Knight's Global 100 ranking exhibit positive abnormal returns over the event period.

Up until now, barely any research addressed the impact of Corporate Knights' ranking on stock returns. This is quite striking given its worldwide notoriety and rich history up until 2005. Since the relationship between CSR and financial performance remains still inconclusive, studying Corporate Knights' ranking could provide valuable additional insights on the impact on financial performance. Also, prior studies covering the impact of sustainability rankings on stock prices predominantly used Newsweek's ranking. Newsweek ranks firms based on environmental performance, and inclusion is based on firm size. On the contrary, Corporate Knight's ranking is based on sustainable performance only, allowing for measurement of a list inclusion effect.

While previous research regarding a list inclusion effect and its impact on investors' expectations exist, research addressing a list exclusion effect of sustainability rankings remained untouched. Therefore, this research will contribute to the existing literature by examining if a reverse effect is present for firms excluded from the Global 100 list, which were included last year. A negative relationship is assumed due to a reduction of marketing appeal provided by the list, resulting in deteriorated investors' expectations.

The degree of consistency with which a firm makes sustainable investments can also influence the financial payoffs of CSR. A consistent strategy can strengthen stakeholders' beliefs about a firm's commitment to sustainability. Consequently, consistent firms enjoy benefits such as employee commitment or improved brand image to a larger extent compared to firms with an inconsistent approach. Inconsistency might suggest that a firm undertakes CSR investments in an arbitrary or even opportunistic way. Investors might perceive the firm's CSR engagement as a mere response to external pressure in case of an adverse event or as window-dressing. Tang, Hull, and Rothenberg (2012) find, based on MSCI's ESG data, that inconsistent implementation of CSR hurts a firm's financial performance. They argue that stakeholders do not perceive a firm's CSR efforts as genuine. Moreover, inconsistency disrupts the learning process and decreases operational improvements. At last, Yadav, Han, and Rho (2015) find that firms which consistently improve their environmental performance as measured by Newsweek's green rankings, achieve on average visibly higher SCAR's but not statistically significant.

On the other hand, one might argue that firms exhibit more media attention when being included in the Global 100 list for the first time. Investors might view a consecutive inclusion as less of an accomplishment or surprise and will consequently reshape its beliefs of a company's future performance to a lesser extent. As a result, firms with consecutive listing experience lower abnormal returns compared to firms newly added to the list.

This research will contribute to the existing literature by assessing whether the positive effect of consistency in Newsweek's ranking extends to Corporate Knights sustainability rankings. Previously, Yadav, Han, and Rho (2015) used improvement or deterioration in Newsweek's ranking, given that inclusion is based on size. This research adds another measure of consistency, i.e. the number of consecutive inclusions in Corporate Knights' ranking, besides the rank improvement or deterioration variable. This new measure allows for measurement of consistency over more extended time periods. This is summarised by the following hypothesis.

Hypothesis 2: The impact of the Global 100 ranking on stock returns is more substantial for firms with consecutive listings and rank improvements, portraying a long-term commitment.

One of the reasons that the outcome of research on the impact of CSR on financial performance remained inconclusive up until now is the different time periods studied by researchers. Stakeholders' concerns about CSR have developed over time, both upwards and downwards. Holt and Barkemeyer (2012) showed that CSR coverage by newspapers increased over the years, due to growing social and environmental concerns, but decreased during the financial crises of 2008. Doluca, Holzner, and Wagner (2018) pointed out firms' response to this growing trend by indicating that firms, over 15 consecutive years, significantly increased its CSR efforts. Harrison and Berman (2015) concluded that a firm's CSR practices are partly dependent on a country's GDP growth. As of to date, no previous research examined the impact of CSR practices on financial performance over time. Given the growing concerns of CSR over the years, an upward trend in investors' reaction to Corporate Knights' ranking is expected, i.e. firms included tend to generate higher abnormal returns over time. However, an opposite effect is expected during the financial crises in 2008. This results in the following hypothesis.

Hypothesis 3: The impact of the Global 100 ranking on stock returns varies over time, depending on the economic state and social and environmental awareness.

Besides a list inclusion effect, the relative sustainability rank might also have an impact on a firm's return around the announcement. The sustainability rank is based on multiple environmental and social performance indicators, which can influence investors' expectations due to its distilled and comprehensible format. Yadav, Han, and Rho (2015) and Lyon and Shimshack (2012) both found a positive correlation between green score and abnormal returns. Besides the information included in a company's sustainability score, it is expected that top-ranked firms will receive much more media attention, triggering a boost in firm reputation or brand image. However, not all existing research confirmed this positive relationship (Meric, Watson, and Meric, 2012). Analysing other CSR rankings, such as Corporate Knights', can, therefore, contribute to the existing literature on the relationship between CSR rankings and financial performance, especially due to its worldwide coverage and rich history of data. After the publication of the ranking, investors are likely to update their expectations based on a firm's sustainability rank, as top-ranked firms can generate a more significant competitive advantage. This results in the following hypothesis.

Hypothesis 4: A company's sustainability rank is negatively related to its stock return.

The sustainability score constructed by Corporate Knights is based on a set of twenty indicators and uses different weights for each industry to account for industry relevance. These twenty subscores can be categorised into four fields, i.e. resource management, financial management, employee management and clean revenues. These four fields are different compared to other rankings such as Newsweek's ranking. It is therefore valuable both from an academic as well as a managerial viewpoint to analyse whether investors' reaction to the Global 100 is driven by the overall score or by certain individual subscores that investors value highly. This results in the following hypothesis.

Hypothesis 5: Investors take into account individual subscores in their market response to the publication of the Global 100.

3. Dataset and Institutional Details

3.1 Corporate Knights

The Global 100 ranking is constructed by Corporate Knights, a Toronto-based media and investment advisory firm. Corporate Knights was founded in 2002 and first started publishing the Global 100 ranking in 2005 at the World Economic Forum in Davos, Switzerland. Their aim is to, annually, raise awareness of leading companies within the field of sustainability engagement. The ranking is based on publicly-disclosed data such as financial filings and sustainability reports. Any submissions by companies are not required. To guarantee Corporate Knights' reputation as an independent, objective judge of sustainability, they have a strict policy regarding the separation of revenue streams from research services and the editorial content of its magazine. Any employee found to have allowed for unfair influence from advertisers or other revenue streams on the organization's print or online content will be dismissed (corporate disclosure policy as posted on their website). All worldwide, publicly listed companies with revenues greater than $1 billion are considered. In 2020, their methodology rested upon 21 key performance indicators (KPIs), covering resource management, financial management, supplier performance, employee management and clean revenue. Given the vast differences between sectors, each sector is assigned a fixed number of places in the list, based on each sector's relative presence in MSCI's All Country World Index (ACWI). Next to this, the weights of 17 KPIs are adjusted for industry relevance to allow for cross-sector comparison. The Global 100 ranking changed vastly over the years due to growing and evolving KPIs and the increasing demand for transparency. Up to 2010, the Global 100 ranking did not feature a relative ranking within the top 100. As of 2010, they started publishing a sustainability score and rank on a scale of 1 to 100. This study uses the relative rank instead of score to assess the link between consistency of a firm's sustainability performance and financial performance, due to the high variability of average scores over the years. In 2012, the average score constituted 38% while in 2018 the average score equalled 67%. Secondly, to measure the significance of the sustainability score subfields, this study categorizes the 21 KPIs into four subfields, i.e. financial management, employee management, clean revenues and resource management. Detailed data on the sustainability subscores is only available for the past two years. Before 2019, they published none or only absolute subscores,

making comparisons over the years difficult. The subfield scores are calculated by multiplying the industry-specific CPI weights by the CPI scores. Hereafter, the scores are divided by the total weight of each subfield to transform the scores into a scale of 1 to 100. In total, Corporate Knights has included 435 unique companies in their Global 100 ranking over the last 16 years. Compared to Newsweek's Global 500 ranking, their list constituents differ significantly. In 2017, only 8 of Corporate Knights' companies were included in Newsweek's top 100 and 39 in Newsweek's top 500.

3.2 Pairwise Correlation Independent Variables

Table 1 presents a correlation table of the rank, score, and subscores for the years 2019 and 2020. Other years are excluded due to a lack of data, as mentioned earlier. As expected, rank and score are negatively correlated as the rank of a company is based on its score relative to other scores. In addition, all subscores are negatively correlated with the rank of a company at the 1% significance level, except the financial management subscore, which portrays an insignificant negative relationship. Since the overall score is assigned based on the four subscores and their industry weightings, all the subscores exhibit a positive correlation with the overall score. The uniquely negative, significant correlation of clean revenue with financial management and employee management signifies that a firm's efforts in generating clean revenue adversely affect its exertion to perform well on financial and employee management.

