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Additional Information

Do irresponsible corporate activities prevent membership in sustainable stock indices? The case of the Dow Jones Sustainability Index World.

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Abstract

The study analyses the real-life results from the DJSI World selection process and investigates whether companies are treated differently because of sectoral or geographical diversification needs of the index; furthermore, the question whether its methodology penalises ESG-related irresponsible corporate activities is investigated. The last is an important issue, as it is not unusual to find constituents of sustainable indices implicated in corporate scandals. This is a striking fact, contradicting the ethical and sustainable imperative such companies are supposed to comply with. The authors scrutinise data from a data panel containing 2872 firms between 2011 and 2016 and estimate a variety of logit models. The empirical evidence indicates that ESG-related controversies affect the probability to be included in the DJSI World. Surprisingly, whilst controversy-implicated companies which are already index members were penalised, the likelihood of selection for those companies which have not been selected for the index yet, remained unchanged.

Keywords: Controversy; Negative screening; Corporate social responsibility; Social rating agency; Sustainable investment

1. Introduction

Socially responsible investment has attracted a lot of attention in contemporary finance research and practice. Its robust segment growth during the past decades is primarily fuelled by its ever-expanding attraction for retail investors: Between 2016 and 2018 assets managed by sustainable investment strategies increased by 34 per cent in the major investment markets (i.e., Australia and New Zealand, Canada, Europe, Japan and the United States) with assets under management on sustainable investment strategies reaching \$30.7 trillion in 2018 (Global Sustainable Investment Alliance, 2018).

This growth prompted the development of new financial products on a “sustainable”, “ethical” or “socially responsible” footing. Such products exclusively select stocks by applying environmental, social and governance (ESG) principles, hence servicing retail investors to whom ESG principles appeal. Stock selection strategies for sustainable financial products are diverse and have evolved in the last decades, from simple negative screening approaches, which deselect specific corporate activities, to sophisticated positive screening and impact strategies or a combination thereof.

Sustainable stock indices were developed as benchmarks for sustainable investment products, such as mutual or pension funds. In addition to being important benchmarks in terms of their risk and return profile, they also function as a blueprint for identifying eligible sustainable companies for these portfolios.

Companies usually refer to their inclusion in sustainable stock indices as evidence of their ESG credentials and utilise memberships in sustainable indices to attract potential clients and retail investors (Scalet & Kelly, 2010).

Social rating agencies select stocks for sustainable stock indices on the basis of complex, rigorous criteria often examining hundreds of variables. Nevertheless, it is puzzling that a multitude of companies listed in these indices are entangled in scandals surrounding unsustainable, non-ESG related behaviour. Some of these scandal-ridden companies have been shown to even break the law. In fact, Espinós-Vañó and García (2018) unveiled how the responsible behaviour of Spanish companies listed in the Spanish sustainable index FTSE4Good IBEX was questioned by prestigious NGOs. In other study (Espinós-Vañó, 2019) it is concluded that most Spanish companies which are defined as sustainable and are even included in the index FTSE4Good IBEX had been fined several times for non-compliance with the European legislation. Regarding the index DJSI world, which is the index analysed in our study, 10% of its components were developing irresponsible activities in 2016 (Iván Arribas, Espinós-Vañó, García, & Morales-Bañuelos, 2019). And the percentage was even higher in 2011, reaching 40%.

These findings contravene their public claim to be ethical and sustainable companies which do not only act in accordance with the law, but go the extra mile and voluntarily uphold higher ethical standards. (Carroll, 1979; European Commission, 2001). Most retail investors lack the expertise, information, and time required to conduct screening methodologies and hence blindly rely on the work

of social rating agencies. Furthermore, retail investors tend to source information on sustainable companies from the media. For retail investors, law compliance is a key criterion to differentiate between sustainable or socially responsible companies and those which fall short (Iván Arribas, Espinós-Vañó, García, & Oliver, 2019). Hence, including companies in sustainable stock indices, which are involved in ESG scandals or which broke the law harms the credibility and prestige of, as well as the confidence in, these indices and sustainable financial investment strategies.

The main goal of this research is to examine the extent to which socially irresponsible activities and illicit behaviours affect the probability of companies to be included in the DJSI World. It is expected that the probability of being elected to join the DJSI World will decrease if companies perform irresponsible activities. This index was chosen, as it is one of the pioneering and highly regarded sustainable stock indices; it dates back more than 20 years and is widely accepted as a benchmark for sustainable stock investments. The index is constructed by the social rating agency RobecoSAM and it is one of the most prestigious and transparent indices providing extensive information about its index construction methodology (S&P Dow Jones Indices & RobecoSAM, 2018). Furthermore, it provides public information regarding the eligible universe of companies, and its key criteria for stock selection. However, one limitation of this index is the fact that individual criteria and their weights are not disclosed.

Another goal of this study is to unveil which irresponsible activities RobecoSAM's methodology penalises the most, in the event that socially irresponsible activities do prevent companies to be included in the index.

The third goal of this article investigates to which extend the index construction methodology may lead to the inclusion of irresponsible companies in the index. Specifically, we want to analyse whether companies are treated differently because of the index need to reduce turnover and its need to achieve proper sectoral or geographical diversification; i.e., whether *ceteris paribus* the probability of joining or leaving the index is affected by the previous index membership of the companies, their industry sector or their location.

This paper on the constituents' selection process of one of the most prestigious sustainable stock indices contributes to the literature on the causes for the diverse and partially contradictory performance of sustainable firms and stocks compared to their conventional peers. Furthermore, the problem of defining what constitutes a "sustainable company" is addressed as this definition represents the cornerstone on which socially responsible investments rely. In order to determine instances of corporate unsustainable and socially irresponsible behaviour, we select those controversies, which represent illegal activities performed by the company in question and covered in the media. Hence this study contributes to the body of research on irresponsible behaviour and firm controversies analysis (Aouadi & Marsat, 2018; Arribas, Espinós-Vañó, García, & Tamosiuniene, 2019; Utz, 2019).

Finally, this paper also contributes to the analysis of the nature of sustainable stock indices. The number of these indices is increasing worldwide (Kutay & Tektüfekçi, 2016) and their significance has attracted and continues to attract insightful research from a variety of perspectives (Arias Fogliano de Souza Cunha & Samanez, 2013; Ferreira, Rover, & Vicente, 2018; Miralles-Quirós & Miralles-Quirós, 2017; Searcy & Elkhawas, 2012).

For the purpose of this study Ziegler and Schröder (2010) are a helpful starting point as their analysis seeks to determine the variables crucial for the inclusion of European companies in the sustainability stock index DJSI World. Our study takes their insights further by analysis in a more recent time period (2011 to 2016 compared to Ziegler's and Schröder's time period between 1999 and 2004). Secondly, this study includes all eligible companies worldwide, not just the European landscape. Finally, the authors examine not only economic and accounting aspects for index inclusion, but widen the analysis to corporate, environmental, social performance and economic success as well as the occurrence of "controversies" (i.e., ESG related corporate scandals) which the authors consider crucial. The relevant hypothesis here is that the probability of being included in the DJSI World index decreases when a company displays irresponsible behaviour.

