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ANALYSIS OF INVESTORS REACTIONS TO SUSTAINABLE RANKINGS IN
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ABSTRACT

Corporate Sustainability is the ability that firms have to nurture and grow over time by meeting the expectations of stakeholders. The definition implies social, environmental, and economic dimensions. Sustainable indexes and rankings are developed to measure the corporate sustainability of companies. Moreover, investors have information regarding corporate sustainability. Therefore, the aim of this study is to analyse how investors react to sustainability by observing how the market shares volume evolve. Indeed, the study is developed distinguishing between inclusion, exclusion, maintenance, and membership of entities in sustainable rankings. The information used is the one provided by the sustainable ranking of RobecoSam, the Yearbook. The findings reveal that the inclusion, exclusion, and maintenance of companies do not equivalently affect the abnormal volume of companies that participate in our sample. Investor's value the consistency of companies included in the ranking.

Keywords: Sustainability Ranking, Environmental social and governance (ESG), RobecoSam, Sustainable Development Goals (SGD), abnormal volume, investors.

RESUMEN

La sostenibilidad empresarial es la capacidad que tienen las empresas de alimentarse y crecer en el tiempo satisfaciendo las expectativas de las partes interesadas. La definición implica las dimensiones social, medioambiental y económica. Se han desarrollado índices y rankings de para medir la sostenibilidad corporativa. Los inversores disponen de información sobre la sostenibilidad corporativa. Por lo tanto, el objetivo de este estudio es analizar cómo reaccionan los inversores ante la sostenibilidad observando cómo evoluciona el volumen de las acciones del mercado. El estudio se desarrolla distinguiendo entre la inclusión, la exclusión, la permanencia y la pertenencia de las entidades a los rankings de sostenibilidad. La información empleada es la proporcionada por el ranking de RobecoSam, el Yearbook. Los resultados revelan que la inclusión, la exclusión y la permanencia de las empresas no afectan de forma equivalente al volumen anormal, y que los inversores valoran la permanencia de estas.

Palabras clave: Ranking de sostenibilidad, RobecoSam, Objetivos de Desarrollo Sostenible (ODS), ambiental social y gobierno (ASG), volumen anormal, inversores.

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1. INTRODUCTION

There is a growing body of literature that recognises the importance of Corporate Sustainability. Sustainability is a goal in mind of not only business but also governments and non-profits. Nevertheless, the measure of organizations towards sustainability was not determined until the “triple bottom line” (TBL) accounting framework was proposed by Elkington (Hall & Slaper, 2011). The TBL model includes the social and environmental dimensions to the traditional accounting systems. Several European countries require companies to account environmental information on their reports. Moreover, in Spain, companies must disclose the details about their environmental impact (Larrinaga et al. 2002). Indeed, Larrinaga et.al (2002) showed that according to KPMG, 49% of the top 100 companies of 19 countries provided in their report’s environmental information, on the contrary, in the 2020 KPMG report 5200 companies of 52 different countries were analysed, as they stated, “making it our most extensive survey ever”. KPMG is a company stated in 146 countries whose aim is to provide audit services for companies. The company is committed with quality and transparency to build trust with their clients. There is no doubt that sustainability is fast becoming a required and demanded data for companies to include in their reports.

A key aspect of Corporate Sustainability is Socially Responsible Investments (SRI). SRI include the environmental, social and governance (ESG) criteria in the investments decisions that companies develop. SRI provides investors the possibility to reflect their values in their portfolio and at the same time, encourages corporate ethical behaviour (Dawkins, 2018). The issue of ESG’s has received considerable critical attention in the business world, that is the case, that firms have merged it with their strategy (Richardson, 2009), ESG is considered a key factor for business success (Hart & Milstein, 2003, p. 57).

Sustainability is the centre of profit and non-profit organizations since in 2015 the Sustainable Development Goals (SDG) were approved by the United Nations members. SDG are composed by 17 goals that are subdivided in 169 subobjectives. The goals proposed are integrated and though, the activities done in one area will affect the results obtained on others.

The SDG are divided into 5 areas called the “5P-s”, that correspond to Planet, People, Prosperity, Peace and Partnership. As we can imagine, in this paper we are going to be focused on the Planet area and on the five objectives that this area embraces. We are moving around objective number 6, “clean water and sanitation”, objective 12 “responsible consumption and production”, objective 13 “climate action”, objective 14 “life below water”

and objective 15, “life on land”. From those five, this paper is going to be more related to objectives 6,12, and 13.

There is evidence suggesting that sustainability plays a crucial role in society, thus, in order to measure corporate sustainable activities performed by different organizations, rating agencies, ranking and sustainability indexes have risen.

These ESG's rating agencies develop a positive screening, to see the sustainable practices of firms, and a negative one for the bad practices (Del Río et al, 2020), investors are then using this information to penalize or benefit responsible companies (Hockerts & Moir, 2004).

This paper aims to analyse how investors value sustainability. Indeed, we analyse if the inclusion, exclusion, maintenance and being included in the sustainability ranking of RobecoSam, the “Yearbook” is relevant for investors. In contemplation of studying the reactions that investors have regarding companies sustainability, the market share volume of those companies has been analysed.

The overall structure of the study takes the form of four more sections. The second section of this paper will examine the literature review and the working hypotheses. The third section is concerned with data, variables and the methodology used for this study. The fourth section presents the findings of the research, and finally the fifth section provides a discussion and a conclusion of the results obtained.

2. LITERATURE REVIEW AND WORKING HYPOTHESES

2.1 Corporate sustainability

The World Commission on Environment and Development defined the concept of sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Development, World Commission on Environment and Development 1987, Chapter 2). This definition is linked with other concepts used by organizations such Corporate Social Responsibility (CSR), Environmental Management (EM) and Corporate Sustainability (CS).

Corporate Social Responsibility, as Crane, Matten, Glozer and Spence (2019) state, is defined as the attempt by firms to meet the economic, legal, ethical, and philanthropic demands of a society at a particular time. Carroll in 1991, proposed the most common model of CSR called the “four-part model of corporate responsibility”. This model is represented in a pyramid where, at the bottom, we find the economic responsibilities, as he says, this step is required by the society, employees, shareholders, and customers. He ensures that the satisfaction of this first stage is compulsory for all organizations. The next level is legal responsibilities,

which, once again are required by society. Legal responsibilities demand that companies stand for the law and play by the rules of the game. The law can be defined as “the minimum acceptable standards of behaviour” following Crane et al. (2019). Carroll (1991) suggests that this level must be satisfied by companies that seek to be socially responsible. Ethical responsibilities are expected by society, meaning that there is not an obligation for companies, it is just an expectation, citizens expect that companies act doing what is right and fair. The last step, located on the top of the pyramid, is philanthropic responsibility, a responsibility that is desired by society. In this step, we locate different activities that are within the organization to improve society. We can include charitable donations, improving the quality of life of employees, support local activities and others. The word “desired” means that it is the last inquire of society, and of course, there is not an expectation nor an obligation for companies, making this responsibility, the least important one. (Crane et al. 2019).

Corporate Social Responsibility, Corporate Sustainability, and Environmental Management¹ are closely related, despite, Environmental Management is not widely used in literature. Corporate Social Responsibility and Corporate Sustainability are the most common terms. In this paper, Corporate Sustainability is the starting point, following the argumentation of Lo (2010), where he discussed that Corporate Social Responsibility is incorporated in the term Corporate Sustainability. Furthermore, Wempe and Kaptein, 2002, declared that Corporate Sustainability is considered the last aim of companies, while Corporate Social Responsibility is an intermediate step of the process, an idea that was also supported by Linnanen & Panapanaan (2002). CS encompasses the social, environmental and economic dimensions, that companies need to consider if they want to remain sustainable in the long run as Elkington 1998, (2004) stated.

Corporate Sustainability is defined as the ability of a firm to nurture and support growth over time by effectively meeting the expectations of diverse stakeholders (Neubaum & Zahra, 2006). They also mentioned what sustainability meant for businesses, stating that it involves sustaining and expanding economic growth, shareholder value, prestige, corporate reputation, customer relationships, and the quality of products and services. It also means adopting and pursuing ethical business practices, creating sustainable jobs, building value for stakeholders, and attending to the needs of the underserved citizens, following Szekely and Knirsch (2005).

¹ “a purposeful activity with the goal to maintain and improve the state of environmental resources affected by human activities” Uwakwe and Kamalu (2016).

Corporate sustainability activities are voluntary activities that firms perform to interact with stakeholders (Lo, 2010). As these activities are voluntary, meaning that there is not an obligation for companies to perform them, Marrewijk (2003) suggests that companies adopt sustainable practices for three different reasons; because they feel obliged to do it, they are made to do it, or they want to do it. The Stakeholder Theory of Freeman, 1984 states that corporations are not simply managed in the interest of their shareholders, but that they must take into account other social groups, called stakeholders. Stakeholders are individuals or groups that in specific situations, companies' activities arouse them with a positive or negative impact (Crane et al. 2019).