Table 1: Pairwise correlations rank, overall score and sub scores

Variables	Rank	Score	Resource Management	Financial Management	Employee Management	Clean Revenue
Rank	1.000					
Score	-0.969***	1.000				
Resource Management	-0.379***	0.324***	1.000			
Financial Management	-0.081	0.065	0.023	1.000		
Employee Management	-0.373***	0.352***	0.315***	-0.034	1.000	
Clean Revenue	-0.724***	0.792***	0.052	-0.225***	-0.131*	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Note: the values represent the correlation coefficients between the variables. The correlation table is based on Corporate Knights' rank and (sub)score(s), covering all available years.

3.3 Financial Data

The financial data is retrieved from Thomson Reuters and Datastream. Daily stock prices are used to calculate daily stock returns. These stock prices are adjusted for dividends and stock splits.

$$Daily\ stock\ return = \ Ln(\frac{P_t}{P_{t-1}}) \quad (1)$$

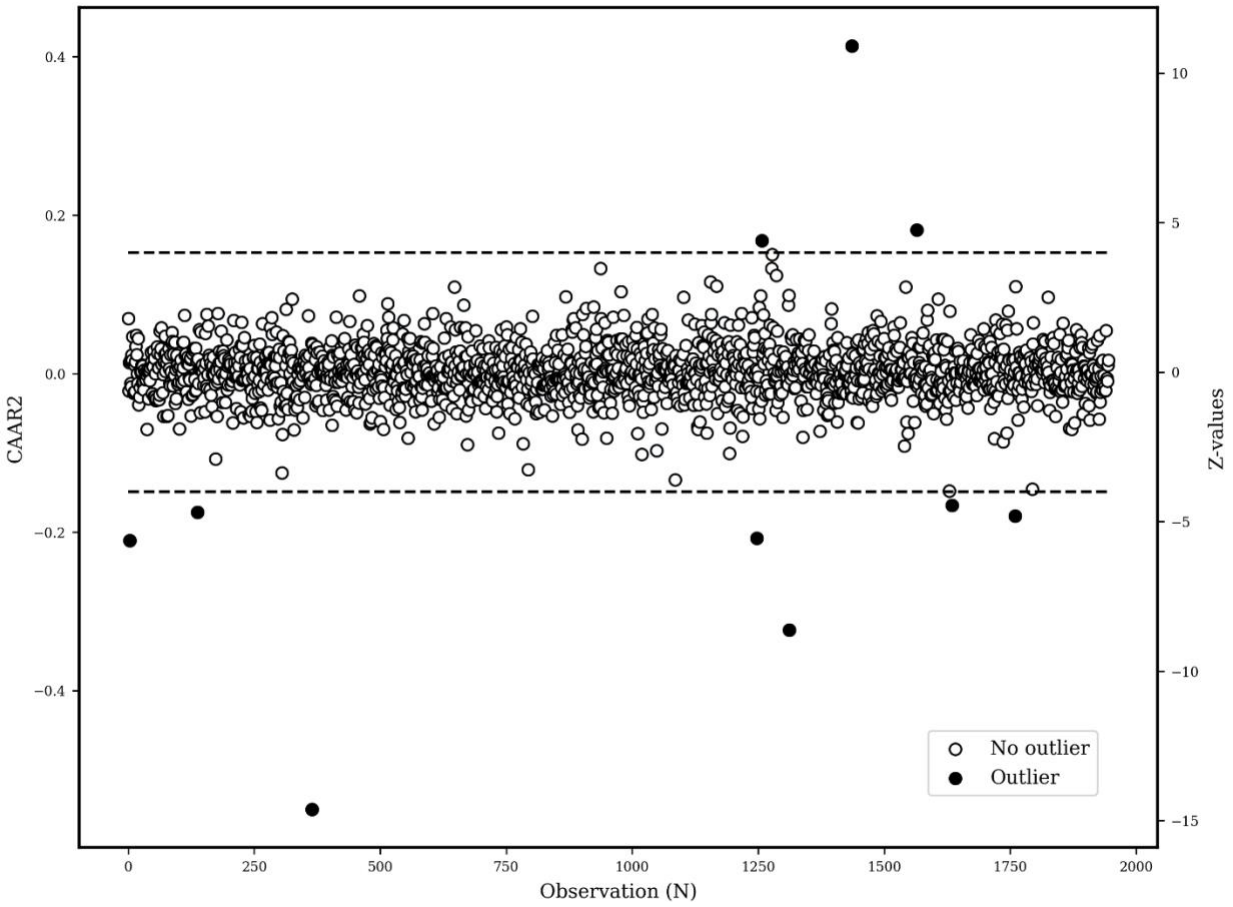
The daily 11 MSCI ACWI return indices for each sector are used as a proxy for the market return in the market model. The ACWI sector returns represent mid- and large-cap securities from 23 developed countries and 26 developing countries. The index is chosen because it is the broadest benchmark available (Renner, 2011). To account for firm-specific characteristics in the cross-sectional analysis, this study controls for firm size, capital structure, and profitability (Yadav, Han, and Rho, 2015). Firm size is measured by the natural logarithm of a firm's total assets. Capital structure is proxied by total debt as a percentage of total capital. Return on assets is equal to net income over total assets.

It is common to exclude firms with overlapping events in the event window to prevent biased estimates of the normal returns. Therefore, this study excludes all firms with coinciding events in the event window. The following types of events are considered: earning announcements, IPO filings, stock splits, investments, and mergers and acquisitions. The data is extracted using the Eikon data API from Thomson Reuters. In total, 130 firms are excluded. Most of the firms are excluded due to earnings announcements as the publication of the Global 100 falls within the earnings season of the fourth quarter. In addition to firms with overlapping events, 63 firms are excluded because the firm was delisted before the publication of the Global 100 ranking, no data could be retrieved from Datastream, or the firm was listed two times in one year (Philips in 2012).

Lastly, the data is checked for potential outliers. Although companies with overlapping events are removed as described above, there is still a possibility of coinciding events that are not covered by the above analysis. Therefore, outliers with a Z-value larger than +4 or smaller than -4 are removed from the dataset as it is highly unlikely that the publication of the Global 100 instigates these extreme returns. Including such returns, especially for analyses with smaller

subsamples, can result in biased estimates. Figure 2 provides an overview of the outlier analysis. In total, ten outliers are removed.

Figure 2: Outlier analysis cumulative abnormal returns, Z = +/- 4



Note: The cumulative average abnormal returns [-2,+2], CAAR2, are absolute values (not %). Z-values are constructed by subtracting the mean CAAR2 of each observation and dividing it by its standard deviation. The two dashed lines represent the cut-off points for observations, i.e. Z = +/- 4.

An overview of the sample counts and descriptive statistics of the main financial variables used in the regressions is presented in tables 2 and 3. An overview of the sector and geographical distribution of the list constituents is located in tables 1 and 2 of the appendix.

Table 2: Overview frequency count (sub)samples

Category	Subcategory	Count	Category	Subcategory	Count
Sample			Rank		
	Total Companies	2139		Rank up	297
	Overlapping events or outlier	130		Rank down	306
	Outliers	10	Period		
	Delisted or no data	63		2005-2007	322
	Companies used	1936		2008-2010	358
Consistency				2011-2013	374
	Zero years	575		2014-2016	362
	One year	327		2017-2019	395
	Two years	199		2020	125
	Three years plus	359			
	Next year excluded	476			

Note: The table includes frequency counts of the different subsamples used in this study. The rank up/down samples are relatively small because rank is only published as of 2010.

Table 3: Descriptive statistics financial variables and sustainability scores

Variables	N	Mean	Std. Dev.	p5	Median	p95
Total Assets	1460	17.249	1.628	14.761	17.041	20.386
Debt Ratio	1460	40.309	48.098	5.000	37.660	83.895
Return On Assets	1460	6.725	7.451	0.095	5.415	19.125
Score	1017	0.581	0.122	0.331	0.592	0.757
Resource Management	194	0.427	0.249	0.002	0.409	0.816
Financial Management	194	0.464	0.157	0.180	0.476	0.737
Employee management	194	0.519	0.224	0.113	0.555	0.818
Clean Revenue	194	0.823	0.194	0.416	0.875	1.000
CAAR1	1460	0.165	2.629	-3.811	0.038	4.355
CAAR2	1460	0.353	3.190	-4.623	0.208	5.745

Note: Score includes only 1017 observations as Corporate Knights only started publishing scores as of 2010. Subscores include only 194 observations due to comparability issues before 2019. CAAR represents the cumulative average abnormal return in percentage. Other variables include 1460 observation which is the total sample size minus 'firms excluded next year'.