The remainder of the paper first reflects on the relevant literature on the concept of "sustainable companies" and the methodologies applied to identify such companies. Based on this discussion the authors define what constitutes a socially irresponsible company for the purpose of this study. After a critical

discussion of the methodology employed the authors describe the database employed. The empirical results are then presented and discussed before the key conclusions and outlook of the research is critically evaluated.

2. Assessing companies' social responsibility

For many investors socially responsible investments are a way to promote a richer and better world that is more ecologically stable (Drexhage & Murphy, 2010).

In view of its growing assets under management and subsequent increasing importance, sustainable behaviour of companies and sustainable investment have been examined from a variety of perspectives, including the impact of ESG-related news on the stock price (Capelle-Blancard & Petit, 2017), information disclosure, conventions in CSR reports (Hermawan & Gunardi, 2019; Lin & Hsu, 2018), CSR information and involvement strategies (Taylor, Vithayathil, & Yim, 2018; Vollero, Conte, Siano, & Covucci, 2019) and the development of company rankings based on ESG scores (García-Martínez, Guijarro, & Poyatos, 2017).

The comparison of the performance by sustainable, ethical and socially responsible companies and financial products with their conventional peers has attracted particular attention (Tsai, Huang, & Chen, 2020). The number of papers dealing with this topic is formidable, however a consensus view has not been reached (Hang, Geyer-Klingenberg, Rathgeber, & Stöckl, 2018). Some studies conclude that sustainable companies and financial products perform better than conventional ones (Achim, Borlea, & Mare, 2016; Gherghina & Vintilă, 2016;

Tebini, M'Zali, Lang, & Perez-Gladish, 2016), whilst others arrive at the contrary conclusion (Lesser, Rößle, & Walkshäusl, 2016; Nainggolan, How, & Verhoeven, 2016; Trinks & Scholtens, 2017). Yet other authors do not find any significant differences between the returns generated by sustainable and conventional companies or financial products returns (Humphrey & Warren, 2016; Ibikunle & Steffen, 2017; Xiao, Faff, & Gharghori, 2017).

These different, partially contradictory results may be due to a multitude of factors such as dissimilar empirical samples or performance measurement periods; different methodologies (Revelli and Viviani, 2015), or the fact that the impact of socially responsible behaviour can depend on individual firms' characteristics (Hull and Rothenberg, 2008; Luo and Bhattacharya, 2006). Recently, Yang and Stohl (2020) suggested that the link between company's CSR, consumer behaviour and firm's financial performance is still unclear. Furthermore, most studies do not correctly discriminate between sustainable and irresponsible companies (Iván Arribas, Espinós-Vañó, García, & Morales-Bañuelos, 2019; Espinós-Vañó, 2016; Gangi & Varrone, 2018; Utz & Wimmer, 2014). In this vein, some studies take inclusion in a sustainable stock index as the necessary and sufficient condition for being a sustainable company with all other stocks categorised as conventional companies (Charlo, Moya, & Muñoz, 2015, 2017). Hence, if the selection of companies for sustainable stock indices is inadequate, if sustainable stock indices include socially responsible as well conventional companies and irresponsible firms which may even be involved in scandals, the subsequent results are invalid. As many socially responsible investors use sustainable stock indices as a reference to select the companies for their

portfolios, this would at least partially explain the inconclusive results described above. Moreover, it would also go a long way to give a reason for the high correlation between conventional and sustainable stock indices and index constituents which are often identical (Espinós-Vañó, García, & Oliver, 2018, 2018; Managi, Okimoto, & Matsuda, 2012).

When socially responsible investments first emerged, investors applied their personal ethical preferences for stock selection. In most cases companies producing alcoholic beverages, tobacco, pornography and the like were excluded. This so-called negative screening approach offers simplicity and transparency, however it is not exempt from criticism (Schwartz, 2003). Negative screening is still common, but social rating agencies have developed more complex methodologies to assess sustainability and social commitment. One popular approach is the so-called positive screening best-in-class: It selects and weights variables on the basis of various ESG dimensions, thereby calculating a ranking and then selecting those companies which rank highest. This complex multicriteria methodology has attracted much attention resulting in a multitude of different methodologies capable of selecting and weighting companies (García, González-Bueno, Oliver, & Riley, 2019; Lamata, Liern, & Pérez-Gladish, 2018; Ou, 2016; Silvestre, Antunes, & Filho, 2018).

However, positive screening has been criticised for its lack of standardisation, transparency and independence (Chatterji, Levine, & Toffel, 2009; Windolph, 2011). This criticism is especially justified if one is not able to guarantee that the

thus identified companies have not engaged in socially irresponsible behaviour and illegal activities.

The Dow Jones Sustainability Index World (DJSI World) tracks the stock market performance of major global companies applying a best-in-class approach (S&P Dow Jones Indices & RobecoSAM, 2018). No explicit negative screening is applied, but companies which perform inexcusable actions in terms of sustainability can be excluded from the index. The number of companies included in the index may vary but is around 330. Only the biggest companies in the world in terms of market capitalization are eligible for the index. The selection process is quite complex, as it incorporates not only sustainability criteria but also other criteria to ensure the correct diversification of the index in terms of industry sector and location of the companies around the globe. It is also important to mention that, in order to reduce turnover, a standard buffer is applied to the constituent selection process. Sustainability performance is assessed by means of industry-specific questionnaires featuring between 80-120 questions focusing on economic, environmental and social factors (RobecoSAM, 2014). The questionnaires are completed by the companies invited to join the index. As a result of the corporate sustainability assessment, firms are assigned a score which represents their sustainability performance. Neither the questions nor their weights are public.

In our analysis, we employ the socially irresponsible activities, the so-called controversies, to define and quantify companies' sustainable behaviour. This method implies a negative screening approach, which identifies those companies

which cannot be defined as “socially responsible” due to their unethical and irresponsible behaviour. This is a simple and transparent assessment, compared with the complex, subjective and not transparent assessment used in the positive, best-in-class screening methodologies. In this paper, controversies are identified using the EIKON Thomson Reuters database (Thomson Reuters, 2018). As mentioned in Arribas *et al.* (2019a), in 2016 one in ten companies included in the DJSI World were involved in controversies.

3. Methodology

In this study, we estimate a variety of logit models to analyse which actually firm characteristics actually influence the inclusion of companies in the DJSI World index.

The dependent variable in the model is binary, i.e., the inclusion or exclusion of a company in the DJSI World index. In a data panel, let $DJSI_{it}$ be a dichotomous variable which takes the value 1 if company i is included in the DJSI World in year t , and 0 if company i is not included that year.

The analysis of panel data avoids some endogeneity problems which may appear in cross-sectional data and which is caused by the existence of relevant unobserved variables (Greene, 2012). For example, a specific corporate culture may influence the number and category of the controversies a company is involved in whilst at the same time affecting some financial ratios. If this variable (corporate culture) is not included in the model, because it cannot be observed,

the obtained estimates will be biased and inconsistent regarding the measured effects. Panel data models remove non-observed heterogeneity by including either fixed or random effects of the companies.