The difference between the stakeholder theory and CSR is that meanwhile in CSR is focused on the responsibilities that firms have, rather than on the individuals that should be respected by corporations, the stakeholder theory starts looking at different groups to which firms have a responsibility (Crane et al. 2019). Freeman (1984) provided reasons supporting why the traditional view in which managers need to act in the interest of shareholders need to be changed; these reasons are divided into two perspectives, the legal and the economical one.

From the legal perspective, the one based on the contracts between organizations and employees, it is not true that the only group with interest in firms' activities are shareholders.

On the other hand, from the economic point of view, shareholders do not usually buy shares for the "ownership" of a corporation, but speculative reasons. This argumentation was followed by Ghoshal (2005), she defends the point that shareholders can easily sell their stocks, but that employees that work for companies do not have the same chances to find a new job. Ghoshal thus, questions, why the short-term speculative motives of shareholders to buy stocks are prioritized to the long-term ones of several groups of people such as employees. According to Freeman (1984), this view of responsibility towards several stakeholders assigns a new role to management in which managers must consider the interest of all stakeholders, including those who do not have a voice, such as the environment (Crane et al. 2019). There are different forms of this stakeholder theory, but in this paper, the attention is on the "instrumental stakeholder theory". The instrumental theory tries to answer whether it is beneficial for corporations to take into account the stakeholder's interest (Crane et al. 2019). In other words, if companies gain money or not if they have a broad responsibility concept, considering more groups apart from their shareholders, or if on the contrary, they do not.

Despite their motivations, firms aware of CS follow Socially Responsible investments (SRI) as part of their business. Socially Responsible Investment "is an investment discipline that adds concerns about social or environmental issues to the normal ones of risk and returns as determinants of equity portfolio construction or activity" (Sparkes, 2008). SRI is known as ethical investments where companies include sustainable dimensions in their activities, merging economy with environmental, social and governance issues (ESG). Stakeholder theory emerged to address firms value creation and connect capitalism with ethics in business following Parmar, Freeman, Harrison, Wicks, Colle, Purnell (2010).

The ESG concept is closely related with the Sustainable Development Goals (SDG), also known as Global Objectives or 2030 Agenda. The SDG were adopted in 2015 by the United Nations members, and their aim is finishing with poverty, save the planet and make sure that everyone has prosperity in 2030. This new plan of action is a substitute for the one called Millennium Development Goals which was focused on eradicating poverty and hunger, prevent the deadliest diseases and extent primary school to all children. The Millennium Development Goals had only 8 objectives and 15 years to get to the proposed goals. They achieved various progress such as reduce poverty, the access to water, decrease infant mortality, and improve maternal health.

2.2 Corporate sustainability measurement

Sustainable Development Goals have emerged in stakeholders the need of becoming more sustainable; moreover, stakeholders' pressure and demand companies to take responsibility for the consequences of their operations (Freeman et al., 2010). This social demand has triggered several agencies to measure the corporation's ESG level of performance, such as KLD Research and Analytics, Ethical Investment Research Services (EIRIS), RobecoSAM or Vigeo, among others (Avetisyan and Hockerts, 2017). The KLD Social Index is designed to expose companies high MSCI ESG ratings and to exclude those with negative ones. MSCI ESG rating measures companies' resilience to long-term industry ESG risks. They identify industry leaders according to their exposure to ESG risk and on how they manage them, then, they categorize companies from leader (AAA, AA), average (A, BBB, BB) to laggard (B, CCC). This index consists of 400 companies selected from the MSCI USA Investment Market Index (IMI), in which there are included large, medium, and small US companies. The final aim of this index is to select companies with high ESG ratings in several sectors and try to maintain each sector weight like the one of the parent indexes.

EIRIS and Vigeo have merged forming a new agency called "V.E", a rating and research agency which aim is the integration of ESG factors into their strategies, operations, and

management. The mission of V.E is to provide companies with the ESG insights they need to be able to manage their risks and address their social and environmental impact. In order to create their ESG analysis, they use ESG key performance indicators (KPIs) and controversies, reports of different sectors, analysis of events that can affect their opinion, risk analysis, ESG opinions, ratings and their controversy database. Their controversy database keeps them informed about allegations affecting companies' portfolio; this information is relevant due to the impact that controversies can have on the reputation and security of companies. V.E provides a personalized evaluation of ESG of specific companies.

Robeco is an international fund manager that offers a broad range of fix and variable investments, Sam, on the other hand, analyses and provides information about sustainable investments. Robeco and Sam worked together forming what is mentioned above; "RobecoSam".

In this paper, RobecoSam Yearbook data is the one used since, as mentioned, V.E only provides research for companies that have to contact them to do so and their information is not public, and KLD research and analytics provides information about US companies, meanwhile, RobecoSam data is more global as it takes the 15% of the top companies of each sector to develop their Yearbook. In 2020 S&P Global acquired the ESG Rating and Benchmarking business of RobecoSam; thus, the Corporate Sustainability Assessment of Sam, is now available in S&P Global. The Corporate Sustainability Assessment (CSA) provided by S&P Global is an annual evaluation of sustainable practices of companies, it is focused on the financial materiality framework of firms. The concept of materiality in business refers to material information, indeed, to economic information (Jebe, 2019). On the other hand, sustainability organizations refer to companion materiality, a concept that refers to the economic, social and governance (ESG) information (Jebe, 2019).

SAM analyst performs a financial materiality analysis to identify the sustainability factors that lead to greater business value and that have more impact on long-term valuation in financial analysis. This analysis provides the environmental, social and governance issues that are most probable factors of business growth, cost, and future financial performance. In this way, the factors that seem to have the greatest long-term impact on financial assumptions, are the ones with more weight in CSA.

The first step carried by SAM to construct the CSA is a questionnaire focused on financial, economic, environmental and social criteria. Questions of each criterion are used to measure each company awareness of sustainability, and to look for signals that reveal that they are

implementing strategies to be more sustainable. They also evaluate the process and the quality of their strategies. Consequently, the questions that companies are going to find in their questionnaires will evaluate their awareness of the ESG for their financial success, their financial materiality regarding their exposure to sustainable factors, their strategies to manage sustainability risks or opportunities, how they measure the effectiveness of their strategy, the valuation of their results, and the transparent communication. To ensure objectivity, SAM has predefined scoring systems for each question; quantitative answers will be assigned punctuation between 0 and 100; on the other hand, qualitative answers are evaluated with a predefined appraisal method that results in a quantitative score, finally, whenever companies need to upload documents, the maximum score will only be provided whenever companies attached the proper documentation to support the question.

Once the number of points is assigned to each answer, we can calculate the Global ESG score of each business; to do so, we are going to do the summation of the points received in each question, then we multiply by each question weight and by the criterion weight. After calculating the S&P Global ESG Score for each company, companies of the same industries are compared to determine the best ones.

SAM's analyst also performs a Media and Stakeholder Analysis (MSA) to measure the consistency of companies' behaviour and management in crises. Indeed, they measure if they follow their business principles and policies. MSA cases appear whenever a company has been involved in a negative incident of which it is responsible, their actions are inconsistent with their policies and there is damage for the company. Each MSA case is evaluated depending on the response that firms have developed and the impact the case has, this evaluation then provides a score that is called "MSA multiplier". The MSA multiplier is a coefficient that will adjust the CSA criteria, the adjustment would be more negative whenever the impact is more negative for the company. The MSA is complemented with data provided by RepRisk ESG Business Intelligence. This source of information screens, captures, filters and analyses ESG risks. The MSA multiplier affects negatively the S&P ESG score of each company.

The P&S Global ESG score of each company is then used to classify companies that are going to appear, and the ones excluded, as well as the medal that they will get. The Yearbook is a publication of corporate sustainability based on data collected through CSA. The Yearbook is published annually normally between January and February and it takes CSA data of the previous year. In this Yearbook participate the world's largest companies according to Dow Jones Wilshire Global Index. In contrast, only 15% of the top companies

in each sector are considered to enter in the book, indeed, in 2020, 458 firms entered the book from the 4710 studied.

The Yearbook provides diverse recognition to business differentiating between membership and gold, silver or bronze medals. Companies that only appear in the Yearbook as members, need to be inside the top 15% of the companies in their industry and achieve a score in the CSA within 30% of the top-performing company in their industry. Companies classified as bronze, need a score of at least 54 and be inside the range of 5%-10% top-performing companies of their industry. The silver medal will be for those with a minimum score of 57 and whose score is between the 1%-5% of the top companies of the sector; finally, the gold medal would be for companies with at least 60 point and that are within the 1% of the top-performing companies of their sector.

2.3 Sustainability for investors

Hawn, Chatterki and Mitchell, 2018 revealed in their study that the continuation of companies in the sustainability indexes, provides corporations with at least minimum benefits. This finding might imply that investors increasingly value CS or CSR activities.

Flammer (2013), conducted a study to test whether stakeholders are sensitive or not to firms environmental footprint, and his findings revealed that there was an increasing tendency to react negatively to environmentally harmful activities while there was a decrease of positive reactions for “environmentally good” activities. Ioannou and Serafeim, 2015 suggested that analyst has become more optimistic about firms that practice socially responsible activities and that thus are included in CSR ratings. On the other hand, Flammer 2013, showed a decrease in the reactions of investors towards those activities. Indeed, he suggests that a feasible reason for investors reaction could be the “no differentiation” of firms explained with the widespread adoption of sustainable practices. So, Hawn et al. (2018) revealed that on average, shareholders have a negative reaction to some sustainable events, indeed, they evidenced that they punish companies that remain or enter in sustainable indexes. The paper proposes a reasonable reflection to their findings explaining that whenever firms invest in sustainable activities, the capital that they derive from more profitable projects diminish. An interesting point to highlight is that investors reactions change during time and space; moreover, they react more positively during time (Hawn et al., 2018).