3.4 Google Trends

Lastly, Google Trends' worldwide search volume data around the publication dates is downloaded to analyse whether there is a significant increase in search volume after the announcement and for how many days this spike persists. Google Trends provides relative search

volume data on a scale of zero to a hundred. The highest interest level in each period studied is set to 100% and interest levels on other days are scaled to a relative percentage of the highest interest level. Due to the large amount of data Google has stored, they use a random sampling technique to facilitate fast calculations. It is, therefore, possible to achieve different results when downloading the data on different moments. Since 2005, daily time-series datasets are downloaded, each including 15 days before the event, the event date, and 15 days after the event. 'Corporate Knights (magazine)' is used as the search term.

4. Empirical Methodology

4.1 Google Trends

To get an idea of investors' interest in the publication Corporate knights' ranking, Google Trends Interest Index levels are studied. The results of this analysis are used to set an appropriate event window. Based on event windows used in previous studies and the duration of the spike in search volume, it is possible to choose a more customised event window for this specific event type. Previous studies in the health sector on spikes in Google Trends' search interest have used different tests, such as the ANOVA, students' t-test or the Wilcoxon signed-rank test (Mavragani, Ochoa, and Tsagarakis, 2018). Based on the distribution, this study uses the students' t-test and the Wilcoxon signed-rank test. For each event day, i.e. from -15 to +15, average interest index levels and standard deviations are calculated based on the past 16 years. Next, the average interest level across all event dates is determined and will act as a baseline interest level. To test whether the publication generates a significant spike in interest and for how long it persists, the following T-test is conducted.

$$TS_1 = \frac{\mu_t - \mu}{s_t} \times (N-1)^{0.5} \quad (2)$$

μ_t is the average interest level on an event day, μ is the average interest level across all event days, σ_t is the standard deviation in interest levels on event day t and n is the number of observations for each event day.

Due to the strong normality assumptions of the T-test and the relatively small sample size of the event days, 16 observations, the non-parametric Wilcoxon signed-rank test is included for robustness. A detailed description of the test is presented in subsection 4.3, formula 14.

4.2 Event Study

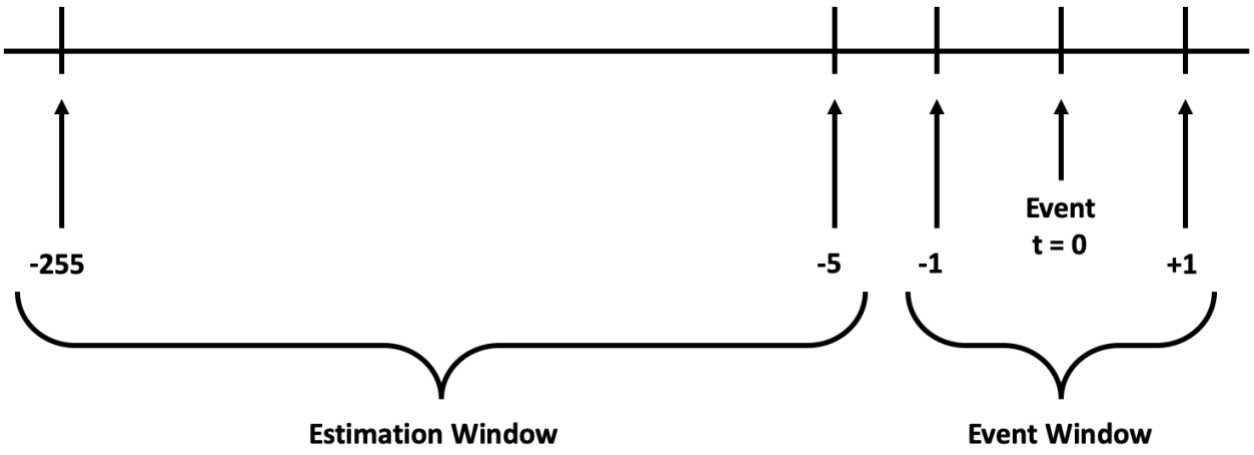
4.2.1 Excess Returns

In line with previous research on announcement effects of sustainability rankings (Yadav, Han, and Rho, 2015), an event study is used to examine the behaviour of stock prices around corporate events. This particular research methodology is chosen because the magnitude of abnormal performance at the time of an event provides a measure of the impact of this (unanticipated)

event on the wealth of a firm's claimholders. The primary and vital assumption followed in an event study is that markets are efficient and instantly respond to any new information regarding a firm's future profitability. Hence, event studies focusing on corporate announcement effects can provide evidence to further understand corporate policy decisions.

The first step of the event study consisted of choosing an estimation and event window. The estimation window was set to 1 year (250 trading days), ending 5 days before the event. Similar estimation windows were used in the past (Yadav, Han, and Rho, 2015). The publication of the Global 100 ranking has occurred in the second half of January each year up until now. Although the specific dates can be found on Corporate Knights' press releases page, there might still be some event day uncertainty. The Global 100 consists of companies from exchanges all over the world, each lying in different time zones. The publication of the Global 100 might therefore not be incorporated by investors on the event day but one day after, depending on the stock exchange. Also, the media might cover the publication of the Global 100 with some delay, raising the need for an extended event window. On the other hand, expanding the event window increases the probability of confounding events entering into the computation of CAR's, which may bias the results (Brown and Warner, 1980). It is also common to include one or two days prior to the event to account for information leakage (Yadav, Han, and Rho, 2015). Based on previous research and the Google Trends analysis, this study uses two event windows, [-1,+1] and [-2,+2]. In the event window, -1 refers to the last trading day before the event. A schematic overview is presented below:

Figure 3: Schematic overview of estimation and event window



Note: the above numbers represent the days relative to the event.

Event studies use abnormal returns to assess the impact of an event on investors' wealth. This abnormal return is the difference between an estimate of the normal return and the actual return observed in the market. Previous studies have proposed different normal return models, such as the mean-adjusted return model, the index model, the market model, or the CAPM model, of which the market model is used most often. Previous event studies in a global setting have utilised different methods in assessing normal returns. Park (2004) utilised the world market model, consisting of local and world market indexes and foreign exchange rate changes. Another common approach is to use only the domestic market indices (Campbell, Cowan, and Salotti, 2010; Constanza, Restrepo-Ochoaa, and Peña, 2020). Lastly, Renner (2011) and Harvey, Lins, and Roper (2004) use a world market index, such as the MSCI's all-country world index, as a benchmark for the market return. Bierley, Hilliard, and Hoyt, R. E. (2008) find similar results for domestic market models and the world market model (Park, 2004). Given the similar outcomes, this study chooses not to work with the world market model for simplicity reasons. Renner (2011) checked for any differences between a domestic and global market model and found comparable results. Therefore, this study takes on the global market model, as some of the firms included in the Global 100 ranking have too much influence on their domestic market indices (Renner, 2011). As event date clustering is present, this research uses MSCI's ACWI sector returns, as categorised by GICS, to account for cross-sectional correlation bias. The market model can be summarised as follows:

$$R_{i,t} = \alpha_i + \beta_i R_{ms,t} + \epsilon_{i,t} \quad (3)$$

where $R_{i,t}$ is the return of security i on day t, $\alpha_i$and β_i are the OLS estimates, $R_{mt,s}$ is the global market return of sector ms on day t and $\epsilon_{it}$is the random error of security i on day t. Two assumptions are made; $E[\epsilon_{it}] = 0$ because excess returns cannot consistently differ from zero in efficient markets and $var[\epsilon_{it}] = \sigma_{i,t}^2$. The abnormal returns during the event window are then equal to the prediction errors of the market model.

$$AR_{i,t} = R_{i,t} - \left(\hat{\alpha}_i + \hat{\beta}_i R_{ms,t}\right) = \epsilon_{i,t} \quad (4)$$

Further analyses are based on the event study reader provided by de Jong and de Goeij (2011). To improve the informativeness of the individual abnormal return, unweighted cross-sectional average abnormal returns are calculated;

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t} \quad (5)$$

To account for information leakage and event date uncertainty, broader event periods are analysed (-1,+1 & -2,+2) through cumulative abnormal returns.

$$CAR_i = \sum_{t=t_1}^{t_2} AR_{i,t} \quad (6)$$

Cumulative average abnormal returns are constructed by aggregating the CARs in the cross-section or by aggerating the AAR_t's over time.