On the other hand, endogeneity could be caused by reverse causality. For example, an increment in the controversies could cause the exit of a company from DJSI World. However, in that case the company could change the corporate behaviour and reduce the number of controversies. As in cross-sectional data, panel data models solve this type of endogeneity by including lagged values of the variables.

Given the vector of explanatory variables \mathbf{x}_{it} , let p_{it} be the probability of company i to get included in the DJSI World in year t :

$$p_{it} = \text{Prob}(DJSI_{it} = 1 | \mathbf{x}_{it}).$$

If we assume that the *logit* function links this probability with the linear combination of the company characteristics, we obtain the model specification (1),

$$\log(p_{it}/(1 - p_{it})) = \alpha + \boldsymbol{\beta}'\mathbf{x}_{it} + \varepsilon_{it}, \quad i = 1, \dots, N; \quad t = 1, \dots, T \quad (1)$$

The vector of explanatory variables \mathbf{x}_{it} can contain contemporary variables \mathbf{y}_{it} and lagged variables $\mathbf{z}_{i,t-1}$, that is $\mathbf{x}_{it} = (\mathbf{y}_{it}, \mathbf{z}_{i,t-1})$. Therefore, the vector of the parameters of the model specification (1) can be broken down as $\boldsymbol{\beta} = (\boldsymbol{\gamma}, \boldsymbol{\delta})$. In order to consider the heterogeneity between companies, it is assumed that the

error term has two components: one specific for the company and invariant in time; and another which is idiosyncratic of the model and which depends both on the company and on the year. That is, $\varepsilon_{it} = \mu_i + \epsilon_{it}$. Therefore, we obtain an alternative model specification (2)

$$\log(p_{it}/(1 - p_{it})) = \alpha + \boldsymbol{\gamma}'\mathbf{y}_{it} + \boldsymbol{\delta}'\mathbf{z}_{i,t-1} + \mu_i + \epsilon_{it}. \quad (2)$$

where

$$\mu_i \sim (0, \sigma_\mu^2) \text{ i.i.d,}$$

$$\epsilon_{it} \sim (0, \sigma_\epsilon^2) \text{ i.i.d,}$$

$$\text{cov}(\epsilon_{it}, \mu_i) = 0 \text{ for every } i = 1, \dots, N; \quad t = 1, \dots, T,$$

$$\text{cov}(\epsilon_{it}, \mathbf{x}_{it}) = 0 \text{ for every } i = 1, \dots, N; \quad t = 1, \dots, T.$$

For the estimation of the model specifications the language and environment for statistical computing the authors chose was R (R Core Team, 2014) with the *Rchoice* package (Sarrias, 2016).

4. Database and explanatory variables

Data used in this research stem from two sources: Thomson Reuters Eikon and Dow Jones Sustainability Indices. The Thomson Reuters Eikon database collects negative ESG news and scandals, which are defined as “controversies”, covering over 7,000 public companies globally. Most controversies are related to illegal activities. Controversies are grouped into seven categories which allows to examine whether some controversy categories are more penalised by the DJSI World index methodology compared to others. The Thomson Reuters Eikon

database was also used to collect corporate economic and financial information, such as company location, sector, market value, profitability and leverage.

Information from the Dow Jones Sustainability Index was used to identify the companies included in the DJSI World.

The research analyses a data panel of companies from 2011 to 2016. The selection process identified the 4,000 largest companies in the world by market capitalization according to Thomson Reuters Eikon. From this dataset, only those companies which appear consistently between 2011 and 2016 were selected. The resulting dataset consists of 2,872 firms and 17,232 cells (combination of years and firms). Economic information items collected for these firms were: sector, headquarter location, market capitalization, profitability and leverage. In addition, the controversies in which these companies were involved were classified in seven categories: environment, community, workforce, human rights, product responsibility, management and shareholders. Moreover, for each year the companies included in the DJSI World were identified.

Based on the role of the variables, we have classified them into three groups: dependent variable, control variables and research variables. Thus, the variables detailed above were evaluated as follows:

Dependent variable

- **DJSI World inclusion:** A dichotomous variable was created for the data panel using information from S&P Dow Jones Indices and RobecoSAM (2018). For

every company and year, this variable (DJSI) is equal to one when the company is included in the DJSI World and zero otherwise. Every year around 7.7% of the firms in the sample were included in the sustainability index. Regarding DJSI Word turnover, on average 13.3% of the index constituents are changed every year.

Control variables

This set includes two type of variables, those which are usually employed in the literature as control variables measuring profitability and leverage (Ziegler and Schröder, 2010); and those variables related with the methodology followed by S&P Dow Jones Indices and RobecoSAM in the construction of the DJSI World.

- **Return on assets:** We selected return on assets (ROA) as a measure for profitability. ROA is calculated as net income to total assets.

- **Leverage:** This variable represents the leverage ratio of the company. The ratio is calculated as total liabilities to total shareholders' equity.

- **Market capitalization:** As explained in the index methodology, only the largest public companies in the world are eligible to be included in the DJSI World index. Therefore, it is obvious that firms' size must be considered as an inclusion criterion in our model. Market capitalization is obtained by multiplying the total number of company's outstanding shares by the market price of one share the last trading day of the year.

- **Sector:** The sectoral categories were applied in accordance with the index's methodology (S&P Dow Jones Indices and RobecoSAM, 2018). Hence the companies in our sample are grouped in eight sectors (construction, financial and insurance services, information and communication, manufacturing, other services, wholesale and retail, industry supplies, agriculture and mining). The distribution of companies along these sectors is heterogeneous. Hence, manufacturing firms account for 37% of the companies in the sample, whilst construction companies represent less than 3%.

- **Geographic area:** To take consideration of the geographical diversification strategy implemented by the DJSI World, the model includes six geographic areas (Africa, Asia, Europe, North America, Oceania and South America). More than 93% of the companies in the sample have their headquarters located in Asia, Europe or North America. By contrast, companies located in Africa, Oceania and South America are very rare in our sample.

Research variables

- **Location of the company:** We included a variable to account if the company is located in one of the 20 countries with the highest GDP worldwide. The purpose of this variable is to test whether a company located in one country, which belongs to the twenty countries with the highest GDP, receives different treatment than a company located in a country with a lower GDP. The information regarding the location of companies' headquarters is retrieved from the Eikon database. We have used the information in the World Bank Open Data (The World Bank, 2018) to identify the 20 biggest economies in terms of GDP during the period of

analysis (2011 - 2016). For this period, the group of the 20 biggest economies has remained unchanged. The resultant dichotomous variable (“Top20”) takes the value one if the company is located in a country which belongs to the top twenty GDP countries and takes the value zero otherwise. In the sample, 77.1% of the firms are located in a “Top20” country.

- **Total controversies:** The variable “total controversies” shows the total number of controversies, i.e., negative media stories emanating from socially irresponsible behaviour and registered in the Eikon database, in which a company has been implicated in a given year, regardless the nature of the controversy.