However, remaining on the indexes seems to have a benefit for companies, which could mean that reliable and constant CSR activities are valued. Consequently, it can be argued that entering on the indexes is not sufficient for investors that seem to value the corporation's

commitment to sustainability. Finally, investors do not penalize firms that are deleted from indexes, at least as an average (Hawn et al., 2018).

Hawn et al, (2018) developed their paper by studying the abnormal return of companies that entered the stock index of DJSI. The same applies to the study developed by Flamer (2013), as it is shown, two of the most recent studies referred to how investors and stakeholders react to sustainable events have been based on the abnormal return. Indeed, most researchers investigating this field have utilised the abnormal return del Río et.al, (2020) or Hawn, Chatterji, Mitchell (2015) to measure if the entrance, exit or maintenance in sustainability indexes affect companies benefits.

Nevertheless, Beaver (1968) argued that price reaction reflects the consensus among investors meanwhile trade volume reflects the disagreements among them. Moreover, Ajinkya, Atiase and Gift (1991) found a positive relationship between trading volume and the dispersion of investors beliefs, and Ziebart (1990) found a positive relationship between the abnormal volume and the change in dispersion analyst forecast, and the revision of those forecasts. Finally, Dontoh and Ronen (1993) demonstrated that trade volume depends on prior dispersion beliefs and the dispersion originated by the different interpretations of the public information.

These researches suggest that trade volume is a better parameter to measure the investor's reactions. Indeed, it is suspected that the results that previous studies have obtained regarding investor's reactions when sustainability events occur could not be accurate enough due to the parameter used, that is, the return. For these reasons, this paper is going to measure the reactions that investor has regarding sustainability events with the abnormal volume rather than with the abnormal return.

Volume reflects a lack of consensus in prices, which is risen by the publication of new information (Beave, 1968). Moreover, Beave (1968) stated that volume tests reflect changes in the individual investor's expectations. For that reason, the abnormal volume would state whether the publication of the Yearbook affect's trading.

Following the prior literature in which we have highlighted that abnormal volume is a better estimator than the abnormal return, Bildersee, Radhakrishnan and Ronen (1996) stated that earnings announcements could reduce or increase disagreements between traders and that those will depend on the earnings precision. They used the trading volume, the prior and contemporaneous dispersion of beliefs and the precision of earnings to study the behaviour of trading volume in earnings announcement dates. They calculated the abnormal trading

volume following the market model that Beaver (1968), Bamber (1986), and Ziebart (1990) have previously used. Prior dispersion of beliefs, that refers to the asymmetry of information that investors have due to the private information that some of them will have and others not. The precision of the earnings variable refers to the expectations that investors did and if they have been close or not to the real prices. After their analysis, they discovered that abnormal and trade volume reaction to earning announcements increases with earnings precision and prior dispersion and that decreases with changes in dispersion. In other words, when the expected earnings are close to the earnings announced, the trading volume will increase and vice versa.

Papers studying investor's reaction to different events have been an issue of study for a long time, despite, the study of how they react to ESG news and events is a current matter of study.

ESG's has become a relevant issue for governments, investors and shareholders in the risk management field, but also for companies, that have merged it with their strategy (Richardson, 2009), ESG is considered a key factor for business success (Hart & Milstein, 2003, p. 57). These ESG's rating agencies develop a positive screening, to see the sustainable practices of firms, and a negative one for the bad practices (Del Río et.al, 2020), investors are then using this information to penalize or benefit responsible companies (Hockerts et. al, 2004). This argumentation was supported by Hong and Kacperczyk (2009), stating that investments in CSR could increase market liquidity attracting investors.

Cellier, Chollet and Gajewski (2015) revealed how investors change their beliefs when announcements regarding ESG are published. Furthermore, they observed that analyst decrease their trades before the announcements, and afterwards they increase them. Information provided by rating agencies is private, which leads to information asymmetry that affects uninformed analyst, they lower their willingness to trade in comparison with the informed ones. Nevertheless, when the announcement is made, analyst changes their trade using private and the published information. Thus, investors investigate and use these rating's information as a relevant point for their trading.

In conclusion, the tendency of studies of how analyst reacts to ESG events has risen and as mentioned, there is literature about the field, despite, it is driven with the abnormal return. The abnormal trading volume has been demonstrated to be a better estimator of how analyst reacts to market events, but there is no study using this parameter until now. This paper provides a study based on the abnormal volume of companies that have been included,

excluded, maintain, or just appeared in the ranking of RobecoSam. The aim is to analyse how investors react to the scenarios mentioned by using the abnormal volume, which, as it has been demonstrated, is more informative than the return.

In order to drive this study, four different Hypotheses are proposed through which the question of how investors value corporate sustainability will be answered. The Hypotheses are the following:

- H1: Investors do not value that companies appear in sustainable rankings; thus, the abnormal volume of entities is not affected.

With this first Hypothesis, it is studied if a company that it is included in the Yearbook provided by RobecoSam will find its abnormal volume affected or not. It is expected that companies that appear in the Yearbook will be positively affected, that is benefited for their inclusion.

- H2: Investors do not value that companies enter in sustainable rankings; thus, the abnormal volume of entities is not affected.

The second Hypotheses tries to study if companies that enter in the Yearbook will find a benefit showed on their abnormal volume or if on the contrary, their volume will remain unchanged. It is expected that companies that enter in the sustainable ranking of RobecoSam will find themselves benefited by investors.

- H3: Investors do not value that companies exit sustainable rankings; thus, the abnormal volume of entities is not affected.

This third hypothesis studies if exiting the Yearbook will have an impact on the abnormal volume of companies. In this case, as the exit of a sustainable ranking, is not good, or at least this is the view followed before knowing the results of the study, it is expected that investors will value this exit as a negative thing for the company. Therefore, the abnormal volume will be negatively affected by this event.

- H4: Investors do not value that companies remain in sustainable ranking; thus, the abnormal volume of entities is not affected.

Finally with this fourth hypotheses if remaining on the raking is relevant for investors it is studied. This last hypothesis is particularly relevant for the study since previous literature has stated that the consistency that companies have on sustainable rankings is valued by

investors. It is hoped that investors value positively the consistency of those companies that stay in the Yearbook.

3.DATABASE AND METHODOLOGY

3.1 Database

The research data in this final degree work is drawn with the ranking provided by RobecoSam, the Yearbook.

In this research, membership is the focus point, there is no distinction between medals. Our sample is composed of 203 companies of 15 different countries, Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Norway, Portugal, United Kingdom, Spain, Sweden and Switzerland.

The sample is built by just sustainable companies, meaning that non-sustainable ones are not taken into account for the performance of the analysis. Indeed, it consists of companies that have appeared in the Yearbook for at least one year from 2009 to 2017, which is the timeframe in which we are going to support our calculations.

The variables that are used in this work are the abnormal volume and the return of those 203 companies. The data used to calculate the abnormal volume, as well as the one regarding the return, were taken by the database of datastream. Daily data from 2009 to 2017 has been used to develop more accurate research. The return was selected from the whole database to get one of the companies studied, as well as the one of the days required. The return data needed in the research is the one of the event day, the previous day and the next day.

Table 1: Number of sustainable companies per country and the average data used

	Number of sustainable companies	Volume	Return
Austria	2	0.6839	0.0168
Belgium	4	0.8642	0.0119
Denmark	6	0.9654	0.0123
Finland	13	0.9773	0.0172
France	31	0.9409	0.0161
Germany	20	0.8234	0.0144
Italy	12	0.2194	0.0148
Luxembourg	1	0.6817	0.0180
Netherlands	14	0.3213	0.0145
Norway	4	0.7511	0.0135
Portugal	5	0.7047	0.0122
United Kingdom	53	0.8709	0.0138
Spain	18	0.9955	0.0113
Sweden	10	1.1937	0.0139
Switzerland	10	0.5757	0.0132
Total	203	0.8868	0.0142

Source: Author's own elaboration.

Table 1 represents the average data that it is going to be used in the research. The abnormal volume is the parameter used since it provides a further explanation of how investors react to market events. The means presented in the table are regarding the data that is used in the research to test the Hypotheses proposed.

The volume average is composed of the daily data of each of the 8 years studied. The average per country, as well as the total one, has been calculated to see in detail the volume that the average of the country's companies included in the Yearbook have. Meanwhile, the average return is composed of the event day return, the previous and the next day with respect to the event day.