$$CAAR = \frac{1}{N}\sum_{i=1}^{N} CAR_i = \sum_{t=t_1}^{t_2} AAR_t \quad (7)$$

4.2.2 Testing Abnormal Returns

This section comprises the statistical tests used to challenge the first three hypotheses, as stated in the literature review. First, a graphical representation of the abnormal returns is constructed to support the statistical tests. Next, statistical tests are formed to examine whether the abnormal returns are significantly different from zero or whether they differ between subsamples. Three confidence levels are tested, i.e. 1%, 5%, and 10%. The following null

hypothesis is used to test whether the aggregate abnormal returns around the event date are significantly different from zero, both for firms included in and firms excluded from the ranking:

$$H_0 : E(CAR_i) = 0 \quad (8)$$

The most appropriate t-statistic depends on the statistical properties of the stock returns. Event data clustering issues are controlled for by including multiple sector returns in the market model. Moreover, central limit theorem states that the abnormal returns exhibit a normal distribution if the sample is large enough and the returns have the same mean and variance. Hence, the following test statistics can be used to check for abnormal returns.

$$TS_2 = \sqrt{N}\ \frac{CAAR}{s} \approx N(0,1) \quad (9)$$

with

$$s = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(CAR_i - CAAR)^2} \quad (10)$$

The second and third hypotheses both are tested using a mean comparison test on the subsamples, as opposed to the hypothetical mean of zero used in TS_2. The following null hypothesis is assembled to analyse the significance of the difference in means between sample 1 (s1) and sample 2 (s2):

$$H_0 : E\left(CAR_{i,s1}\right) = E\left(CAR_{i,s2}\right) \quad (11)$$

First, the 'rank up' sample is tested against the 'rank down' sample by including a dummy variable and comparing the difference in means between the groups. Then, the influence of consecutive years is examined by comparing the 'zero-year' against the 'one-year' sample, the 'zero- and one-year' against the 'two-year' sample, and the 'zero-, one- and two-year' against the 'three-year & more' sample. Thirdly, the influence of time is assessed by comparing the subsamples against the base year sample, i.e. 2005-2007, utilising the following regression analysis:

$$CAR(-1,+1)_i = \beta_0 + \beta_1 D_{08-10,i} + \beta_2 D_{11-13,i} + \beta_3 D_{14-16,i} + \beta_4 D_{17-19,i} + \beta_4 D_{20,i} + \epsilon_i \quad (12)$$

At last, the difference in average abnormal return between the first and second half of the dataset is tested, using the same regression analysis as in expression 12, only with different dummy variables. This model should be more robust to the variability between years. Equal variances between the subsamples are assumed, meaning the standard deviation employed in TS_1 can be reused. The following test statistic is used for mean comparison:

$$TS_3 = \sqrt{N}\ \frac{CAAR_1 - CAAR_2}{s} \approx N(0,1) \tag{13}$$

The above test statistics both rest upon the assumption that the returns are normally distributed by invoking the central limit theorem. Although our sample is relatively large, the distribution might still be fat-tailed, especially in the smaller subsamples used in this study. Fama, Fisher, Jensen, and Roll (1969) even argue that the stocks hold a sum-stable return distribution, for which the variance does not exist and, therefore, central limit theorem does not apply. In addition to these normality problems, the above statistics might not be robust to outliers and other data imperfections. Therefore, in addition to the standard t-test, the Wilcoxon signed-rank test and rank-sum test are deployed and will act as a robustness check (Yadav, Han, and Rho, 2015). The Wilcoxon signed-rank test is chosen as it accounts for the magnitude of the abnormal returns, as opposed to the sign test, which is of great importance to investors.

The Wilcoxon signed-rank and rank-sum test are both non-parametric tests and are used to test the null hypothesis that the median of the distribution is equal to some value, e.g. zero or the median of another sample. The signed-rank test acts as an equality test for matched data, e.g. normal returns vs actual returns, while the rank-sum test is employed for independent unmatched samples, e.g. abnormal returns of the rank-up vs the rank-down sample. The rank a particular observation is assigned in the signed-rank test is based on the relative gap from the median compared to the gap from the median of other observations. Next, each rank is assigned a negative or positive sign based on the sign of the difference to the median. The test statistic of the signed-rank test is often expressed as T_+, which is equal to the sum of the positively-signed ranks and n is equal to the number of observations. The following test statistic is used to calculate the Z-value.

$$TS_4 = z = \frac{T_+ - E(T_+)}{\sqrt{Var(T_+)}} = \frac{T_+ - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}} \quad (14)$$

The rank-sum test is calculated slightly different as it contains unmatched data and unequal sample sizes. First, the returns are ranked without regards to the sample to which they belong. The test statistic, T, is equal to the sum of the ranks of the returns of the first sample. The following z-value can be calculated to test for a difference in medians between the samples:

$$TS_5 = z = \frac{T - E(T)}{\sqrt{Var(T)}} = \frac{T - \frac{n_1(n+1)}{2}}{\sqrt{\frac{n_1 n_2 s^2}{n}}} \quad (15)$$

where s is the standard deviation of the combined ranks, r_i, of both groups:

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(r_i - \bar{r})^2 \quad (16)$$

4.3 Multivariate Analyses

A cross-sectional OLS regression is conducted to determine the relationship between a firm's rank in the Global 100 list and its cumulative abnormal return. To isolate the effect of the Global 100 ranking on financial performance, this study controls for firm-specific effects by including a size (log assets), capital structure (total debt ratio), and profitability (ROA) factor in the regression. In addition, year dummies are added to account for yearly fluctuations in investors' average reaction. This study already corrected for sectorial differences in its abnormal return calculations. The following multivariate regression model is used to answer the fourth hypothesis from chapter two:

$$CAR(-1,+1)_i = \beta_0 + \beta_1 SR_i + \beta_2 Size_i + \beta_3 CapStr_i + \beta_4 Prof_i + \beta_5 D_{year,i} + \epsilon_i \quad (17)$$

where SR stands for the sustainability rank, Size, CapStr, and Prof for the firm-specific control variables (log(size), capital structure, and profitability), D for the year dummy, β for the regression coefficients and ϵ for the error term. The same regression is also conducted using the [-2,+2] event window.

The fifth and last hypothesis is answered by the same cross-sectional OLS regression as presented above, but replacing the sustainability rank by the four subfields, i.e. resource management, financial management, employee management, and clean revenue. Due to a lack of historical data, the regression is run using only the last two years.

$$CAR(-1,+1)_i = \beta_0 + \beta_1 ResMan_i + \beta_2 FinMan_i + \beta_3 EmpMan_i + \beta_4 CleRev_i + \beta_5 Size_i + \beta_6 CapStr_i + \beta_7 Prof_i + \beta_8 D_{year,i} + \epsilon_i \quad (18)$$

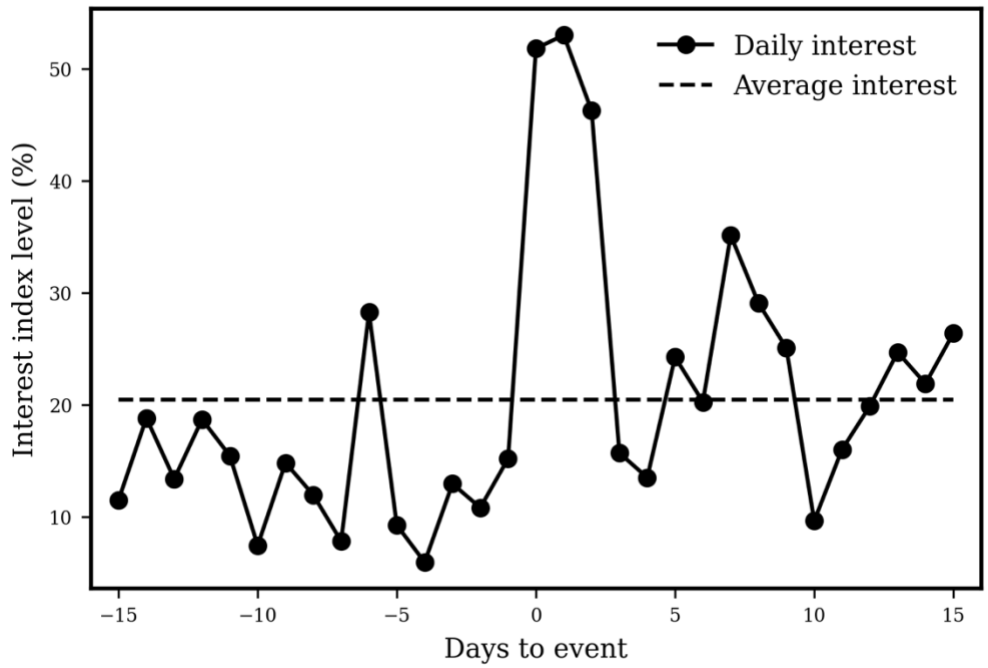
In the above regression, CAR is the cumulative abnormal return; ResMan, Finman, Empman and CleRev are the sustainability subscores, i.e. resource management, financial management, employee management, and clean revenue; lastly, Size, CapStr, Prof, and D represent the control variables, i.e. log(size), capital structure, profitability, and a year dummy.