- **Controversy topic:** The number of controversies by topic is also included in the analysis. The rationale behind this categorisation is to test whether the nature of the controversy has an impact on the DJSI World inclusion probability or whether all controversy themes have the same impact on index membership.

As mentioned above, controversies are grouped into seven topics: environment, community, workforce, human rights, product responsibility, management and shareholders. The source is the Eikon database.

Table 1 shows the descriptive statistics for the financial variables and the controversies as a whole as well as for each distinct controversy category.

TABLE 1 SHOULD BE ABOVE HERE

It is important to examine the correlation between variables, as high correlations can generate multicollinearity problems which could affect the validity of the model. Table 2 shows the Pearson correlation matrix between variables and the variance inflation factor (VIF) of each variable. On the basis of table 2, where VIF is lower than 2, it can be ascertained that there are not multicollinearity problems.

TABLE 2 SHOULD BE ABOVE HERE

5. Empirical results and discussion

Model specification (2) was estimated using the contemporary variable y_{it} for the sector, geographical area and the “Top20” variable; as well as the lagged variables $z_{i,t-1}$ DJSI, the logarithmic transformation of market capitalization, ROA, leverage, total controversies and the controversy categories.

For the estimation of model specification (2) fixed effects were assumed. The effect of a company can be considered to be fixed or random. So, it is necessary to examine which model is more appropriate. Hence, both models were estimated (fixed effects and random effects) and the Durbin-Wu-Hausman test (Greene, 2012) was performed. For panel data, under the null hypothesis the random effects estimator is preferred, while under the alternative hypothesis fixed effects are preferred. In our analysis, we obtain a p-value under 0.0001, so the null hypothesis is rejected, and the estimation of the coefficients is calculated using the fixed effects model.

Given the high number of companies in the sample, any fixed effects model implies a big reduction of the degrees of freedom. For that reason, an examination of whether the company effect is caused by the individual characteristics of each company or whether this effect can appear as the result of determinants such as the sector or location of the companies, was conducted. To test this, we compared whether there are significant differences between the explanatory ability of a fixed effects model in a company and a more parsimonious model encompassing sector and geographic area.

The result of the analysis shows that there are no significant differences in the likelihood of both models (LR = 1380,7 d.f. = 2859, p-value = 1.000), so the more parsimonious model was chosen.

Considering the analyses described above, we have estimated model specification (2) using five different sets of lagged variables. The base model of the research includes as explanatory variables the geographic area, the sector and the lagged DJSI variable, in order to account for the buffer effect. We will refer to this estimation of model specification (2) as Model 1. Model 2 adds to Model 1 the location variable "Top20" and the economic variables (with a one-period lag) market capitalization (log), ROA and leverage. Models 3 and 4 include controversies to the variables already included in Model 2 considering two different levels of disaggregation: Model 3 adds only "total controversies" (with one-period lag) meanwhile Model 4 adds seven variables, one for each controversy type (with one-period lag). Finally, Model 5 builds upon Model 3 and includes a moderating effect.

Table 3 shows the results of the five estimations. Those results are robust across the five models and they are also independent of the link function used (logit versus probit). Furthermore, if we assume no sphericity in the errors and compute a sandwich estimator of the covariance specifically devised for panel data, the inference remains the same.

As mentioned above, Model 1 includes as explanatory variables the geographic area, the sector and the lagged DJSI variable. As explained in the index construction methodology (S&P Dow Jones Indices & RobecoSAM, 2018), a standard buffer rule is applied to the constituent selection process in order to reduce turnover; obviously this should be included in our model. This first model (see Model 1 in table 3) revealed insightful results:

First, we verified the impact of the buffer: Companies which were already included in the DJSI World the previous year enjoy a higher probability for inclusion in the index in the following year. The coefficient of variable lag (DJSI) in the first model is 6.158 and has a significance level below one per cent.

Second, the impact of the diversification strategy applied by the DJSI World showed that the sector in which a company operates does not significantly affect index inclusion, but the location of the companies could be shown to be significant. In fact, companies located in Oceania, South America or Europe are more likely to join the DJSI World than Asian firms (reference level), with a significance level below five per cent.

Model 2 adds location variable “Top20” and the lagged economic variables market capitalization (log), ROA and leverage (see Model 2 in Table 3).

TABLE 3 SHOULD BE ABOVE HERE

The inclusion of these additional variables did not alter the significance of previously significant factors; they remained significant as was the case in the previous model and their coefficients did not significantly change in magnitude. Interestingly, “other services” in the variable category for industry sectors, turned significant, and the same effect could be identified with regards to the geographical variable “Africa”. Both variables possess a positive coefficient. Furthermore, within the same geographical area, a company located in a country in the “Top20” group was more likely to join the index than a company located in another country (the significance level was below one per cent).

Amongst the economic variables, only market capitalization was found to be highly significant (at the one per cent level), while the variables ROA and leverage were not. Therefore, the empirical evidence indicates that companies’ size plays an important role even if only the biggest companies worldwide are considered for index inclusion. Maybe, this result is due to bigger companies devoting more resources to corporate social responsibility reporting and to comply with information requirements by RobecoSAM and answering the questions in the sustainability assessment more precisely. This hypothesis is in line with previous studies (Andrikopoulos & Kriklani, 2013; Mayorova, 2019; Sial, Zheng, Khuong,

Khan, & Usman, 2018). However, ROA and leverage are insignificant for the inclusion in the index according to the empirical evidence.

Model 3 includes the variable “total controversies” (see Model 3, table 3). This variable was statistically significant (p-value lower than 5%) and the expected negative sign of the coefficient was confirmed. Again, those variables which were significant in the previous models remained so with the magnitude of their coefficients on a similar level.

Hence the evidence confirms that if in the number of controversies raises, *ceteris paribus* (holding other dependent variables in the model constant) the probability to be included in the DJSI World falls.

This analysis was repeated in a variety of ways including the variable “controversies” in the models (e.g. as a raw number, as a dichotomous variable, or by controversy range), but the outcome remained unchanged.

Model 4 (see table 3) tests whether all controversy categories equally affect the probability of membership in the DJSI World or, conversely, whether some controversy types impact more on index inclusions than others.

In order to test these hypotheses, the lagged variable “total controversies” was extracted from the previous model (Model 3) and the different controversy categories, were included with a one-year lag. In the resultant model, the variables that were significant in previous models remained significant.

Regarding the controversy categories, only “product responsibility” could be identified as significant (at the 5% level). The sign of the coefficient was negative as expected.

This outcome shows that, *ceteris paribus*, a company involved in irresponsible corporate behaviour relating to its products is less likely to join the index than a company without such controversies. The other controversy categories were not significant.

