

Master Thesis U.S.E.

Investigating the Effects of Different Sustainability-Linked Reporting Frameworks on Firm Performance

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In the past decades, the focus on sustainability has significantly increased, and with it the need for qualitative sustainability reporting frameworks. Current research indicates a primarily positive relationship between sustainability disclosure and firm financial performance, but it mainly focuses on relationships between individual disclosure frameworks and firm performance. By using a sample consisting of the firms from the S&P500 index between 2018-2022, this research attempts to compare the effects of different sustainability-linked reporting frameworks, especially examining whether a difference exists between the effects of these frameworks. Fixed effects and random effects panel regression analyses on the individual and joint models, whilst controlling for both firm-specific and macro-economic factors, indeed indicate such a difference: GRI disclosure is found to have a significant and sizable positive effect on firm performance, whereas the effect of SASB disclosure appears to be negative. Even in the joint models and after clustering, most of these results remain similar.

Introduction

In the past decades, the focus on sustainability has significantly increased, and with it the need for qualitative sustainability reporting frameworks. An increasing long-term orientation of investors creating pressure for firms (Amran & Ooi, 2014), combined with the increasingly valued notion of stakeholder theory and the multi-stakeholder approach (Torelli et al., 2019), have led to a significantly increasing importance of sustainable business for firms. In order to answer the needs of companies for ways to report on their efforts towards more sustainable business, different institutions have developed guidelines to allow companies to report these efforts, such as the GRI (Global Reporting Initiative) guidelines and the SASB (Sustainability Accounting Standards Board) standards. Although sustainability reporting is very important for both firms and investors, especially sustainability-conscious investors, do these reporting frameworks actually positively influence financial firm performance? And more specifically, how do these results compare among the different reporting frameworks that are currently in practice? A thorough analysis of the current literature regarding the effects of ESG or sustainability disclosure on firm performance in general, as well as the effects of specific reporting frameworks of sustainability disclosure, specifically of the GRI guidelines and the SASB standards is conducted. Findings from current literature indicate that different types of individual sustainability-linked reporting frameworks are primarily seen to positively influence firm performance (Chen & Xie, 2022; Eng et al. 2021; Laskar, 2018). However, these studies have often focused on individual frameworks, rather than comparing different sustainability reporting frameworks. Bose (2020) notes that these frameworks, although similar, do have some different characteristics, such as their orientation (shareholder or multi-stakeholder), as well as their measurement construction (specific KPIs or industry-based standards) and materiality definition. Furthermore, these frameworks appear to have different drivers (Pizzi et al., 2022), with the GRI guidelines being adopted more often due to ethical and sustainable principles and the SASB due to primarily financial incentives. Thus, this study reasons that adoption of these different frameworks may also influence performance differently. In order to analyze and compare the effects of the different sustainability-related reporting frameworks on firm performance, the following research question is proposed:

“Are there differences in the effects of using different sustainability-linked reporting frameworks on financial firm performance?”

In an attempt to quantitatively analyze the effects of using different sustainability reporting frameworks on financial firm performance, data is obtained from the Refinitiv Eikon DataStream and the SASB Navigator. A sample is used from 2018 to 2022, based on the companies from the S&P500 index, which includes exactly 500 companies in total during this

time period. Firm performance is measured through three commonly accepted proxies: Return on Assets (RoA), as well as two different calculation methods of Tobin's Q. These firm performance measures are then regressed onto the usage of the GRI and SASB disclosure guidelines, measured in the form of dummy variables. E, S, G performance indicators are included in the model to control for sustainability performance (to avoid "boilerplate" disclosures influencing results). Firm size and leverage structure are included to control for possible variances in firm performance, as to allow significant analysis of the value-creating effects of using either GRI guidelines or SASB standards. Lastly, inflation, GDP growth and COVID are included as macro-economic control variables. Robustness checks are performed to test the significance of the obtained results. To compare the effects of the different reporting frameworks on firm performance, it is important to also analyze the individual effects of both reporting frameworks thoroughly on firm performance when included in a combined model. Thus, the following two sub-questions are identified:

1. *What is the effect of GRI disclosure on firm performance?*
2. *What is the effect of SASB disclosure on firm performance?*

By answering these sub-questions and in turn the research question, this study will contribute to current literature on the relationship between sustainability disclosure and firm performance. This, by being the first study to quantitatively analyze and compare the effects of the different and currently most popular sustainability reporting frameworks, used by companies, on firm performance. Thus, the relevance of this study is mainly scientific, as analyzing these relationships may increase the understanding of the interconnected economic network. Therefore, this study and its findings may also serve as a framework for future comparative analyses to build upon. Although it is not the primary objective, some societal relevance may also lie in the possibility of the results of this study to be incorporated by investors when making investment decisions, as well as considered by companies when deciding on their own sustainability reporting methods.