5. Results

5.1 Google Trends

Figure 4 provides a plot of the interest index levels over days to the event. There is a clear, significant spike in volume after the event which persists for two days. Both the t-test and Wilcoxon signed-rank tests support this statement as both tests provide significant test statistics for the days zero, one, and two at a 95% confidence level. Besides the significant spike in search volume, there seems to be no information leakage before the event as the interest levels on the days before the event are not significant. Based on previous event studies and the above analysis, two event windows, i.e. [-1,+1] and [-2,+2], are used to assess the impact of the ranking on stock prices.

Figure 4: Google Trends' interest index levels



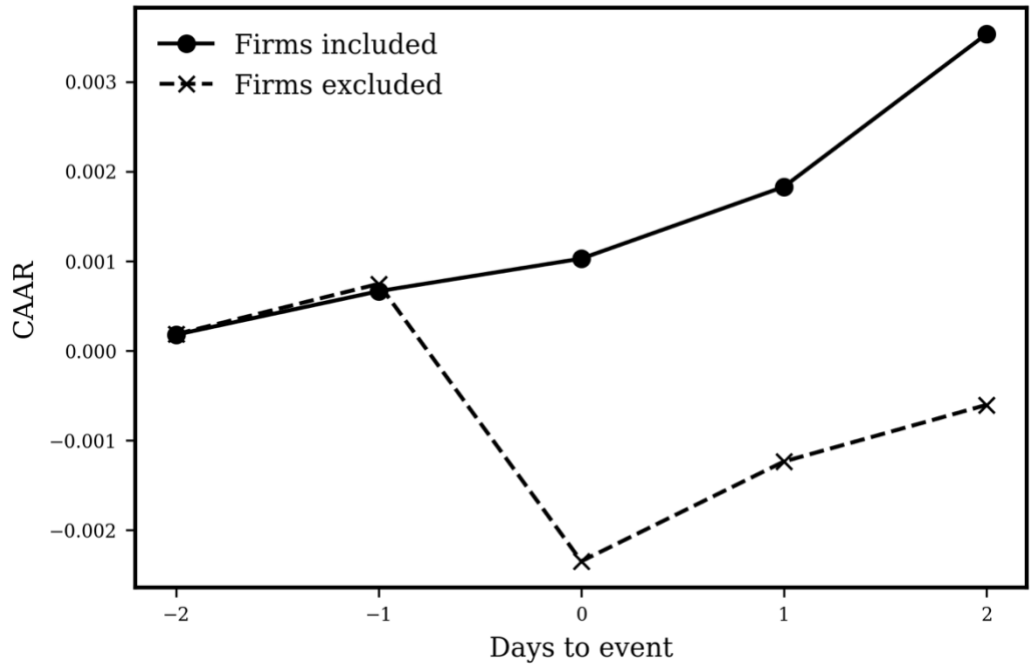
Note: The dots on top of the black line represent the interest index level on a single day before or after the event. 'Corporate Knights' is used as the search term for calculating the Interest index level. The dashed line represents the average interest level.

5.2 Testing Abnormal Returns

Figure 5 depicts the movement of the CAAR over time. There appears to be a positive trend in stock returns for companies included in the Global 100. The largest abnormal returns take place on day 2, which is likely instigated by a delayed reaction of investors due to time zone differences

or delayed media coverage. The CAARs up to day -1 are slightly positive, but not significant at a 95% confidence level, both for firms included and excluded. On the other hand, firms excluded from the list exhibit a solid negative return on the event day, providing evidence of a delisting effect. However, the returns on the two days following the event are both positive, largely neutralizing the initial strong negative abnormal return on the event day. For robustness purposes, a plot of the CAARs including up to 5 days after the event is added to the appendix, figure 1, to check for an even greater delayed announcement effect. Based on this figure, it can be concluded that after two days, the abnormal returns become relatively stable and display small deviations from the cumulative abnormal return after two days.

Figure 5: CAAR included vs excluded companies



Note: The graph depicts the cumulative average abnormal returns (CAAR) over the days to the event. The returns are absolute values, i.e. not percentages. Different line types are used for the two subsamples, included vs excluded firms.

Table 4 contains the tests statistics, including significance stars. Six CAARs are listed in the table below, two for each event window and three for each subsample, i.e. included, excluded and the difference. The CAARs for firms included in the Global 100 are significant at the 5% and 1% level depending on the test statistic used. On the other hand, the CAAR for firms excluded is insignificant for both event windows. Lastly, it appears that the difference in abnormal returns

between included and excluded firms is significantly different from zero (5% and 1% level), proving investors preference for companies engaging sustainable practices.

Table 4: Cumulative Abnormal returns included and excluded companies

	Included				Excluded				Difference
Variables	N	Mean	T-stat	Wilcoxon Sign. Rank	N	Mean	T-stat	Wilcoxon Sign. Rank	Mean
CAAR(-1+1)	1460	0.165	2.398***	2.064**	476	-0.142	-1.174	-1.324	0.307**
CAAR(-2+2)	1460	0.353	4.228***	3.846***	476	-0.061	-0.426	-0.277	0.414***

**** p<0.01, ** p<0.05, * p<0.1*

Note: The t-stat and Wilcoxon sign. rank stat test if the means of the subsamples are different from zero. The last column includes the difference in means and significance stars based on a t-test between the subsamples. Cumulative average abnormal returns (CAAR) for both event windows are in percentage for scaling reasons.

To sum up, the inclusion in the Global 100 has a significant positive impact on investors' expectation and the return of a stock. Therefore, an inclusion effect seems to exist for the Global 100 list. Moreover, the difference in abnormal returns between included and excluded firms is strongly significant, although primarily driven by the massive positive abnormal returns in the included sample. An exclusion effect does not seem to be present, although the returns are negative on average for firms excluded from the list.

Tables 5 and 6 and figure 6 depict the abnormal returns of the different subgroups, i.e. rank up/down and zero-/one-/two-/three plus-years included, and the test statistics of the difference in means between the subgroups. Table 5 reveals that there is no significant difference in abnormal returns between firms that improved or worsened their ranking. All the differences in mean/median test-statistics are below the 10% significance level. Besides, all average abnormal returns are significantly positive at the 10% level, except the rank up subsample in the [-1,+1] event window. This implies that even though a firm's ranking worsened, they still exhibit a positive abnormal return if they are included in the Global 100. The small impact of rank change on stock prices might be explained by a large portion of small changes in ranks. However, the last four columns of table 5, including only observations with absolute rank changes above the median (18), indicate similar results as achieved using the full sample, i.e. no significant difference in means between the subgroups. It is however notable that the average abnormal returns and their significance decrease as only the CAAR2 remains significant at the 10% level.