3.2 Main variables

3.2.1 Corporate sustainability

In this final degree work, the key point is sustainability and for that reason the non-sustainable companies are not studied. The data that it is going to be shown and worked is regarding the 203 sustainable firms. Those firms are going to be classified yearly depending on if they have entered, exited or remained and if they are or not in the Yearbook, what it is called "medal". Firms classified as "medal" will be those that are in the Yearbook the year we are studying; in this classification, it is only relevant the inclusion of the company in the ranking. It is called "enter" if the company was not in the Yearbook the previous year to the one studied and on the contrary, in the year studied it is; if we are studying 2009, the firm will be classified as enter if in the 2008 Yearbook was not included but it is in 2009. We will call "exit" when a company that appeared in the previous year to the one studied it is not appearing the year studied; following the example, if we are studying 2009, the company will be classified as an exit if it appeared in the 2008 Yearbook but not in the 2009 one. Finally, companies classified as "remain" will be the ones that appeared in both years, the previous year studied and the one studied now; the ones that appeared in 2008 and 2009.

It has been worked with 4 different Dummy variables that take either value one or zero. Dummy =1 stands for companies that are in the Yearbook classified in one of the mentioned criteria (remain, exit, enter or medal), and Dummy=0 stands for companies that are neither in the Yearbook nor classified in one of the mentioned criteria.

Table 2: Classification of companies depending on Medal, Enter, Remain or Exit per country and year.

		Total	AUT	BEL	DNK	FIN	FRA	DEU	ITA	LUX	NLD	NOR	PRT	UK	SPA	SWE	CHE
2009	Medal	125	1	1	1	2	13	6	12	1	14	4	5	39	13	8	5
	Enter	21	0	0	1	1	11	1	4	0	0	1	0	0	0	2	0
	Remain	117	0	1	0	2	2	5	12	0	14	14	5	39	13	5	5
	Exit	25	2	2	1	1	8	2	0	0	0	0	0	3	3	3	0
2010	Medal	137	1	0	0	4	29	8	12	1	14	4	5	37	13	6	3
	Enter	34	0	1	0	1	18	3	2	0	2	0	2	0	0	2	3
	Remain	119	0	0	0	0	11	5	12	0	14	14	5	37	13	5	3
	Exit	16	1	1	1	2	2	1	0	0	0	0	0	2	2	2	2
2011	Medal	132	0	0	3	13	23	3	12	0	14	4	5	35	12	5	3
	Enter	7	0	0	1	0	0	0	1	0	2	0	0	0	1	1	1
	Remain	129	0	0	0	4	23	3	12	0	14	14	5	35	12	4	3
	Exit	24	5	0	0	0	6	5	0	0	0	2	0	2	2	2	0
2012	Medal	134	2	4	6	11	23	3	12	0	14	4	5	34	10	5	1
	Enter	11	1	1	0	0	0	3	1	0	4	0	1	0	0	0	0
	Remain	131	0	0	3	11	23	0	12	0	14	14	5	34	10	4	1
	Exit	13	3	0	0	2	0	3	0	0	0	0	0	1	1	1	2
2013	Medal	138	2	3	5	11	21	20	12	0	14	4	5	32	9	0	0
	Enter	25	0	2	0	2	0	17	0	0	0	0	0	0	1	2	1
	Remain	129	0	3	5	11	21	3	12	0	14	14	5	32	9	0	0
	Exit	11	0	1	1	0	2	0	0	0	0	0	0	2	2	2	1
2014	Medal	145	1	3	4	9	20	19	12	0	14	4	5	29	8	7	10
	Enter	5	0	0	0	1	0	0	1	0	1	1	0	0	0	1	0
	Remain	137	0	3	4	9	20	19	12	0	14	14	5	29	8	0	0
	Exit	15	1	0	1	2	1	1	0	0	0	0	0	3	3	3	0
2015	Medal	135	1	3	3	9	15	18	12	1	14	4	5	30	8	6	6
	Enter	13	0	0	0	2	1	1	0	1	0	0	0	6	1	1	0
	Remain	131	0	3	3	8	14	17	12	0	14	14	5	24	5	6	6
	Exit	32	2	0	1	1	6	2	0	0	0	1	0	5	5	5	4
2016	Medal	129	0	3	3	10	11	19	12	0	14	4	5	31	5	5	7
	Enter	11	0	0	1	1	0	1	0	0	1	0	0	7	0	0	0
	Remain	128	0	3	3	9	11	18	12	0	14	14	5	24	4	5	6
	Exit	24	0	0	0	0	4	0	0	1	0	1	0	6	6	6	0
2017	Medal	126	0	2	4	9	24	13	8	0	11	1	2	26	14	6	6
	Enter	17	0	0	1	2	1	1	1	0	1	0	0	8	1	0	1
	Remain	122	0	2	2	10	10	18	11	0	11	11	5	28	5	3	6
	Exit	19	1	1	1	0	1	1	1	0	3	0	0	3	3	3	1

Source: Author's own elaboration

Table 2 provides information about the number of companies that each year are in the medal, enter, exit and remain criteria. The United Kingdom, Netherlands, Spain, France and Italy are the ones with more enterprises in the Yearbook from 2009 to 2012. The United Kingdom achieved its maximum representation in 2009 with 39 inclusions and its minimum in 2017 with just 26.

In the Netherlands, we find a really stable situation regarding the companies included in the Yearbook, from 2009 to 2016 we find that the 14 that started continued and with really poor variation regarding new entrances.

Spain on the other hand started in 2009 with 13 companies in the medal and in 2017 it had 14 companies. Nevertheless, the evolution has not been positive, we can see that from 2010 on there is an annual decrease of Spanish companies in the medal till 2017.

The representation of French companies has varied, in 2010 the inclusions doubled the ones of 2009, and although they had a huge decline in 2016, with just 11 inclusions, in 2017 it is observable an exponential increase leaving the French representation at 24.

From 2013 to 2017 more countries are taking presence in it, like Germany. The case of Germany is particularly striking since they pass from having an insignificant presence on the Yearbook in 2012 with just 3 companies, to have the second-highest presence in 2013 with 20 firms.

As it can be observed, in a general manner, companies that enter in the yearbook one year, remain in it the following years, there are low rates of entrance or exit. This data reveals, that companies tend to remain in the Yearbook by improving their practices year by year, which implies that sustainable companies are consistent with their practices.

3.2.2 Trading volume

The hypotheses are evaluated with the abnormal volume (V_t). For an understanding of this concept, we are going to start explaining the trading volume concept first. Trading volume refers to the shares that are transacted in a period of time. Companies usually have an average trading volume in a determined period. The abnormal volume is used to study the relationship between volume, information, and investors (del Río & Santamaría, 2010). The calculation of the abnormal volume is based on previous publications of Llorente, Michaely, Saar and Wang (2002), Dennis and Strickland (2002) or Covrig and Ng (2004), being the formula used the following:

$$V_{i,t} = \log rotation_{i,t} - \frac{1}{200} \sum_{s=1}^{200} \log rotation_{i,t-s}$$

where the rotation is:

$$\log rotation_{i,t} = \log(100 * rotation_{i,t} + 0,000255)$$

The rotation is measured by dividing the number of negotiated stocks and the number of stocks in circulation. Once the rotation was calculated, the *log-rotation* was done. The abnormal volume formula has the characteristic of having to develop an average of the logarithm of the rotation of the previous 200 days. This means that in order to obtain one abnormal volume, 201 rotations need to be taken into account. The average of the previous 200 rotations to the day studied needs to be done and use the logarithm of rotation of the day studied.

The analysis of the abnormal volume enables us to observe the impact that new market information has on the daily volume of companies in respect with the average volume traded (del Río & Santamaría, 2010).

3.2.3 Control variables

Two more concepts need to be explained before moving to the next section of this paper, the control variables and the year dummies that have been used to test the hypotheses. The dummy year, are variables that are referred to as the year of the data, if we are in 2008, data from 2008 will have a value of 1 and the rest of the years will have a value of 0, therefore, the abnormal volume average will be linked with its corresponding year. The control variables are those that are held constant not to affect the results that we are going to obtain in the regression. The control variable in this paper is the return. The return is referred to as “an entity’s ability to generate earnings or income as compared to its expenses and other relevant costs incurred during a specific period of time” (Cheuk, 2016). This term is linked with efficiency, it is the ability that a firm has to produce a return on investment based on their resources (Süer, 2019), return ratios are done to measure the income (success) that a company has had in a period of time following Weygandt, Kimmel, Kieso (2015). Return data for the event day, the previous day and the next day have been taken to test the hypotheses.

3.3 Methodology

The abnormal volume approach is the one used in this paper in order to test whether the inclusion (medal), exclusion, maintenance or entrance of companies in the ranking of RobecoSam affects firms volume. The categorization of companies will occur once a year,

when the Yearbook is published, to select the scenarios to which each company will pertain in that year, it is needed to compare the previous ranking and the current one.

With a view to know if the sustainable events related to the publication of the ranking of RobecoSam provoke a reaction in investors, which at the same time will be reflected in the market share volume of companies, three different models have been developed.

In the first one, the simplest one, the dummy regarding medal, enter, remain or exit, as well as the abnormal volume of the day studied, and the year dummies have been taken into account. In the second model, we considered the dummy regarding medal, enter, remain or exit, the abnormal volume of the day studied, the year dummies and the profitability of the previous day to the one studied. Finally, in the third model, the most complex one, we considered the dummy regarding medal, enter, remain or exit, the abnormal volume of the day studied, the year dummies and the profitability of the previous day to the one studied as well as the one of the days studied.