In this context it is important to consider however, that the number of controversies in which companies are implicated is very small in some controversy categories (e.g. “human rights” controversies). The very small quantity of such controversies is a possible explanation for their insignificance in our model. The findings above are congruent with those published by Girerd-Potin *et al.* (2014). In their study the authors examine which social responsibility dimensions tend to concern investors. The findings suggest that the variable “business stakeholders” (which includes employees, customers and suppliers) is the most important for investors. Consequently, investors demand a higher risk premium when companies display poor behaviour on this dimension. “Product responsibility” in our study could be interpreted as roughly similar to the relationship with customers, as product quality is an important feature for customers. In this context, product responsibility directly affects company’s cash flow and, consequently, its market value. From this perspective, it seems reasonable that the index methodology considers those factors that concern potential index users, that is, investors.

It is also important to determine the extent to which the number of controversies (“total controversies”) impacts on the probability of DJSI World membership and whether other variables moderate this effect. Hence, starting with Model 3, new models were calculated with different moderating variables. The only significant moderating effect found is the variable of DJSI membership, which captures the buffer effect, with a one-year lag (p-value = 0.001. See Model 5). In order to correctly interpret this moderating effect, it must be noticed that in Model 5 the direct effect of “total controversies” on the probability to join the index turned out not to be significant anymore. Therefore, the number of controversies in which a company is involved seems to only affect the probability to be included in the DJSI World if the company already belonged to the index during the previous year. Hence, a company with DJSI membership in the previous year, an increasing number of controversies is likely to reduce its probability to remain in the index the next year. By contrast, for a company which was not included in the DJSI World the previous year the number of controversies have no impact on its probability to be included in the index next year.

This result indicates that irresponsible behaviour by companies which are already included in the index is penalised, whereas the same behaviour by companies not included in the index has no effect on the probability to be included in the index next year. Moreover, a company which is already a DJSI World constituent having no controversies during the year is likely to increase the probability to remain in the index next year, but having no controversies does not increase the

probability to join the index if the company was not included in the DJSI World the previous year, *ceteris paribus*.

The results obtained shed light on several issues pointed out in the literature regarding the importance of the assessment employed to identify sustainable or responsible companies. In the case of the DJSI World, a best-in-class approach is performed which does not directly prevent irresponsible companies to be included in the index. Although the methodology does consider the number of controversial activities in which companies are implied, the impact of the controversies on the probability to join the index is limited and asymmetric, as the index considers other important aspects such as size, diversification and turnover. As a result, companies which could be defined as irresponsible due to the number of controversies may be included in the index. This result underlines the importance of the selection process and is in line with previous works which focus on the importance of the discrimination methodology between responsible and irresponsible companies (Baccaro & Mele, 2011; Chatterji, Levine, & Toffel, 2009; Utz & Wimmer, 2014). Screening methodologies which do not clearly discriminate firms' behaviour could be responsible of the wide variety of results obtained in the literature when comparing the performance of sustainable companies and financial products vs. conventional ones (Cai & He, 2014; Lean, Ang, & Smyth, 2015; Humphrey & Tan, 2014; Leite & Cortes, 2014; Muñoz, Vargas, & Marco, 2014) and the high correlation between sustainable stock indices and conventional stock indices (Espinós-Vañó, García, & Oliver, 2018).

6. Conclusion

Socially responsible investment portfolios follow an investment strategy which selects stocks on conventional economic as well as on ESG criteria. One of the key goals for socially responsible investors is the avoidance of stocks whose management commit ESG malpractices. Social rating agencies evaluate corporate ESG behaviour and apply complex methodologies to select those firms which comply with ESG requirements. Those sustainable companies are then included in sustainable portfolios and other financial products such as sustainable stock indices. Notwithstanding the complexity of the methodologies applied, it is not unusual that companies which are defined and “sustainable” are involved in media scandals due to their irresponsible behaviour. This problem may harm the reputation of socially responsible financial products, as it reveals that the sustainable selection methodology is not in line with investors’ perception and preferences.

For this reason, it is important to sharpen in the screening methodologies employed and discern which criteria are actually considered. More specifically, in order to remain credible, one needs to be clear whether irresponsible behaviour impacts on a company’s likelihood to be included in a sustainability index.

The quantitative models calculated in this study estimate the probability of companies to join the sustainability index. The model includes the variables which are considered in its index construction, as described in the index methodology. In addition, other variables are included to capture financial characteristics and ESG behaviours. These were, that measured using the controversies, in which the companies were involved. For the purpose of this study controversies were

defined as scandals due to companies engaging in activities widely considered as unsustainable, as recorded in the Eikon Thomson Reuters database.

As expected, the variables which are mentioned in the index construction methodology have a significant impact on the probability of companies to be included in the DJSI World. These variables are the headquarter location, company size and index membership during the previous year.

Regarding location, firms located in Europe, Oceania and South America were shown to be more likely to join the index compared to peers in other continents; the underlying reason for this, lays in the geographic diversification required by the index. Moreover, companies which are located in a country which belongs to the group of 20 countries with the highest GDP are more likely to attain index membership.

Regarding size, bigger companies enjoy higher odds of index inclusion compared to smaller ones. This is the case, even though the sample used in the analyses only includes the biggest public companies worldwide.

Finally, as a result of the use of a buffer rule to reduce turnover, as detailed in the index constituent selection process, the probability of those companies which are included in the index to be included the next year is higher than the probability of companies which are not.

The variables included in the model to capture economic performance, return on assets and leverage, were insignificant in either model. This result shows that the selection methodology of the index does not use criteria which we could define as “opportunistic” to select those companies with the best economic performance.

Regarding controversies, we conclude that the number of controversies in which a firm is involved has a negative impact on the probability to join the index next year. That means that companies’ controversies are considered in the constituent selection process of the DJSI World, even though they are not used as exclusionary, negative screening criteria.

When analysing the different controversy topics separately, only those controversies related to “product responsibility” were significant. This result may be due to investors placing a clear priority on the product compared to other irresponsible activities. A possibly explanation could be that irresponsible activities concerning the company’s products are considered dangerous for its economic performance through penalties and fines, as well as consumers corporate image of the company, negatively affecting company’s cash flow and market value. By contrast other non ESG activities might be considered as having less of an impact compared to product-specific controversies. Though such a view may be considered incorrect and short-sighted it nevertheless could be prevalent in investment circles. It would be fruitful to examine in the future whether this is actually the case.

When different variables in the model are used as moderating variables on the effect of the number of controversies, only the lagged DJSI variable is significant, which shows whether the company was included in the DJSI World the previous year or not. Therefore, we can state that engaging in irresponsible activities has a different impact on the likelihood of index inclusion depending on whether the company is already an index constituent or not. A company that is already included in the index is negatively affected by controversies occurring, whilst a company which is not included in the index and which is not involved in irresponsible activities will not improve its probability to join the index next year compared to one which is engaged in irresponsible activities.

In short, the role of the irresponsible activities on the probability to become a DJSI World constituent is limited and asymmetric. A company can be expelled from the index if it is involved in many ESG scandals. But a company which is not included in the index could join it next year even though having the same high number of controversies.

This is clearly a surprising and to some extent a counter-intuitive finding which invites further research in this fascinating and ever expanding field.