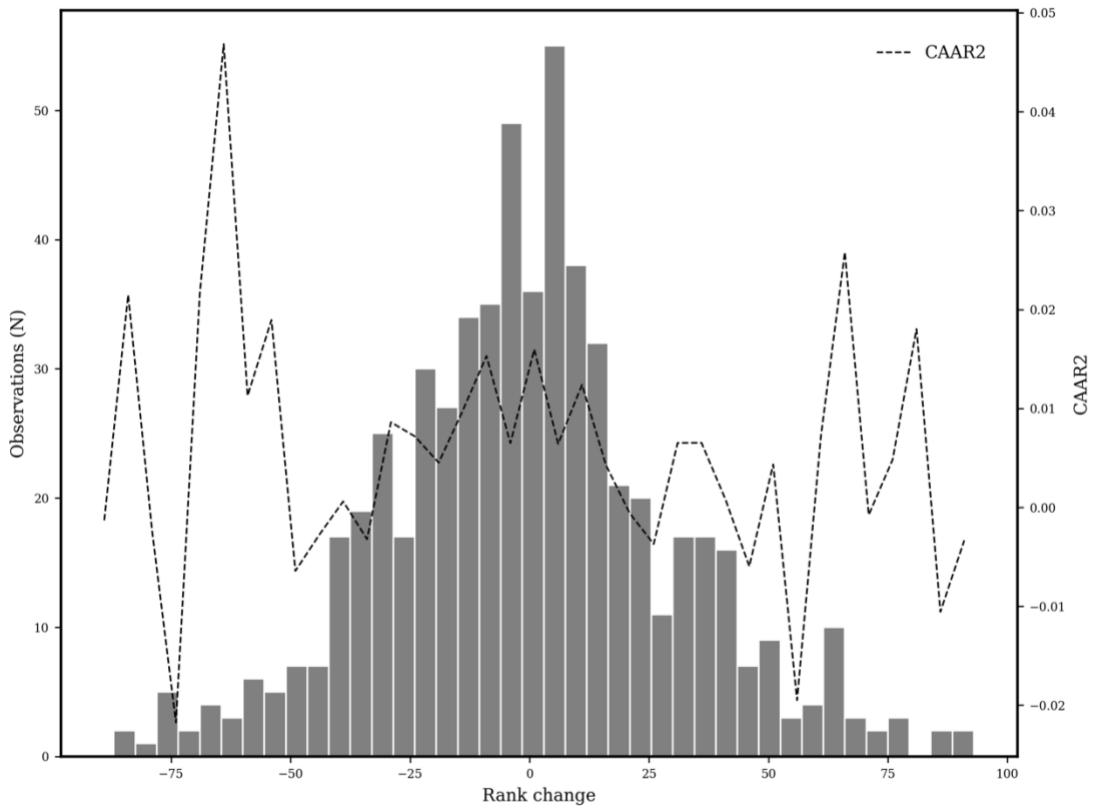
Figure 6 provides a histogram of the rank changes, including the abnormal returns for each bin. The figure confirms the outcomes of table 5, as there is no clear link between CAAR and rank change.

Table 5: Rank up/down test statistics

Variables	Rank up (N=297)	Rank down (N=306)	T-stat	Wilcoxon Rank Sum	Rank +18 (N=133)	Rank -18 (N=158)	T-stat	Wilcoxon Rank Sum
CAAR(-1+1)	0.178	0.303*	0.617	0.058	0.062	0.203	0.444	-0.550
	(0.155)	(0.059)	(0.537)	(0.954)	(0.721)	(0.419)	(0.658)	(0.583)
CAAR(-2+2)	0.680***	0.656***	-0.093	-0.439	0.236	0.415*	0.499	-0.092
	(0.000)	(0.000)	(0.926)	(0.661)	(0.366)	(0.092)	(0.618)	(0.926)

p-values are in parentheses
**** p<.01, ** p<.05, * p<.1*
Note: The t-stat and rank-sum test statistics represent the difference in means between two subgroups, i.e. rank-up vs rank-down. Cumulative average abnormal returns (CAAR) for both event windows are in percentage for scaling reasons. Rank -/+18 represents the rank up and down subgroups with absolute changes in rank above the median.

Figure 6: Rank change & abnormal returns



Note: The histogram of rank changes is divided into 40 bins. The cumulative average abnormal returns (CAAR) for each bin are illustrated by the dashed line. CAAR2 are absolute values (not %).

Table 6 uncovers that the average abnormal return for companies with consecutive listings is higher compared to companies that entered the Global 100 for the first time. Moreover, the abnormal returns consistently get higher with more consecutive listings for the CAAR2. The significance of the difference in mean returns depends on the event window and subsamples, as the difference in returns is only significant (5% level) for the three-year vs zero-, one-, two-year subsample using the [-2,+2] event window. Furthermore, the significance of the test statistics of the difference in means increases further when comparing the two- and three-year average abnormal returns to just the zero-year sample (see appendix table 3). At last, it is likely that the impact of consecutive listings is understated due to the method of measuring consistency. Firms which were included in year minus three and minus two but excluded in year minus one, are placed in the zero-year sample if included again in year zero. Hence, some firms with a reasonably high level of consistency are considered as inconsistent in this study. The alternative would be to classify consistency as the sum of listings in the past three years. However, this method does not differentiate between firms which were excluded last year or the year before that, ignoring the impact of an inclusion effect, i.e. benefits of being added to a sustainability ranking. Furthermore, the relatively small sample size of the two-year sample might explain the moderate t-stat of only 1.113. Altogether, the consistency factor seems to only have an impact on investors' reaction to the publication of the Global 100 if firms commit to sustainability practices for 3 years or more.

Table 6: Consecutive listings test statistics

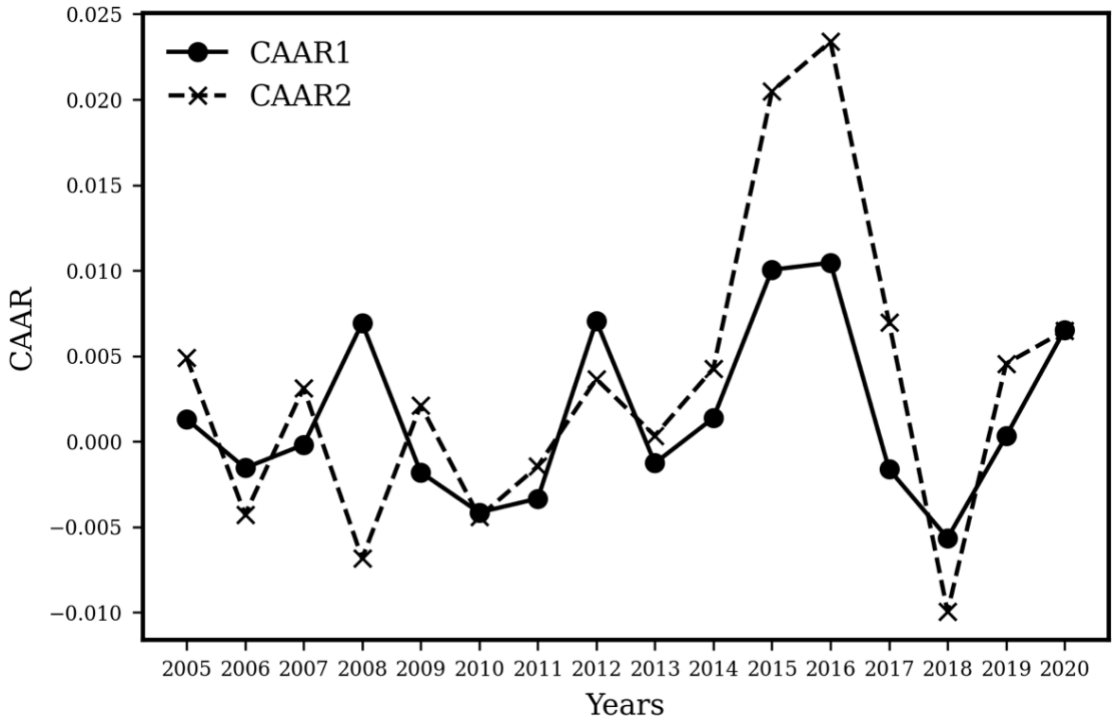
Variables	Zero-year (N=575)	One-year (N=327)	Two-year (N=199)	Three-plus (N=359)	T-stat zero vs one	T-stat zero & one vs two	T-stat zero & one & two vs three
CAAR(-1+1)	0.026	0.291*	0.289*	0.204	1.472	0.829	0.325
	(0.804)	(0.059)	(0.098)	(0.166)	(0.141)	(0.407)	(0.745)
CAAR(-2+2)	0.149	0.307*	0.472**	0.656***	0.750	1.113	2.076**
	(0.250)	(0.063)	(0.031)	(0.001)	(0.454)	(0.266)	(0.038)

p-values are in parentheses
**** p<.01, ** p<.05, * p<.1*
Note: The T-stat represents the difference in means between the three subgroups, i.e. zero-year vs one-year, zero- & one-year vs two year, and zero-, one-, two-year vs three-year. Cumulative average abnormal returns (CAAR) are in percentage for scaling reasons.

Figure 7 provides a plot of the cumulative abnormal returns from 2005 to 2020. Based on the figure, there does not seem to be a clear up- or downward trend in the abnormal returns. One thing which stands out is the difference in CAAR between the event windows, especially in 2008,

2015, 2016, and 2017. This might be explained by the delayed reaction of investors caused by different time zones or delayed media coverage. In addition, the CAAR2 displays a strong negative return in 2008, potentially caused by investors' deprioritization of sustainability in economic downturns. However, after examining the daily (abnormal) returns in 2008, the returns appeared to be extremely volatile due to investors' fear of an upcoming recession in the United States. The daily excess returns constituted to -1.2%, +.7%, -1.4%, +1.5%, and -.2%. Given this high level of uncertainty, it is unlikely that the release of the Global 100 is the main source of the abnormal returns in 2008. Furthermore, the steep drop in abnormal returns in 2018 might be induced by the ending of the American government's shutdown on 23 January 2018. The ending of the shutdown will likely have a stronger impact on American stocks compared to other countries. As the proportion of American companies in the market return proxy, i.e. MSCI ACWI sector indexes, is 58%, and the proportion of European stocks in the Global 100 is only 17%, the market return proxy will likely be overstated, resulting in negative abnormal returns.