We can notice that to each of the models proposed, different variables have been added to the previous model in order to increase the level of complexity of the equations. In Model 1, there is no control variable, we only have the abnormal volume of the dummy year and the dummy regarding the situation studied. In Model 2 we introduce the control variable of return of the previous day, and finally in Model 3, we also find the return of the day studied.

Incrementing the complexity of the models enables us to know whether the inclusion of variables affects the results. By developing the calculations in different steps, it can be seen how each variable impact the result and how consistent are the variables that we have in Model 1 and 2, that are the ones repeated also in Model 3.

$$\text{Model 1: } V_{i,t+1} = \sum \alpha_{i,k} D_{k,t+1} + \beta_{i1} * DY_i$$

$$\text{Model 2: } V_{i,t+1} = \sum \alpha_{i,k} D_{k,t+1} + \beta_{i1} * DY_i + |r_{it}|$$

$$\text{Model 3: } V_{i,t+1} = \sum \alpha_{i,k} D_{k,t+1} + \beta_{i1} * DY_i + |r_{it}| + |r_{it+1}|$$

In these models, we find $V_{i,t+1}$, that stands for the abnormal volume of firm i of the following day to the one studied ($t+1$). $D_{k,t+1}$, is the one that we have called year dummy above, this variable will take the value of 1 when we are in the year k and 0 in the rest of the years. DY_i is the variable that will take value 1 when the firm i is included in the Yearbook in year k , in either medal (DM_i), enter (DE_i), exit (DX_i) or remain (DR_i) category. $|r_{it}|$ variable

stands for the absolute value of the return of firm i of the previous day to the one studied, and $|r_{it+1}|$ is referred to the absolute value of the return of the day studied.

Each of the three models presented above is used for four different independent variables, being those medal, enter, exit and remain. To make it simpler and not to write all the equations used, the four independent variables have been collected in just one, that has been called DY_i . In other words, each model is going to be performed for the four independent variables, having though 12 different equation.

For each model, a regression analysis, and t-test analysis has been made. In this paper, the linear regression is going to be used, which is known as Ordinary Least Squares (OLS). Indeed, a multiple linear regression analysis (MLR); a multiple linear regression analysis, is a statistical regression that has more than one explanatory variables in order to predict the reaction of the response variable.

4. EMPIRICAL EVIDENCE

4.1 Descriptive statistics

The abnormal volume (V_t) was calculated for the 203 companies from 2009 to 2017, and data from the event day, the previous day and the next day was selected from the whole calculations. “Event day” is referred to the day when the Yearbook was published, then the next and the previous day would be selected depending on the event date. In table 3 and 4, we have presented some statistical measures such as the average, the median, the mode, the standard deviation, and the kurtosis of all the abnormal volume and return values we had from 2009 to 2017, that is, the whole-time frame studied. Moreover, the distinction between the medal, enter, exit and maintenance of companies are kept, thus a general statistical view of the scenarios mentioned is provided. The information has been divided depending on if the data is of sustainable companies or if it is of non-sustainable companies.

On the other hand, in tables 5,6,7 and 8 it is presented the average of the total abnormal volumes of companies that enter, exit, remain and were in the Yearbook for each year from 2009 to 2017. In each of the mentioned tables, we have, as in table 3 and 4, distinguish between sustainable and non-sustainable companies. In these tables, we can see the average and the t-test calculations results. Statistical data supporting that both means are not equal is relevant to continue this research since it would mean that there is a difference between the abnormal volume of sustainable and non-sustainable companies.

Table 3: Statistical descriptions of the 203 companies' abnormal volume for years 2009-2017.

	Medal									
	Average		Median		Mode		Standard Deviation		Kurtosis	
	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust
Day-1	0.9941	0.7914	0.8136	0.7307	0.3074	0.3074	0.7468	0.5496	2.4235	5.5753
Day	0.9943	0.7915	0.8134	0.7320	0.3074	0.3074	0.7466	0.5497	2.4217	5.5802
Day+1	0.9950	0.7919	0.8147	0.7338	0.3074	0.3074	0.7470	0.5497	2.4199	5.5727
	Enter									
	Average		Median		Mode		Standard Deviation		Kurtosis	
	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust
Day-1	0.8333	0.9325	0.7751	0.7905	0.3074	0.3074	0.5846	0.7002	4.8904	3.2668
Day	0.8337	0.9326	0.7761	0.7916	0.3074	0.3074	0.5846	0.7001	4.8846	3.2649
Day+1	0.8345	0.9332	0.7770	0.7917	0.3074	0.3074	0.5851	0.7004	4.8789	3.2640
	Remain									
	Average		Median		Mode		Standard Deviation		Kurtosis	
	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust
Day-1	1.0143	0.7991	0.8216	0.7415	0.3074	0.3074	0.7625	0.5562	2.1695	5.3824
Day	1.0144	0.7992	0.8215	0.7408	0.3074	0.3074	0.7623	0.5563	2.1679	5.3846
Day+1	1.0151	0.7997	0.8217	0.7436	0.3074	0.3074	0.7627	0.5564	2.1666	5.3779
	Exit									
	Average		Median		Mode		Standard Deviation		Kurtosis	
	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust
Day-1	0.8567	0.9307	0.7621	0.7900	0.3074	0.3074	0.6049	0.6991	5.0602	3.2774
Day	0.8568	0.9308	0.7616	0.7913	0.3074	0.3074	0.6051	0.6990	5.0768	3.2748
Day+1	0.8569	0.9314	0.7631	0.7917	0.3074	0.3074	0.6044	0.6994	5.0667	3.2734

Source: Author's own elaboration.

In table 3 we can see how the average abnormal volume increases, from the previous day to the next day, and how the average abnormal volumes are higher in the medal and remain scenarios in comparison with the ones of enter and exit. Indeed, the remain average is higher than the one of medal.

The median shows the higher value of the whole series of abnormal volume depending on the scenario studied. The highest abnormal volumes are obtained in the medal and remain scenarios of companies classified as sustainable. This means that companies that fulfil these two characteristics have a greater abnormal volume, suggesting that investors value the fact of being on the medal and remaining on it.

The mode provides information about the most repeated value of the data, and as we can see its value is 0.307, meaning that the most repeated abnormal volume value is 0.307. By comparing it with the average values we can see that the mode is much smaller, suggesting that the abnormal volumes of the sample studied are variated, some companies have a high abnormal volume, meanwhile, others do not.

Regarding the standard deviation, the statistical measure that informs about the distance that there is between the mean and the rest of the values of the sample, we can say that it is moving between medium and high values. Having a medium-high standard deviation means that there is dispersion between the abnormal volume's values and its mean value.

Finally, when looking at the kurtosis value, we can see how we have different results. On the one hand, we can see how the medal and the remain scenarios have similar results; firms classified as sustainable, present a normal distribution, suggesting the data is in the middle of the distribution. On the other hand, the non-sustainable ones with a value of 5 suggest that their values are on the tails of the distribution, not in the middle. The kurtosis of the “entry” scenario of sustainable companies suggests that its values are on the tails of the distribution, and, on the contrary, the ones classified as non-sustainable are located in the middle. The same situation applied in the scenario of “exit”.

Table 3 presents a general idea about how the abnormal volume is higher when we are talking about medal and remain criterion and how when there is an exit or entry the investors seem to penalize the company. In addition, we can see how the data achieved from the calculation of the abnormal volumes are spread from the mean and how are distributed along with the whole normal distribution.

Table 4: Statistical descriptions of the 203 companies' return for years 2009-2017.

	Medal									
	Average		Median		Mode		Standard Deviation		Kurtosis	
	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust
Day-1	0.0143	0.0148	0.0100	0.0106	0.0000	0.0000	0.0156	0.0198	13.7288	123.4223
Day	0.0143	0.0142	0.0100	0.0080	0.0000	0.0000	0.0168	0.0188	65.9319	9.6488
Day+1	0.0137	0.0148	0.0089	0.0103	0.0000	0.0000	0.0149	0.0145	11.4038	5.5139
	Enter									
	Average		Median		Mode		Standard Deviation		Kurtosis	
	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust
Day-1	0.0156	0.0144	0.0096	0.0102	0.0000	0.0000	0.0157	0.0173	3.3749	84.5547
Day	0.0140	0.0139	0.0104	0.0086	0.0000	0.0000	0.0146	0.0177	9.8925	41.7819
Day+1	0.0141	0.0142	0.0107	0.0100	0.0000	0.0000	0.0138	0.0148	9.2946	9.4483
	Remain									
	Average		Median		Mode		Standard Deviation		Kurtosis	
	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust
Day-1	0.0147	0.0142	0.0106	0.0092	0.0000	0.0000	0.0176	0.0166	118.5951	12.4519
Day	0.0137	0.0142	0.0088	0.0084	0.0000	0.0000	0.0170	0.0181	69.3749	9.9506
Day+1	0.0141	0.0144	0.0101	0.0100	0.0000	0.0000	0.0143	0.0154	12.3062	6.3197
	Exit									
	Average		Median		Mode		Standard Deviation		Kurtosis	
	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust	Sust	Non-sust
Day-1	0.0138	0.0146	0.0108	0.0101	0.0000	0.0000	0.0151	0.0173	5.7344	83.5008
Day	0.0181	0.0126	0.0118	0.0084	0.0000	0.0000	0.0201	0.0161	5.1630	69.6460
Day+1	0.0168	0.0140	0.0112	0.0100	0.0000	0.0000	0.0189	0.0144	6.2523	9.6665

Source: Author's own elaboration.