In the next section, first the current literature will be analyzed as well as relevant theories discussed, to provide a complete overview of the current reporting landscape, and to identify the relevant factors and theories that affect the studied relationships. After that, an elaboration will follow on the specific sample and data sources that are used in this research, followed by the methods that are used to allow future research to replicate and build upon the constructed frameworks.

Literature review and Theoretical Framework

In this section, an elaboration will follow on the importance of sustainability reporting, the risks involved with this type of reporting, the current situation regarding sustainability reporting, and an analysis of current research of the relationship between sustainability-related reporting and firm performance. From this, the current research gap will then be identified and its significance, and the research question that ought to be answered by this study.

The importance of sustainability reporting

In the past decades, climate change concerns have become an increasingly important topic, with the social and environmental footprint of companies becoming more visible. Due to this, investors as well as other stakeholders have increasingly started demanding companies to report on their sustainability efforts, creating pressure for firms but also creating value opportunities for quality sustainability reporting (Amran & Ooi, 2014). Besides, Torelli et al. (2019) note that sustainability reporting also creates value for the company itself. Current literature increasingly accepts this value to be created through the notions of stakeholder theory, which emphasizes the need to consider all stakeholders, rather than just shareholders. These ideas are implemented in the sustainability reporting frameworks, which are taking a more multi-stakeholder approach. To elaborate on this, stakeholder theory is often found to be important for firm performance, as it implies making efforts towards treating stakeholders well, which in turn increases stakeholder trust and motivation that translates to increased effort (Harrison & Wicks, 2013). Disclosure is important in the subject of stakeholder engagement as it is a voluntary form of goal and challenge communication that allows building relationships with stakeholders (Al Amosh et al., 2022).

Thus, the importance of sustainability reporting is twofold: To conform to increasing (sustainability information) investor demands, as well as to create firm value by implementing a more stakeholder-oriented model.

Risks within sustainability reporting

Although, as indicated, sustainability-related reporting is very important for both companies and investors in assessing sustainability efforts, the new and developing way of reporting also comes with risks. De Silva Lokuwaduge et al. (2022) outline the issue of greenwashing due to need still for development of qualitative requirements, such as relevance, comparability, and materiality. Flammer et al. (2021) do, however, state that investors are aware of this risk of greenwashing will actually punish bad sustainability reporting. Thus, it seems that this risk of greenwashing is partially already controlled for by investors.

The current sustainability reporting landscape

Currently, there are three widely accepted sustainability-linked reporting frameworks. Bose (2020) outlines these sustainability-related reporting frameworks: the Global Reporting Initiative (GRI) guidelines, Sustainability Accounting Standard Board (SASB), and the IIRC (International Integrated Reporting Council) guidelines, the last one also being known as “Integrated Reporting”. The different reporting frameworks define themselves as follows:

Firstly, the GRI defines their mission as helping “businesses and other organizations take responsibility for their impacts, by providing them with the global common language to communicate those impacts” (Global Reporting Initiative, n.d.). According to the KPMG sustainability survey 2022, the GRI guidelines currently still remain the most-used sustainability reporting framework (“Survey of Sustainability Reporting”, 2022).

Secondly, the SASB denotes their mission to “connect business and investors on the financial impacts of sustainability”. It provides industry-specific measures for 77 different industries (Sustainability Accounting Standards Board, n.d.).

Thirdly, the IIRC posits itself as developer of the integrated reporting framework and thinking principles, to “advance communication about value creation, preservation, and erosion”. Although the integrated reporting principles still exist and research has been performed on integrated reporting, data is available only up to 2020 (Integrated Reporting, n.d.). Thus, it is not possible to analyze integrated reporting after 2020 and, thus, the integrated reporting principles will be excluded from this study due to the use of a more recent sample (2018-2022).

Although other impact reporting frameworks exist, such as the Carbon Disclosure Protocol (CDP), Climate Disclosure Standards Board (CDSB), and specific recommendations made by the Task Force on Climate-related Financial Disclosures (TCFD), these are aimed at small- and medium-sized enterprises (Bose, 2020). Therefore, as the S&P500 companies are all large companies, these reporting frameworks will be excluded from this study.

As this study attempts to conduct a comparative analysis of the different frameworks, it is also important to outline the differences between the disclosure frameworks that are included in this analysis: the GRI guidelines and the SASB standards. Bose (2020) notes that these frameworks take different stakeholder approaches: The GRI takes a stakeholder-oriented approach, whereas the SASB is primarily investor-oriented. Pizzi et al. (2022) also note that the frameworks differ in their definition of materiality, with the GRI materiality definition aims at “topics that reflect the company’s most significant impacts on economy, environment, and

people”, whereas the SASB defines materiality as information that would influence investment if left out or wrongly stated. Furthermore, Busco (2020) emphasizes that this differing audience and materiality definition may also affect the issues included in the disclosure, where GRI may (next to present material issues) also include issues that can materialize in the future.