Figure 7: Longitudinal analysis CAARs (2005-2020)



Note: The dots on top of the two lines represent the cumulative average abnormal returns (CAAR). CAAR values are absolute values (not %).

A similar problem might be present in the event window of 2016, during which Trump was inaugurated. Although the event was anticipated well in advance, it could induce some irrational trading behaviour, especially on American stocks.

Table 7 presents a regression analysis of the abnormal returns using different time-interval dummies. As Corporate Knights only started publishing the list from 2005 onwards, the proportion of firms with consecutive listings in the baseline group is much lower compared to other periods. Therefore, a dummy variable measuring consecutive listings is added to control for a consistency effect. The results suggest a significant (10% level) drop in abnormal returns in the period of the financial crises, compared to the base period, i.e. 2005-2007, only after controlling for the consistency effect, i.e. adding consecutive listing dummies, and using the [-2,+2] event window. The shorter event window and exclusion of control dummies produced insignificant returns. The returns from 2011-2013 are not significantly different from the base period, although the coefficient for all models is higher compared to the previous period. Contrary, the returns from 2014-2016 are highly significant, even at the 1% level, which might suggest a growing interest in sustainable investments. However, the abnormal returns in the subsequent period sharply decrease and become insignificant compared to the base group. The final group, i.e. 2020, suggests, again, an increase in CAAR compared to 2005-2007 for the [-1,+1] event window. The longer event window results in insignificant abnormal returns. At last, the sixth model comparing the abnormal returns of the first and second half of the dataset demonstrates a strong increase in abnormal return in the second half of the dataset, significant at the 1% level. This implies that, over the years, investors' awareness of sustainability efforts has grown in accordance with existing literature, as presented in chapter 2. However, the results do not hold for the [-1,+1] event window.

In short, there does not seem to be a clear trend in investors' reaction to sustainability rankings and extreme spikes in abnormal returns are accompanied by country-specific events, such as the US-government shutdown or extremely volatile periods, e.g. 2008. As a consequence, the causality between the Global 100 announcement and the positive abnormal returns in table 4 can be questioned. However, given the large sample size and positive sign, the announcement is

most likely to have a positive impact on stock prices, as a large portion of the country-specific events should cancel each other out over the years.

Table 7: Abnormal returns over multiple periods

	(1) CAAR1	(2) CAAR2	(3) CAAR1	(4) CAAR2	(5) CAAR1	(6) CAAR2
2008-2010	0.062	-0.422	0.054	-0.502*		
	(0.272)	(-1.550)	(0.235)	(-1.824)		
2011-2013	0.117	-0.018	0.104	-0.107		
	(0.517)	(-0.065)	(0.453)	(-0.391)		
2014-2016	0.755***	1.506***	0.730***	1.415***		
	(3.385)	(5.640)	(3.216)	(5.211)		
2017-2019	-0.206	-0.036	-0.213	-0.107		
	(-0.923)	(-0.136)	(-0.945)	(-0.395)		
2020	0.671**	0.535	0.643**	0.444		
	(2.177)	(1.450)	(2.066)	(1.192)		
2013-2020					0.197	0.761***
					(1.428)	(4.587)
_cons	-0.019	0.112	-0.098	0.049	0.063	-0.041
	(-0.117)	(0.586)	(-0.559)	(0.237)	(0.638)	(-0.345)
Observations	1460	1460	1460	1460	1460	1460
R-squared	0.017	0.042	0.018	0.045	0.001	0.014
Consec. dummy	No	No	Yes	Yes	No	No

t-values are in parentheses
**** p<.01, ** p<.05, * p<.1*
Note: Regression coefficients represent the difference in cumulative average abnormal return (CAAR) compared to the base group, i.e. 2005-2007 or 2005-2012 for the 2013-2020 dummy. Consec. dummy are dummy variables of consecutive listings in the Global 100 list for 1 and 2 years. Cumulative average abnormal returns are in percentage for scaling reasons.

5.3 Multivariate Regression

Table 8 includes the multivariate regression results related to hypotheses four and five, i.e. the effect of rank or (sub)score(s) on abnormal returns. Model 2 displays a negative relationship between rank and abnormal returns, as expected. Companies which are ranked higher, i.e. close to 100, exhibit lower abnormal returns compared to top-ranked firms, i.e. close to 1. The relationship is, however, insignificant in model 1, i.e. the [-1,+1] event window. The coefficients of the score variable are insignificant for both event windows. This might be explained by the less distilled format of the score variable compared to the rank variable, making it harder for investors to assess a company's sustainability performance. Furthermore, the coefficients of the individual subscores are all insignificant, except resource management in model 5. The significant, negative coefficient of resource management implies that firms which perform strongly on resource management bring about lower abnormal returns on average, although the relationship becomes insignificant in model 6. The fact that the subscores are insignificant is not surprising as the

overall score coefficient is also insignificant. The significance of the control variables varies a lot between the models, with the debt ratio being the most consistent and significant predictor of abnormal returns. The F-statistics of models 1, 2, 3, and 5 are highly significant (1% level), while models 4 and 6 explain an insignificant amount of variability of the CAR. The insignificance of model 4 and 6 is likely induced by the smaller sample size in combination with the use of CAAR2, as the CAAR1 models all explain a significant amount of the variation in abnormal returns. Lastly, the mean variance inflation factor for all models is close to one, meaning the models do not suffer from collinearity problems among variables. The slightly higher VIF for models 1 - 4 is caused by the inclusion of more dummy variables as it covers 11 years. In short, it seems that 'rank' does a better job at forecasting abnormal returns compared to score, and the subscore components have little prediction power of abnormal returns.

Table 8: Multivariate regression analysis rank, score and subscores on abnormal returns

	(1) CAAR1	(2) CAAR2	(3) CAAR1	(4) CAAR2	(5) CAAR1	(6) CAAR2
Rank	0.000	-0.007**				
	(0.102)	(-2.087)				
Score			-0.330	1.580		
			(-0.419)	(1.533)		
Resource Man.					-1.538**	0.092
					(-2.180)	(0.097)
Financial Man.					0.136	0.647
					(0.121)	(0.427)
Employee Man.					-0.629	-0.801
					(-0.772)	(-0.728)
Clean Revenue					0.384	0.637
					(0.423)	(0.521)
Total Assets	-0.057	-0.026	-0.057	-0.027	-0.207*	-0.155
	(-1.182)	(-0.407)	(-1.190)	(-0.436)	(-1.947)	(-1.081)
Debt Ratio	0.008**	0.001	0.008**	0.001	0.019***	-0.002
	(2.565)	(0.204)	(2.580)	(0.259)	(3.298)	(-0.315)
Return On Assets	-0.010	-0.020	-0.010	-0.020	0.017	-0.014
	(-1.002)	(-1.554)	(-0.978)	(-1.538)	(0.538)	(-0.338)
_cons	0.287	0.411	0.470	-0.706	3.269	2.867
	(0.339)	(0.371)	(0.503)	(-0.577)	(1.578)	(1.026)
Observations	1017	1017	1017	1017	194	194
R-squared	0.064	0.098	0.065	0.096	0.122	0.017
F-statistic	4.931	7.760	4.943	7.602	3.220	0.393
Prob. > F	0.000	0.000	0.000	0.000	0.002	0.924
Mean VIF	1.691	1.691	1.847	1.847	1.168	1.168
Year dummy	YES	YES	YES	YES	YES	YES

t-values are in parentheses
**** p<.01, ** p<.05, * p<.1*
Note: Cumulative average abnormal returns (CAAR) are in percentage for scaling reasons. Model 3 and 4 cover the same time period as model 1 and 2.

The outcomes of the regression analysis stand in contrast to previous studies on Newsweek's Green ranking (Yadav, Han and Rho, 2015). The key difference between the two rankings lies in the relative importance of a firm's performance compared to other firms included in the list. With the publication of the Global 100, investors are much less focused on a firm's score or rank, as being included in the list is already a significant accomplishment. Contrary, as inclusion in Newsweek's ranking is based solely on firm size, investors are only focused on the relative performance between firms in Newsweek's Green Ranking.