In table 4 we can see how the average return of corporations does not follow a pattern, for example in the medal scenario we can see how the return of the next day is inferior to the one of the event day. On the contrary, in the remain scenario we can see how the previous day has the greatest figure, and in the event day the lowest one. Surprisingly, companies that are excluded from the Yearbook have the greatest return on the publication day of the ranking.

The median values are equally surprising, we find that the highest return values are in those companies that leave the Yearbook. In the medal scenario, we can see how the figures of the non-sustainable companies are higher in the previous and the next day but how in the event day one of the sustainable companies excels the non-sustainable ones. On the other hand, in the remain scenario, sustainable companies show greater figures than non-sustainable ones. Finally, in the enter scenario, the figures are higher for the sustainable companies in the event and the next day but not in the previous day.

By looking at the mode values, we can see how for all the scenarios studied the most repeated value is 0. By comparing it with the average values we can see that the mode is smaller, suggesting, once again that the returns of the sample studied are varied.

Regarding the standard deviation we can say that most of the values of the sample are near the average since the standard deviation it is not high, it is really low.

Finally, when looking at the kurtosis values, large figures appear. The large figures suggest that the return values are on the tails of the distribution. Moreover, it is observable that the dispersion of non-sustainable companies is higher than the one of sustainable ones. The scenarios with less dispersion in the sustainable companies are the ones of entry and exit; this could mean that the return of companies in those scenarios is usually the same. Another conclusion that can be taken by looking at the kurtosis is that for the non-sustainable companies' scenarios, the next day kurtosis is always the lowest one. This implies that the next day return values are more in the middle of the distribution meanwhile the previous and the event day ones are more in the tails.

Table 4 presents a general idea about how the return values move in each of the different scenarios. In contrast to the conclusion achieved in table 3, with the abnormal volume, the return does not seem to have a pattern. Nevertheless, we can say that the exit results are the most shocking ones.

Table 5: Average abnormal volume of companies sustainable and non-sustainable classified as “Medal” per year.

	Medal								
	Sustainable			Non sustainable			T-test		
	Day-1	Day	Day+1	Day-1	Day	Day+1	Day-1	Day	Day+1
2009	0.7460	0.7463	0.7467	0.6389	0.6390	0.6393	0.2554	0.2547	0.2544
2010	0.9204	0.9210	0.9215	0.6649	0.6655	0.6660	0.0029	0.0028	0.0028
2011	0.9953	0.9953	0.9963	0.7270	0.7273	0.7282	0.0023	0.0023	0.0023
2012	1.0048	1.0045	1.0083	0.6436	0.6433	0.6452	0.0000	0.0000	0.0000
2013	1.0143	1.0151	1.0156	0.8361	0.8369	0.8374	0.0389	0.0388	0.0388
2014	1.0393	1.0396	1.0403	0.9340	0.9343	0.9351	0.2773	0.2777	0.2781
2015	1.0745	1.0746	1.0745	0.8912	0.8914	0.8911	0.0557	0.0557	0.0555
2016	1.0496	1.0490	1.0486	0.8608	0.8598	0.8593	0.0476	0.0469	0.0468
2017	1.0872	1.0873	1.0871	0.9490	0.9490	0.9484	0.1793	0.1793	0.1777

Source: Author’s own elaboration.

Table 5 shows how the average abnormal volume of sustainable companies that are classified as “Medal” in general increases as we move from day-1 to day+1. The same applies to non-sustainable companies, the abnormal volume increases with the pass of the days. The t-test values reveal how for some years, the means of the abnormal volume of sustainable and non-sustainable companies are different, and how for others it does not seem to be different.

The t-test seems to be favourable, meaning that the means are different between both types of companies, in 2010, 2011, 2012, 2015 and 2016 and non-favourable for the rest (2009, 2013 and 2017). It can be said that there is more evidence suggesting the difference of means than the equality of both, thus, we can say that the average abnormal volumes of sustainable and non-sustainable companies are different.

Table 6: Average abnormal volume of companies sustainable and non-sustainable classified as “Enter” per year.

	Enter								
	Sustainable			Non sustainable			T-test		
	Day-1	Day	Day+1	Day-1	Day	Day+1	Day-1	Day	Day+1
2009	0.4575	0.4574	0.4575	0.7260	0.7263	0.7267	0.0006	0.0006	0.0006
2010	0.9568	0.9574	0.9577	0.8198	0.8204	0.8209	0.4520	0.4519	0.4524
2011	0.8150	0.8154	0.8162	0.9088	0.9089	0.9099	0.4182	0.4200	0.4199
2012	1.1341	1.1345	1.1393	0.8667	0.8663	0.8694	0.2192	0.2179	0.2174
2013	0.5444	0.5452	0.5462	0.9959	0.9967	0.9972	0.0002	0.0002	0.0002
2014	0.9108	0.9113	0.9125	1.0104	1.0106	1.0113	0.1637	0.1654	0.1675
2015	0.9615	0.9623	0.9620	1.0164	1.0166	1.0164	0.7787	0.7814	0.7807
2016	0.9624	0.9622	0.9621	0.9824	0.9817	0.9812	0.9206	0.9226	0.9240
2017	0.8120	0.8120	0.8119	1.0476	1.0477	1.0473	0.0231	0.0232	0.0234

Source: Author’s own elaboration.

In table 6 we can see how the average abnormal volume of sustainable companies that are classified as “Enter” in general increases as we move from day-1 to day+1. The same applies to non-sustainable companies, the abnormal volume increases with the pass of the days. The

t-test seems to be favourable in the “enter” case in the years 2009, 2013 and 2017 and non-favourable for the rest. We can notice how the conclusions that can be reached with the t-test of table 5 and 6 are the opposite. Meanwhile, in table 5 we can say that the years 2010, 2011, 2012, 2015 and 2016 are the ones in which the mean is different between both types of companies, in table 6 we find that those years are 2009, 2013 and 2017.

It can be said that it is not enough evidence suggesting the difference of means; thus, in this case, we have to say that the average abnormal volumes of sustainable and non-sustainable companies are equal.

Table 7: Average abnormal volume of companies sustainable and non-sustainable classified as “Remain” per year.

	Remain								
	Sustainable			Non sustainable			T-test		
	Day-1	Day	Day+1	Day-1	Day	Day+1	Day-1	Day	Day+1
2009	0.7883	0.7887	0.7892	0.6080	0.6081	0.6084	0.0532	0.0529	0.0527
2010	0.9118	0.9125	0.9130	0.7474	0.7480	0.7485	0.0769	0.0767	0.0765
2011	1.0149	1.0148	1.0158	0.7407	0.7411	0.7420	0.0020	0.0020	0.0020
2012	0.9910	0.9906	0.9943	0.7224	0.7221	0.7245	0.0020	0.0021	0.0021
2013	1.0798	1.0806	1.0810	0.7749	0.7756	0.7762	0.0005	0.0005	0.0005
2014	1.0550	1.0551	1.0558	0.9293	0.9296	0.9305	0.1524	0.1530	0.1538
2015	1.0855	1.0856	1.0854	0.9019	0.9023	0.9020	0.0528	0.0530	0.0528
2016	1.0576	1.0570	1.0566	0.8732	0.8723	0.8718	0.0548	0.0543	0.0543
2017	1.1136	1.1137	1.1135	0.9319	0.9319	0.9313	0.0696	0.0696	0.0690

Source: Author’s own elaboration.

In table 7 we can see how like in the previous tables, the average abnormal volume of both companies, in general, increases as we move from day-1 to day+1. In this case, the “remain” case, we can see how the t-test is favourable for all the years except in 2014. Thus, we can say that the average abnormal volumes of sustainable and non-sustainable companies are different.

Table 8: Average abnormal volume of companies sustainable and non-sustainable classified as “Exit” per year.

	Exit								
	Sustainable			Non sustainable			T-test		
	Day-1	Day	Day+1	Day-1	Day	Day+1	Day-1	Day	Day+1
2009	0.5930	0.5930	0.5933	0.7164	0.7167	0.7170	0.3759	0.3749	0.3746
2010	0.6920	0.6924	0.6925	0.8481	0.8487	0.8492	0.1106	0.1098	0.1086
2011	0.7049	0.7058	0.7071	0.9209	0.9209	0.9219	0.0256	0.0262	0.0265
2012	0.7056	0.7054	0.7076	0.8940	0.8937	0.8969	0.0947	0.0946	0.0945
2013	1.1849	1.1859	1.1866	0.9426	0.9434	0.9438	0.2237	0.2233	0.2227
2014	1.2382	1.2380	1.2386	0.9979	0.9982	0.9989	0.3376	0.3389	0.3388
2015	0.8105	0.8109	0.8103	1.0390	1.0392	1.0391	0.0770	0.0771	0.0764
2016	0.9396	0.9385	0.9378	0.9849	0.9842	0.9838	0.7895	0.7875	0.7859
2017	1.0710	1.0708	1.0685	1.0319	1.0320	1.0318	0.8755	0.8767	0.8832

Finally, in table 8 we can see how like in the previous tables, the average abnormal volume of both companies, in general, increases as we move from day-1 to day+1. Regarding the t-test, we can see how, as in the “entrance table” (table 6), we do not have the majority of years t-test supporting that the means between sustainable and non-sustainable countries are different. In this case only the t-test of years 2011, 2012 and 2015 support that both means are not equal, thus, we cannot defend the difference of average, then we suggest that both means are equal.