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7. References

Achim, M.-V., Borlea, S. N., & Mare, C. (2016). Corporate Governance and

- Business Performance: Evidence for the Romanian Economy. *Journal of Business Economics and Management*, 17(3), 458–474.
<https://doi.org/10.3846/16111699.2013.834841>
- Andrikopoulos, A., & Kriklani, N. (2013). Environmental Disclosure and Financial Characteristics of the Firm: The Case of Denmark. *Corporate Social Responsibility and Environmental Management*, 20(1), 55–64.
<https://doi.org/10.1002/csr.1281>
- Aouadi, A., & Marsat, S. (2018). Do ESG Controversies Matter for Firm Value ? Evidence from International Data. *Journal of Business Ethics*, 151(4), 1027–1047. <https://doi.org/10.1007/s10551-016-3213-8>
- Arias Fogliano de Souza Cunha, F., & Samanez, C. P. (2013). Performance Analysis of Sustainable Investments in the Brazilian Stock Market: A Study About the Corporate Sustainability Index (ISE). *Journal of Business Ethics*, 117(1), 19–36. <https://doi.org/10.1007/s10551-012-1484-2>
- Arribas, I., Espinós-Vañó, M. D., García, F., & Morales-Bañuelos, P. B. (2019). The inclusion of socially irresponsible companies in sustainable stock indices. *Sustainability*, 11(7). <https://doi.org/10.3390/su11072047>
- Arribas, I., Espinós-Vañó, M. D., García, F., & Tamosiuniene, R. (2019). Negative screening and sustainable portfolio diversification. *Entrepreneurship and Sustainability Issues*, 6(4), 1566–1586.
[https://doi.org/10.9770/jesi.2019.6.4\(2\)](https://doi.org/10.9770/jesi.2019.6.4(2))
- Arribas, I., Espinós - Vañó, M. D., García, F., & Oliver, J. (2019). Defining socially responsible companies according to retail investors' preferences. *Entrepreneurship and Sustainability Issues*, 7(2), 1641–1653.
- Baccaro, L., & Mele, V. (2011). For lack of anything better? International

- organizations and global corporate codes. *Public Administration*, 89(2), 451–470. <https://doi.org/10.1111/j.1467-9299.2011.01918.x>
- Cai, L., & He, C. (2014). Corporate Environmental Responsibility and Equity Prices. *Journal of Business Ethics*, 125, 617–635. <https://doi.org/10.1007/s10551-013-1935-4>
- Capelle-Blancard, G., & Petit, A. (2017). Every Little Helps? ESG News and Stock Market Reaction. *Journal of Business Ethics*, 1–23. <https://doi.org/10.1007/s10551-017-3667-3>
- Carroll, A. B. (1979). A Three-Dimensional Conceptual Model of Corporate Performance. *Academy of Management Review*, 4(4), 497–505. <https://doi.org/10.5465/amr.1979.4498296>
- Charlo, M. J., Moya, I., & Muñoz, A. M. (2015). Sustainable development and corporate financial performance: A study based on the FTSE4Good IBEX index. *Business Strategy and the Environment*, 24(4), 277–288. <https://doi.org/10.1002/bse.1824>
- Charlo, M. J., Moya, I., & Muñoz, A. M. (2017). Financial performance of socially responsible firms: The short- and long-term impact. *Sustainability (Switzerland)*, 9(9), 1–15. <https://doi.org/10.3390/su9091622>
- Chatterji, A. K., Levine, D. I., & Toffel, M. W. (2009). How well do social ratings actually measure corporate social responsibility? *Journal of Economics and Management Strategy*, 18(1), 125–169. <https://doi.org/10.1111/j.1530-9134.2009.00210.x>
- Drexhage, J., & Murphy, D. (2010). *Sustainable Development: From Brundtland to Rio 2012*. United Nations.
- Espinós-Vañó, M. D. (2016). Socially responsible investment in Spain: Ethics

- and transparency. *Finance, Markets and Valuation*, 2(2), 73–89.
<https://journalfmv.com/resources/revista/2016/2/ISResponsible.pdf>
- Espinós-Vañó, M. D., & García, F. (2018). Irresponsible behavior of Spanish FTSE4Good Ibex companies based on NGO reports. *10th International Scientific Conference "Business and Management 2018"*.
<https://doi.org/10.3846/bm.2018.26>
- Espinós-Vañó, M. D., García, F., & Oliver, J. (2018). The ethical index FTSE4Good Ibex as an alternative for passive portfolio strategies in Spain. *Finance, Markets and Valuation*, 4(1), 117–129.
<https://doi.org/10.46503/MUKB2397>
- Espinós-Vañó, M.D. (2019). *The concept of ethical or sustainable company and its importance in the design of socially responsible investment products*. Universitat Politècnica de València.
<https://doi.org/10.4995/Thesis/10251/125706>
- European Commission. (2001). *Promoting a European framework for corporate social responsibility: Green paper*.
- Ferreira, J., Rover, S., & Vicente, E. F. R. (2018). Índice de sustentabilidades empresarial: Porque as empresas deixam de participar. *Contabilometria*, 89–107.
- Gangi, F., & Varrone, N. (2018). Screening activities by socially responsible funds: A matter of agency? *Journal of Cleaner Production*, 197, 842–855.
<https://doi.org/10.1016/j.jclepro.2018.06.228>
- García-Martínez, G., Guijarro, F., & Poyatos, J. A. (2017). Measuring the social responsibility of European companies: A goal programming approach. *International Transactions in Operational Research*, 00, 1–22.

<https://doi.org/10.1111/itor.12438>

García, F., González-Bueno, J., Oliver, J., & Riley, N. (2019). Selecting socially responsible portfolios: A fuzzy multicriteria approach. *Sustainability (Switzerland)*, 11(9). <https://doi.org/10.3390/su11092496>

Gherghina, Ș. C., & Vintilă, G. (2016). Exploring the impact of corporate social responsibility policies on firm value: The case of listed companies in Romania. *Economics and Sociology*, 9(1), 23–42.

<https://doi.org/10.14254/2071-789X.2016/9-1/2>

Girerd-Potin, I., Jimenez-Garcés, S., & Louvet, P. (2014). Which Dimensions of Social Responsibility Concern Financial Investors ? *Journal of Business Ethics*, 121, 559–576. <https://doi.org/10.1007/s10551-013-1731-1>

Global Sustainable Investment Alliance. (2018). *Global Sustainable 2018*

Investment Review.

Greene, W. H. (2012). *Econometric Analysis* (7th Edition). Prentice Hall.

Hang, M., Geyer-Klingenberg, J., Rathgeber, A., & Stöckl, S. (2018). Economic Development Matters: A Meta-Regression Analysis on the Relation

between Environmental Management and Financial Performance. *Journal*

of Industrial Ecology, 22(4), 720–744. <https://doi.org/10.1111/jiec.12573>

Hermawan, A., & Gunardi, A. (2019). Motivation for disclosure of corporate social responsibility: Evidence from banking industry in Indonesia.

Entrepreneurship and Sustainability Issues, 6(3), 1297–1306.