6. Conclusion

This research examines the relationship between sustainability performance and financial performance of firms. Using an event study methodology, the impact of the publication of Corporate Knights' Global 100 on stock returns is reviewed. This study found some evidence of investors preference for and recognition of sustainable companies accredited by a third-party organization. Firms included in the Global 100 exhibit significant abnormal returns during the event window and significantly outperform companies excluded from the list. An exclusion effect is, however, not present. The causality between the publication of the Global 100 and the abnormal returns can be questioned due to extreme spikes in abnormal returns over the years, induced by country-specific events. Nevertheless, given the large sample size and positive sign, the announcement is most likely to have a positive impact on stock prices, as a large portion of the country-specific events should cancel each other out over the years.

The degree of consistency with which a company engages in sustainability practices has a relatively low impact on stock returns, although companies with three or more consecutive listings make an exception to this statement. Short term sustainability achievements, such as a rank improvement or consecutive listings with at most two years, are not rewarded by investors in the form of significant, positive abnormal returns.

Due to increasing media coverage and investors awareness of the importance of sustainability, an increasing relationship between sustainable performance and stock returns was expected. Nevertheless, a clear pattern in abnormal returns over time was not visible in the data, although the abnormal returns in the second half of the sample were significantly higher than the first half. The outstanding negative abnormal return in 2008 might be a sign of investors' deprioritisation of sustainability in economic downturns. Nonetheless, it remains unclear whether the Global 100 is the primary driver due to the high volatility in average abnormal returns over the event window. Lastly, the abnormal returns appear to be negatively related to a firm's rank, as expected, while the underlying score and subscores prove to be insignificant at predicting abnormal returns.

This research has important implications for both managers as well as academia. While prior literature on CSR rankings was mainly focused on Newsweek's Green Ranking, where inclusion is based on size, this research proved the relative performance of firms included in a ranking is less big of a deal if inclusion is based solely on performance. In contrast to previous literature, the sustainability score and subscores become insignificant, while rank is only significant for the longer event window.

Second, managers often face decisions regarding the longevity of their CSR commitments and investments, i.e. short-term or long-term. Prior research on Newsweek's ranking tried to find guidance for this question by proxying the consistency of a sustainability policy by single year rank improvements or deteriorations. This study extended the scope of this question by examining if the impact increases with the longevity of the CSR commitment, i.e. the number of consecutive listings. The outcomes showed that investors favour long-term commitments and that average abnormal returns gradually increase, moving from zero to three or more consecutive listings.

Third, no prior research explored the impact of the CSR recognition over time. It is of great concern for managers to keep track of industry trends and evolving perceptions of CSR by investors. Although no clear trend could be unveiled about investors' perception of sustainability, this study did find a significant increase in abnormal returns in the second half of the data compared to the first half, meaning that, on average, investors responded more positively to sustainable performance after 2013 compared to prior years.

This research has some limitations. All firms included had revenues larger than 1 billion dollars, as this is the minimum threshold used by Corporate Knights. It would be valuable to analyse whether these results extend to small- and medium-sized firms. Secondly, this research used a fairly simple market model, including only global sector returns. Adding domestic return indices, as proposed by Park (2004), might solve problems regarding national events. Lastly, further research could investigate the impact of sustainability on firm value using accounting-based measures of financial indicators as well as study if there are any differences in the impact of CSR on firm value induced by geographical location.

7. References

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8. Appendix

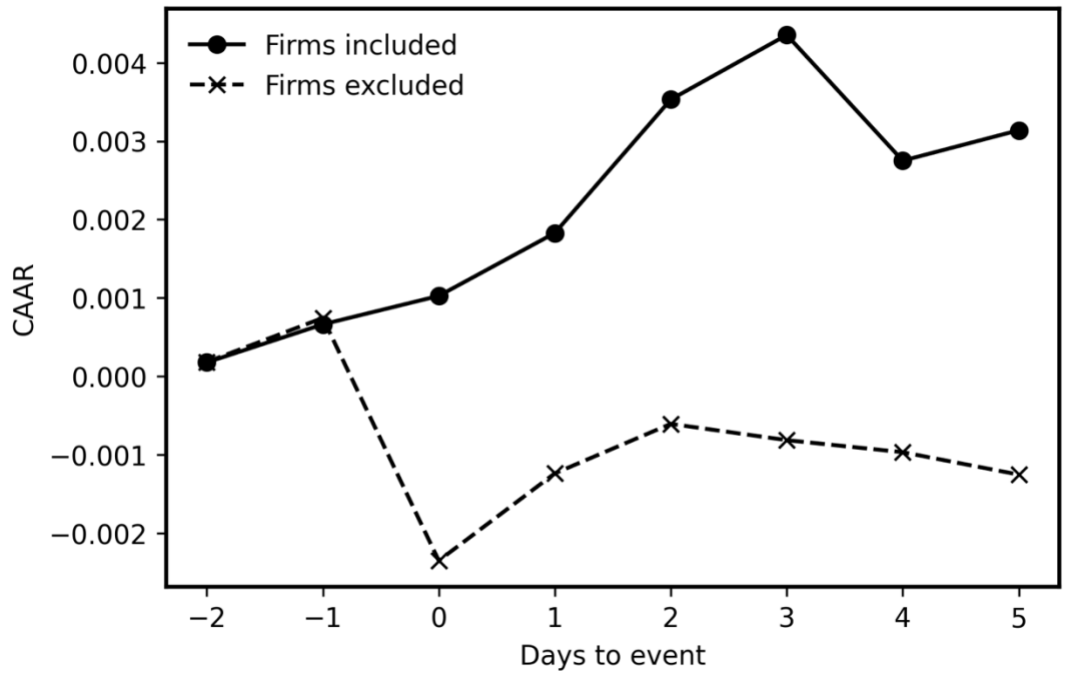
Table 1: Frequency table sectors (GICS)

Sectors	Freq.	Percent	Cum.
Communication Services	54	3.70	3.70
Consumer Discretionary	190	13.01	16.71
Consumer Staples	145	9.93	26.64
Energy	111	7.60	34.25
Financials	230	15.75	50.00
Health Care	128	8.77	58.77
Industrials	190	13.01	71.78
Information Technology	163	11.16	82.95
Materials	106	7.26	90.21
Real Estate	64	4.38	94.59
Utilities	79	5.41	100.00
Total	1460	100.00	

Table 2: Frequency table countries

Countries	Freq.	Percent	Cum.
Australia	65	4.45	4.45
Austria	9	0.62	5.07
Belgium	20	1.37	6.44
Brazil	29	1.99	8.42
Canada	114	7.81	16.23
China	6	0.41	16.64
Denmark	40	2.74	19.38
Finland	62	4.25	23.63
France	130	8.90	32.53
Germany	80	5.48	38.01
Hong Kong	8	0.55	38.56
India	5	0.34	38.90
Ireland	8	0.55	39.45
Italy	18	1.23	40.68
Japan	112	7.67	48.36
Netherlands	33	2.26	50.62
Norway	33	2.26	52.88
Portugal	4	0.27	53.15
Singapore	30	2.05	55.21
South Africa	5	0.34	55.55
South Korea	24	1.64	57.19
Spain	43	2.95	60.14
Sweden	64	4.38	64.52
Switzerland	47	3.22	67.74
Taiwan	5	0.34	68.08
United Kingdom	234	16.03	84.11
United States	232	15.89	100.00
Total	1460	100.00	

Figure 1: CAAR included vs excluded companies



Note: Cumulative abnormal returns over the days to the event. Returns are absolute values, i.e. not percentages. After two days, the returns remain relatively stable.

Table 3: Consecutive listings test statistics (zero-year as base group for all mean comparison)

Variables	Zero-year (N=575)	One-year (N=327)	Two-year (N=199)	Three-plus (N=359)	T-stat zero vs one	T-stat zero vs two	T-stat zero vs three
CAAR(-1+1)	0.026	0.291*	0.289*	0.204	1.472	1.289	1.015
	(0.804)	(0.059)	(0.098)	(0.166)	(0.141)	(0.198)	(0.310)
CAAR(-2+2)	0.149	0.307*	0.472**	0.656***	0.750	1.274	2.299**
	(0.250)	(0.063)	(0.031)	(0.001)	(0.454)	(0.203)	(0.022)

p-values are in parentheses
**** p<.01, ** p<.05, * p<.1*
Note: The T-stat represents the difference in means between the three subgroups, i.e. zero-year vs one-year, zero-year vs two-year, and zero-year vs three-year. Cumulative average abnormal returns are in percentage for scaling reasons.