The tables reveal that the abnormal volume of those firms that remain in the Yearbook are higher than the ones that do not. This tendency is repeated oppositely for those that leave the Yearbook; the abnormal volume of those leaving is lower than that of the ones that stay. Nevertheless, a previously discovered result appears to be consistent in this research, entering in the book does not provide every year a higher abnormal volume. Only in two of the nine years studied, 2010 and 2012, we can see that entering in the Yearbook increases the abnormal volume.

After analysing the results of these tables, we can see how the abnormal volume of companies increases when we are moving from the previous day to the next day. On the other hand, as we suspected when we evaluated the results of table 3, the most consistent data are the ones regarding medal and remain, meanwhile the ones regarding enter and exit differ depending on the years studied. The conclusions stated to follow the mindset that we had before developing the research, and also correspond with the results of previous researchers.

4.2 Results

This subsection is presenting the results obtained in the regressions made for each scenario mentioned. In each table the variables coefficients as well as p-values are shown, these values have been calculated through a multiple linear regression model.

For each independent variable three different days have been analysed, the event day, the previous day and the next day. This means that for the different independent variables, three different scenarios are going to be presented. These three days have been analysed to observe if the abnormal volume of the sample varies during these days and at the same time, to see if the abnormal volume evolution is positive or on the contrary, it is negative. The distinction of these three days is linked with the control variables proposed in the models, the return. As explained, two different returns are going to be used, the one referring to the day studied, which can be the previous, the next or the event day and the one referred to the previous day to the one studied.

Each of the results tables (9,10,11 and 12) follow the same structure; in the columns, the day to which the calculation is referred is located, being those “the event day”, the day in which the Yearbook is published, “the previous day”, meaning the previous day to the publication day, and “the next day”, referring to the day after the publication. Notice, that the starting point is the event day, and from that day, the other two days have been built. Behind those big columns, there is a subdivision where “Model 1”, “Model 2”, and “Model 3” will be written. In other words, the just mentioned first and big columns are at the same time subdivided into these three columns, let’s call them Model columns. These “Model columns” refer to the models that have been purposed to test the hypotheses mentioned at the beginning of the paper.

The number of rows with data is going to vary due to the introduction of more variables in each model. Model 1 is the simplest one, with fewer variables studied, and Model 3 is the more complex one, with most variables studied. To clarify, not all the cells of each table are going to be filled due to the introduction of new variables in each of the Models. In the first row, it is the variable called “Dummy”. This variable represents if the entrance, maintenance, appearance, or exit of companies is studied. In the title of the different tables, this information will be specified.

Next, the r_{t-1} variable appears from Model 2 on, and it indicates the return that each company has on average the previous day to the one studied. For example, if we are in the column regarding “the previous day” as well as in the cells of Model 2 (remember that in Model 1, there is no variable assigned to return, leaving this cell in blank) the variable r_{t-1} , is referred to the event day minus two days. The same logic would be applied to the rest of the days, notice that the starting point will be the day that is written at the top of the column section. After this variable it is the similar one r_t , it represents the return of the company in the day studied. Following the same example as before, if we are in the previous day section of Model 2, this variable is referring to the average return of the day before of each company.

The intercept is a variable calculated by R-commander; it reveals the expected mean of the response variable, in our hypotheses, the abnormal volume, when all the explanatory or independent variables equal zero.

The one called “Dummy of years” as the name indicates, and as it is explained in other sections of the paper is going to take value 1 whenever we are in the same year to the one studied and 0 whenever the year studied it is not the one in which we are on the data. If we

are studying the exit of companies in 2009, the dummy regarding 2009 will take value 1 and the rest of the years studied, (from 2010 to 2017) will take value 0.

The R^2 variable is a statistical tool used to predict future results, it enables to know how good the future results can be predicted. R^2 is a percentage that represents the variability of the model, as a percentage, its value will be from 0 to 100 and the higher its value, the better for the model, since this would mean that the model is well adjusted to the data.

The number of observations means the size of the sample worked, the total of companies that are worked in this paper are 203, and for that reason, 203 is the number shown in those rows.

Table 9: Calculations referring to the three model for the Medal criterion.

	The previous day			The event day			The next day		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Dummy	0.1987 (0.0000)	0.1990 (0.0000)	0.2002 (0.0000)	0.1988 (0.0000)	0.2002 (0.0000)	0.1992 (0.0000)	0.1991 (0.0000)	0.1988 (0.0000)	0.1988 (0.0000)
Rt-1		-0.7806 (0.5015)	-0.5407 (0.649)		-1.0527 (0.2852)	-0.4972 (0.6229)		-3.1084 (0.0101)	-3.0443 (0.0171)
Rt			-0.9461 (0.3484)			-2.9585 (0.0177)			-0.1725 (0.8708)
Intercept	0.5825 (0.0000)	0.5967 (0.0000)	0.6163 (0.0000)	0.5827 (0.0000)	0.6094 (0.0000)	0.6438 (0.0000)	0.5829 (0.0000)	0.6338 (0.0000)	0.6378 (0.0000)
Dummy of years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.0392	0.0394	0.0399	0.0392	0.0398	0.0428	0.0391	0.0425	0.0426
N° of observations	203	203	203	203	203	203	203	203	203

Source: Author's own elaboration.

Table 9 studies the scenario regarding the Medal, or equivalently, the appearance on the Yearbook of each company. This table is related to the first Hypothesis stated in the paper.

First of all, we are going to be focused on the Dummy regarding medal and on the implications that the values obtained with this variable have. To analyse the results obtained, the table column order is going to be followed, starting from the previous day results, and ending with the next day ones, as well as from Model 1 to Model 3.

By looking at the previous day results, we can see how the dummy variable is relevant for the model as its p-value is smaller than 0.10. The fact that the dummy regarding medal is relevant for the model is crucial for the study since in the end, it is the most important variable of this model. Moreover, if we look at the coefficients that it has, we can see how all of them are positive, this implies that if the dummy variable increases (from 0 to 1), the abnormal volume will increase too. Thus, there is a positive relationship among both variables.

In the event day, we can see how for the three Models, the p-value is smaller than 0.10, thus, the dummy medal continues being significant and it can be observed how once again the three coefficients are positive, then, the increase of the dummy variable medal will increase the abnormal volume of the event day.

After analysing the dummy variable, we are going to analyse the control variables of the models, that is, the return variables. The same order as before is applied for the explanations.

After analysing the dummy variable, we are going to analyse the control variables of the models, that is, the return variables. The same order as before is applied for the explanations.

In the previous day, nor the return variable of the day nor the one of the previous day are relevant for neither model. On the event day it is observable how the return of the day studied is significant with a p-value of 0.018, nevertheless, the return of the previous day continuous being irrelevant. Finally, on the next day we observe the opposite scenario to the one observed in the event day, the previous day return, the one regarding the event day, it is relevant although the one of the days studied it is not.

In a nutshell, the first Hypotheses proposed, as suspected it is rejected. It has been proved how the dummy variable Medal, is significant in all the scenarios and Models proposed.

Table 10: Calculations referring to the three model for the Entry criterion.

	The previous day			The event day			The next day		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Dummy	-0.0859 (0.1622)	-0.0856 (0.1635)	-0.0847 (0.1685)	-0.0857 (0.1632)	-0.0845 (0.1693)	-0.0832 (0.0000)	-0.0854 (0.1646)	-0.0833 (0.1749)	-0.0833 (0.1751)
Rt-1		-0.6726 (0.5659)	-0.4965 (0.6791)		-0.7919 (0.4254)	-0.2237 (0.8264)		-3.1064 (0.0112)	-3.0468 (0.0180)
Rt			-0.6932 (0.4958)			-3.0346 (0.0159)			-0.1604 (0.8809)
Intercept	0.7116 (0.0000)	0.7240 (0.0000)	0.7388 (0.0000)	0.7118 (0.0000)	0.7325 (0.0000)	0.7671 (0.0000)	0.7122 (0.0000)	0.7628 (0.0000)	0.7665 (0.0000)
Dummy of years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.0218	0.0220	0.0223	0.0218	0.0221	0.0253	0.0217	0.0251	0.0251
N° of observations	203	203	203	203	203	203	203	203	203

Source: Author`s own elaboration.

In the following table, table 10, the scenario studied is regarding the entrance criteria. As a reminder, this paper has categorized companies as entrance whenever the company has entered the Yearbook in the current year, and it was not in the one of the previous years. This table is related to the second Hypothesis stated in the paper.

As we have done before, the first results analysed are the ones regarding the entrance Dummy; the table column order is going to be followed, starting from the previous day results, and ending with the next day ones.