[https://doi.org/10.9770/jesi.2019.6.3\(17\)](https://doi.org/10.9770/jesi.2019.6.3(17))

Hull, C. E., & Rothenberg, S. (2008). Firm performance: The interactions of corporate social performance with innovation and industry differentiation.

Strategic Management Journal, 29, 781–789. <https://doi.org/10.1002/smj>

- Humphrey, J. E., & Tan, D. T. (2014). Does it Really Hurt to be Responsible ?
Journal of Business Ethics, 122, 375–386. <https://doi.org/10.1007/s10551-013-1741-z>
- Humphrey, J. E., & Warren, G. J. (2016). What is Different about Socially Responsible Funds ? A Holdings- Based Analysis. *Journal of Business Ethics*, 263–277. <https://doi.org/10.1007/s10551-015-2583-7>
- Ibikunle, G., & Steffen, T. (2017). European Green Mutual Fund Performance : A Comparative Analysis with their Conventional and Black Peers. *Journal of Business Ethics*, 145(2), 337–355. <https://doi.org/10.1007/s10551-015-2850-7>
- Kutay, N. ., & Tektüfekçi, F. (2016). A new era for sustainable development: A comparison for sustainability indices. *Journal of Accounting, Finance and Auditing Studies*, 2(2), 70–95.
- Lamata, M. T., Liern, V., & Pérez-Gladish, B. (2018). Doing good by doing well: a MCDM framework for evaluating corporate social responsibility attractiveness. *Annals of Operations Research*, 267(1–2), 249–266. <https://doi.org/10.1007/s10479-016-2271-8>
- Lean, H. H., Ang, W. R., & Smyth, R. (2015). Performance and performance persistence of socially responsible investment funds in Europe and North America. *North American Journal of Economics and Finance*, 34, 254–266. <https://doi.org/10.1016/j.najef.2015.09.011>
- Leite, P., & Cortez, M. C. (2014). Style and performance of international socially responsible funds in Europe. *Research in International Business and Finance*, 30(1), 248–267. <https://doi.org/10.1016/j.ribaf.2013.09.007>
- Lesser, K., Rößle, F., & Walkshäusl, C. (2016). Socially responsible, green, and

- faith-based investment strategies: Screening activity matters! *Finance Research Letters*, 16, 171–178. <https://doi.org/10.1016/j.frl.2015.11.001>
- Lin, S.-J., & Hsu, M.-F. (2018). Decision Making By Extracting Soft Information From Csr News Report. *Technological & Economic Development of Economy*, 24(4), 1344–1361. <https://doi.org/10.3846/tede.2018.3121>
- Luo, X., & Bhattacharya, C. B. (2006). Corporate social responsibility, customer Satisfaction, and market value. *Journal of Marketing*, 70(4), 1–18. <https://doi.org/10.1509/jmkg.70.4.1>
- Managi, S., Okimoto, T., & Matsuda, A. (2012). Do socially responsible investment indexes outperform conventional indexes? *Applied Financial Economics*, 22(18), 1511–1527. <https://doi.org/10.1080/09603107.2012.665593>
- Mayorova, E. A. (2019). Corporate social responsibility disclosure: evidence from the European retail sector. *Entrepreneurship and Sustainability Issues*, 7(2), 891–905. [https://doi.org/10.9770/jesi.2019.7.2\(7\)](https://doi.org/10.9770/jesi.2019.7.2(7))
- Miralles-Quirós, M., & Miralles-Quirós, L. (2017). Improving Diversification Opportunities for Socially Responsible Investors. *Journal of Business Ethics*, 140, 339–351. <https://doi.org/10.1007/s10551-015-2691-4>
- Muñoz, F., Vargas, M., & Marco, I. (2014). Environmental Mutual Funds : Financial Performance and Managerial Abilities. *Journal of Business Ethics*, 124, 551–569. <https://doi.org/10.1007/s10551-013-1893-x>
- Nainggolan, Y., How, J., & Verhoeven, P. (2016). Ethical Screening and Financial Performance: The Case of Islamic Equity Funds. *Journal of Business Ethics*, 137(1), 83–99. <https://doi.org/10.1007/s10551-014-2529-5>
- Ou, Y.-C. (2016). Using a Hybrid Decision-Making Model to Evaluate the

- Sustainable Development Performance of High-Tech Listed Companies. *Journal of Business Economics and Management*, 17(3), 331–346.
<https://doi.org/10.3846/16111699.2015.1110713>
- R Core Team. (2013). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. <http://www.r-project.org>
- Revelli, C., & Viviani, J.-L. (2015). Financial performance of socially responsible investing (SRI): what have we learned? A meta-analysis. *Business Ethics: A European Review*, 24(2), 158–185. <https://doi.org/10.1111/beer.12076>
- RobecoSAM (2014). *Measuring "Intangibles"*.
<https://www.robecosam.com/csa/csa-resources/csa-methodology.html>
(accessed 15 October 2017)
- S&P Dow Jones Indices, & RobecoSAM. (2018). *Dow Jones Sustainability Indices. Methodology*. <https://eu.spindices.com/indices/equity/dow-jones-sustainability-world-index> (accessed 15 October 2017)
- Sarrias, M. (2016). Discrete choice models with random parameters in R: The RChoice Package. *Journal of Statistical Software*, 74(10), 1–31.
- Scalet, S., & Kelly, T. F. (2010). CSR rating agencies: What is their global impact? *Journal of Business Ethics*, 94(1), 69–88.
<https://doi.org/10.1007/s10551-009-0250-6>
- Schwartz, M. S. (2003). The “Ethics” of Ethical Investing. *Journal of Business Ethics*, 43(3), 195–213. <https://doi.org/10.1023/A:1022933912939>
- Searcy, C., & Elkhawas, D. (2012). Corporate sustainability ratings: An investigation into how corporations use the Dow Jones Sustainability Index. *Journal of Cleaner Production*, 35, 79–92.
<https://doi.org/10.1016/j.jclepro.2012.05.022>

- Sial, M. S., Zheng, C., Khuong, N. V., Khan, T., & Usman, M. (2018). Does firm performance influence corporate social responsibility reporting of Chinese listed companies? *Sustainability (Switzerland)*, *10*(7).
<https://doi.org/10.3390/su10072217>
- Silvestre, W. J., Antunes, P., & Filho, W. L. (2018). The corporate sustainability typology: analysing sustainability drivers and fostering sustainability at enterprises. *Technological & Economic Development of Economy*, *24*(2), 513–533. <https://doi.org/10.3846/20294913.2016.1213199>
- Taylor, J., Vithayathil, J., & Yim, D. (2018). Are corporate social responsibility (CSR) initiatives such as sustainable development and environmental policies value enhancing or window dressing? *Corporate Social Responsibility and Environmental Management*, *25*(5), 971–980.
<https://doi.org/10.1002/csr.1513>
- Tebini, H., M'Zali, B., Lang, P., & Perez-Gladish, B. (2016). The Economic Impact of Environmentally Responsible Practices. *Corporate Social Responsibility and Environmental Management*, *23*(5), 333–344.
<https://doi.org/10.1002/csr.1383>
- The World Bank. World Bank Open Data.
<https://databank.worldbank.org/home.aspx> (accessed 16 November 2018)
- Thomson Reuters. (2018). *Thomson Reuters ESG Scores*.
<https://www.refinitiv.com/content/dam/gl/en/documents/methodology/esg-scores-methodology.pdf>
- Trinks, P. J., & Scholtens, B. (2017). The Opportunity Cost of Negative Screening in Socially Responsible Investing. *Journal of Business Ethics*, *140*(2), 193–208. <https://doi.org/10.1007/s10551-015-2684-3>

- Tsai, K. H., Huang, C. T., & Chen, Z. H. (2020). Understanding variation in the relationship between environmental management practices and firm performance across studies: A meta-analytic review. *Business Strategy and the Environment*, 29(2), 547–565. <https://doi.org/10.1002/bse.2386>
- Utz, S., & Wimmer, M. (2014). Are they any good at all? A financial and ethical analysis of socially responsible mutual funds. *Journal of Asset Management*, 15(1), 72–82. <https://doi.org/10.1057/jam.2014.8>
- Utz, S. (2019). Corporate scandals and the reliability of ESG assessments: evidence from an international sample. *Review of Managerial Science*, 13(2), 483–511. <https://doi.org/10.1007/s11846-017-0256-x>
- Vollero, A., Conte, F., Siano, A., & Covucci, C. (2019). Corporate social responsibility information and involvement strategies in controversial industries. *Corporate Social Responsibility and Environmental Management*, 26(1), 141–151. <https://doi.org/10.1002/csr.1666>
- Windolph, S. E. (2011). Assessing Corporate Sustainability Through Ratings: Challenges and Their Causes. *Journal of Environmental Sustainability*, 1(1), 1–22. <https://doi.org/10.14448/jes.01.0005>
- Xiao, Y., Faff, R., & Gharghori, P. (2017). The Financial Performance of Socially Responsible Investments : Insights from the Intertemporal CAPM. *Journal of Business Ethics*, 146(2), 353–364. <https://doi.org/10.1007/s10551-015-2894-8>
- Yang, Y., & Stohl, C. (2020). The (in)congruence of measures of corporate social responsibility performance and stakeholder measures of corporate social responsibility reputation. *Corporate Social Responsibility and Environmental Management*, 27(2), 969-981.

<https://doi.org/10.1002/csr.1859>

Ziegler, A., & Schröder, M. (2010). What determines the inclusion in a sustainability stock index?. A panel data analysis for european firms.

Ecological Economics, 69(4), 848–856.

<https://doi.org/10.1016/j.ecolecon.2009.10.009>

Table 1

Descriptive statistics (N = 17,232).

	Mean	Standard deviation	Minimum	Maximum
Market capitalization	13,805.91	28,036.76	928.66	629,010.25
Total controversies	0.456	1.959	0	118
Controversy topic				
Community	0.252	1.214	0	61
Environment	0.018	0.283	0	17
Human rights	0.006	0.090	0	3
Management	0.006	0.118	0	4
Product responsibility	0.085	0.582	0	36
Shareholders	0.019	0.171	0	6
Workforce	0.069	0.383	0	7
ROA	0.077	0.098	-1.103	2.828
Leverage	0.592	0.221	0.000	2.030

Tabla 2

Mutual correlation coefficients and VIF (N = 17,232). All correlations are significant at 1% level, except for those in italics that are not significant at 5%.

	VIF	Market capitalization	Comm unity	Environ ment	Human rights	Manag ement	Product responsibil ity	Shareho lders	Workf orce	Total Controversi es	ROA	Leve rage
Market	1.20											
capitaliza tion		1.00										
Communi ty	1.67	0.35	1.00									
Environm ent	1.13	0.11	0.30	1.00								
Human Rights	1.06	0.12	0.12	0.08	1.00							
Managem ent	1.05	0.06	0.18	0.09	0.07	1.00						
Product responsi bility	1.45	0.27	0.52	0.27	0.09	0.20	1.00					
Sharehol ders	1.13	0.16	0.32	0.06	0.03	0.08	0.21	1.00				
Workforc e	1.15	0.25	0.26	0.14	0.21	0.07	0.21	0.10	1.00			
Total controver sies	1.18	0.38	0.91	0.45	0.20	0.27	0.73	0.39	0.47	1.00		
ROA	1.12	0.05	-0.04	-0.03	<i>0.01</i>	<i>-0.01</i>	<i>-0.01</i>	-0.03	<i>0.00</i>	-0.03	1.00	
Leverage	1.12	0.07	0.10	<i>0.00</i>	<i>0.01</i>	0.03	0.07	0.04	0.04	0.10	-0.31	1.00

Table 3

Parameter estimates in different panel models, determinants of the inclusion in the DJSI.

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5
DJSI _{t-1}	6.158***	5.780***	5.807***	5.813***	6.053***
Top20		0.598**	0.608***	0.613***	0.620***
Log Market capitalization _{t-1}		0.534***	0.587***	0.592***	0.562***
ROA _{t-1}		-1.006	-1.171	-1.133	-1.117
Leverage _{t-1}		0.302	0.347	0.350	0.284
Total controversy _{t-1}			-0.174*		0.174
Community _{t-1}				0.081	
Environment _{t-1}				-0.208	
Human rights _{t-1}				-0.005	
Management _{t-1}				-0.119	
Product responsibility _{t-1}				-0.642*	
Shareholders _{t-1}				-0.088	
Workforce _{t-1}				-0.176	
DJSI _{t-1} * Total controversy _{t-1}					-0.529***
2013	0.116	0.040	0.026	0.025	0.020
2014	-0.116	-0.287	-0.303	-0.328	-0.305
2015	0.043	-0.142	-0.174	-0.173	-0.193
2016	0.211	0.064	0.013	0.002	0.011
Manufacturing	0.175	0.367	0.355	0.423	0.313
Industry supplies	-0.131	0.091	0.052	0.111	0.010
Construction	0.379	0.760	0.732	0.794	0.690
Wholesale and retail trade	-0.066	0.184	0.176	0.279	0.150
Other services	0.246	0.701*	0.689*	0.765*	0.665*

Information and communication	0.493	0.583	0.562	0.641	0.531
Financial and insurance activities	0.101	-0.011	-0.048	0.045	-0.016
South America	1.027**	1.196**	1.206**	1.189**	1.212**
Europe	0.914***	0.711***	0.746***	0.748***	0.754***
Oceania	1.211***	1.067***	1.115***	1.108***	1.091***
North America	0.173	-0.255	-0.210	-0.208	-0.217
Africa	0.289	0.976*	1.017*	0.989*	0.982*
Constant	-5.129***	-10.403***	-10.852***	-10.979***	-10.681***
AIC	2,448,857	2,361,032	2,358,492	2,366,198	2,344,552
N	14,360	14,360	14,360	14,360	14,360

Note: * (**, ***) means that the appropriate parameter is different from zero at the 10% (5%, 1%) level of significance respectively