The previous day results reveal how the p-value of the dummy entry is not relevant for the model. This means, that the fact that a company enters in the Yearbook it is irrelevant and thus, that the abnormal volume is not affected. On the other hand, we can observe how all the coefficients of the dummy are negative, just the opposite case of the one we have just shown in table 9. Having negative coefficients imply that in the case that the dummy variable “enter” increases, the abnormal volume of our dependent variable, our “y”, will be reduced. This implies that not only the entrance dummy is irrelevant, but also that it reduces the abnormal volume.

In the event days results, the same scenario appears, the dummy is not relevant since the p-value is higher than 0.10, but also, we can see how all the coefficients are negative.

Finally, the next day, as we were suspecting, just the same happens, the dummy variable is not significant and the coefficients are negative, then, the abnormal volume will be reduced in the case that the dummy variable increases.

Moving to the control variables, we can see how in the previous day scenario, the return (nor the one of the previous day, nor the one of the day studied) are relevant. In the event day we can see how the return of the day is relevant but the one of the previous day it is not and finally, in the next day results we can observe how the return of the previous day is relevant, but the one of the days studied it is not.

We can see how, the return results seem to have a pattern, the ones referring to the event day are relevant for the model meanwhile the rest are irrelevant. We conclude by saying that with these results we have no evidence to reject the second hypothesis, so the entrance in the Yearbook does not affect its abnormal volume.

Table 11: Calculations referring to the three model for the Exit criterion.

	The previous day			The event day			The next day		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Dummy	-0.0712 (0.2430)	-0.0717 (0.2399)	-0.0728 (0.2329)	-0.0712 (0.2429)	-0.0726 (0.2339)	-0.0637 (0.2969)	-0.0716 (0.2405)	-0.0874 (0.2014)	-0.0868 (0.2049)
Rt-1		-0.7022 (0.5490)	-0.5104 (0.6706)		-0.8568 (0.3886)	-0.2968 (0.7711)		-2.9770 (0.0410)	-2.8778 (0.0528)
Rt			-0.7557 (0.4578)			-2.9669 (0.0187)			-0.4102 (0.7330)
Intercept	0.7122 (0.0000)	0.7245 (0.0000)	0.7408 (0.0000)	0.7117 (0.0000)	0.7343 (0.0000)	0.7673 (0.0000)	0.7122 (0.0000)	0.7623 (0.0000)	0.7726 (0.0000)
Dummy of years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.0215	0.0217	0.0220	0.0215	0.0219	0.0249	0.0213	0.0256	0.0256
N° of observations	203	203	203	203	203	203	203	203	203

Source: Author's own elaboration.

Table 11 shows the Exit criterion results; a company classified as exit, is the one the previous year was included in the Yearbook, but that in the current one it is not. This table is related to the third Hypothesis stated in the paper.

In this case, the same order as in the previous one will be followed, then, regarding the dummy variable exclusion, in the previous day scenario, we can see how we are in the same position as in the entrance table, table 10. The exit dummy is not relevant for the model since the p-values are surrounding the 0.2 value. Similarly, the coefficients are also negative, stating that the exit dummy will negatively affect the abnormal volume of the previous day. It can be said that the fact that the exit of a company from the Yearbook will affect negatively the abnormal volume is a result that was expected from the beginning of the research and that now, we can ensure that it is true.

If we observed the results obtained on the event day we can see how the dummy continuous being irrelevant for the model and how the negative coefficient persists.

Finally, the next day scenario shows just the same as the previous ones, the exit variable is irrelevant and the coefficient is negative, which implies that an increase in this variable will reduce the abnormal volume.

If we look at the rest of the variables, we can see how the return is only relevant in the case that it is referred to as the event day. This means that the return that is used in the previous day scenario continuous being irrelevant, in the event day the return of the day studied is the relevant one and, finally, regarding the following day, the relevant return is the one of the previous day.

We can conclude by saying that this table results reveal that as in the enter table results, the third hypothesis is not rejected since there is no evidence supporting that the abnormal volume is affected by the exit of companies from the Yearbook.

Table 12: Calculations referring to the three model for the Remain criterion.

	The previous day			The event day			The next day		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Dummy	0.2077 (0.0000)	0.2079 (0.0000)	0.2086 (0.0000)	0.2077 (0.0000)	0.2085 (0.0000)	0.2073 (0.0000)	0.2079 (0.0000)	0.2071 (0.0000)	0.2071 (0.0000)
Rt-1		-0.7563 (0.5141)	-0.5351 (0.6521)		-0.9766 (0.3204)	-0.4282 (0.6713)		-3.0519 (0.0118)	-2.9912 (0.0189)
Rt			-0.8710 (0.3870)			-2.9217 (0.0190)			-0.1633 (0.8774)
Intercept	0.5933 (0.0000)	0.6071 (0.0000)	0.6255 (0.0000)	0.5935 (0.0000)	0.6187 (0.0000)	0.6527 (0.0000)	0.5938 (0.0000)	0.6441 (0.0000)	0.6479 (0.0000)
Dummy of years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.0425	0.0428	0.0432	0.0425	0.0430	0.0459	0.0424	0.0457	0.0457
N° of observations	203	203	203	203	203	203	203	203	203

Source: Author's own elaboration.

The last table (table 12) shows the Remain criterion. This criterion reflects that the company has been in the previous and in the current publication of the Yearbook. This table is related with the fourth Hypothesis stated in the paper.

The remain dummy variable in the previous day scenario is relevant having all the p-values smaller than 0.10. On the other hand, we can see how the coefficients of the dummy are positive, this implies that, once again, there is a positive relationship between the abnormal volume and the dummy remain. In this case, if the dummy increases also will dependent variable, that is the abnormal volume.

On the event day, we can see that the dummy is relevant for all the Models studied and that the coefficient is positive too.

The same applies for the next day scenario studied, the dummy is relevant and due to the positive value that the coefficient has, the abnormal volume will be increased whenever the dummy increases.

The results that we have obtained regarding the remain scenario match with the results that previous literature stated with their studies developed with the abnormal return as main the variable.

Regarding the control variables, we can see how the conclusions that arrive with the previous tables are repeated. Only the return that is linked with the event day is relevant in all the models. As before the previous day scenario return is not relevant for any of the cases, in the event day only the return referred to that day is relevant, and finally, the previous day return in the next day scenario is relevant.

In conclusion, in this case, we have evidence enough to say that the hypothesis is rejected, meaning that the abnormal volume of companies is affected by the maintenance of those in the Yearbook.

5. DISCUSSION AND CONCLUSION

The main aim of this study is to analyse if entering, remaining, exiting or being in the Yearbook affects or not to the abnormal volume of companies. The Yearbook is an annual report published by RobecoSam, a ranking measuring the level of sustainability of the best 15% companies of each sector.

To do so, different models have been developed in which the main variables were the abnormal volume, the case studied (enter, exit, remain or medal), the dummy years, and the return of the companies studied. The results reveal how the abnormal volume of firms is

positively affected by being included in the Yearbook (medal) and by the maintenance of companies in the Yearbook (remain), but it is negatively affected when companies are excluded (exit) and enter.

This result is in accordance with previous studies as the one of Hawn et.al, (2018), in which they discovered a benefit for companies that remained on the index, and they also suggested that only the entrance on the indexes was not enough for the firm to get a benefit. Del Río et.al, (2020) in their study revealed that positive abnormal returns were linked with persistence and inclusion in the Yearbook. Indeed, both papers support that the exclusion of the ranking is not significant for, in their study, the abnormal return of companies.

We can conclude that companies that remain in the Yearbook, the ones that keep their appearance constant year to year, find their abnormal volume affected. This result implies that companies should try to remain in the Yearbook rather than just entering on it if they want to see some effect on their volume. Remaining in the Yearbook implies that entities will have to invest money in Socially Responsible Investments and improve their performance on the areas that are graded for the election of firms that will appear, in this paper, on the Yearbook. Furthermore, if companies invest more to have a more sustainable performance, they will also enhance the Sustainable Development Goals (SDG) achievement. Companies are by far the ones that pollute more the environment and, in some cases, do not respect the human rights of their employees, thus, by performing more sustainably the achievement of the SDG objectives would be closer. This final degree work demonstrates the impact that staying in the ranking has on the volume of companies, thus it can be a good incentive for companies to turn into more sustainable practices.

It is also demonstrated that depending on the case in which we find the company (included, excluded, maintained) we find different reactions regarding volume. Finally, and reiterating the idea of del Río et.al, (2020), sustainable agencies should include in their studies the evolution that companies that have been included in their reports have to do so during a period of time. This idea is supported by the results obtained with the remain scenario. Investor's value the compromise of companies with sustainability, thus, including this data on the reports would be interesting.

On the other hand, this paper only uses the data of European companies that are included in RobecoSam's Yearbook excluding the rest of the rating agencies as well as the non-European entities. Future studies on the current topic are therefore recommended.

In summary, for the informants in this study, it can be said that investors value the efforts that organizations make to pertain to sustainable rankings. Thus, sustainability is not only a goal that is trying to be achieved by the United Nations members through the SDG, but also a relevant feature that investors seek in companies.

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