The influence of sustainability performance on firm performance

Before the effect of sustainability-linked reporting on firm performance can be analyzed, it is important to first discuss the findings of (the different dimensions of) sustainability performance on firm performance.

On one hand, a study by Pulino et al. (2022) analyzed Italian companies in the period 2011 to 2020 and found a positive effect of ESG performance on firm performance as well as separately for the E and S dimensions on firm performance. No significant effect was found for the governance dimension. A study by Al Amosh et al. (2022), however, did also find a significant effect of governance on financial firm performance, but only on the company return on assets.

On the other hand, a study by La Torre et al. (2020) analyzed the effects of companies’ ESG scores on stock return within the Eurostoxx50 Index. They found that the effect of ESG efforts on company return varied from company to company, but in general did not find a significant positive effect.

Although the results differ per study, in general, most recent research does indicate a positive relationship between ESG disclosure and firm performance. This, for instance, is confirmed by Huang (2021), who analyzed 21 meta-analytical studies regarding ESG activity and firm performance. They found that in the mixed results, there exists a generally modestly positive relationship.

The influence of sustainability-linked reporting on firm performance

Similarly to the findings of sustainability performance on firm performance, much debate still exists regarding the effect of sustainability-linked reporting on firm value and firm performance. For this relationship, studies have found mixed results. However, these mixed results also seem to occur due to the differing reporting frameworks and circumstances.

Firstly, Chen & Xie (2022) studied the effects of ESG disclosure (measuring ESG disclosure as a dummy variable being 1 if the company disclosed ESG information in the previous year) on different measures of firm performance. They also found ESG disclosure to positively influence corporate financial performance, however, no specification is made here

as to what specific guidelines are used for these disclosures. Next to that, Khan (2022) performed a bibliometric analysis on 199 articles in the period 2012-2020, and actually found a positive indirect relationship between sustainability disclosure and firm value, through decreased cost of debt incurred by the disclosing firms.. Although these studies show positive relationships of ESG disclosure with firm financial performance, none of these analyze specific reporting frameworks.

Mervelskemper & Streit (2017) analyzed the influence of ESG performance, as well as the influence of integrated reporting specifically, on firm performance. They found that ESG performance is more valued by the market when a specific ESG report is published, as well as that integrated reporting is related to a higher effect on ESG and corporate governance performance, compared to when a separate ESG report is published, thus indicating the value of integrated reporting. However, for this study, a sample was used for the period 2010-2014, from the GRI Sustainability Disclosure Database. Similar to the IIRC database, this database has no longer provided reporting data after 2020 (GRI, n.d.).

As for the GRI guidelines, the results found by studies indicate a positive relationship between GRI disclosure on firm performance. For example, Aifuwa (2020) performed a content analysis bases on the GRI guidelines and found that, although disclosure level was generally low in developing climes (analyzing literature regarding primarily Nigeria, but also Romania, Malaysia, and Kenya), sustainability disclosure following the GRI guidelines is generally positively related to firm performance. Additionally, Laskar (2018) also performed a content analysis analyzing the influence of corporate sustainability reporting on firm performance and found a positive relationship of GRI-based disclosure on firm performance for Japan, India, and South Korea.

Regarding the effects of SASB disclosure on firm performance, Carvajal & Nadeem (2022) performed a study analyzing the effect of financially material sustainability reporting on firm performance, using the SASB concept to classify materiality. They found a positive relationship between sustainability reporting and firm performance in general for New Zealand, with the relationship being stronger if the disclosure was in line with the SASB materiality guidelines. Next to that, Eng et al. (2022) found that higher quality SASB disclosures increase firm value, although “boilerplate” disclosures were related to lower firm value. However, in general, the findings here also indicate a positive relationship, but the quality of the disclosure is importance to take into account. It is interesting to note that this importance of quality disclosure was not necessarily found in the study by Laskar (2018).

As for differences between two of the large-firm sustainability reporting frameworks, Pizzi et al. (2022) have published a study that compares the SASB standards and GRI guidelines, and that analyzes the drivers of adopting one framework over another, or of adopting a combination of both. They found that there are actually different drivers for adoption of the reporting frameworks: Adopting the SASB standards tends to be more directly financially driven, whereas adopting the GRI guidelines tends to be influenced more by sustainable and ethical principles. Another difference between the sustainability-related reporting frameworks, is the stakeholder orientation of the GRI guidelines compared to the investor-orientation of the SASB standards (and the IIRC principles) (Bose, 2020).

Hypotheses

Whilst, as shown above, there has been considerable research into the effects of certain types of sustainability reporting on firm performance and other firm-related characteristics, many relationships between the reporting frameworks are still quite unresearched due to the newness of these frameworks. As Pizzi et al. (2022) obtained interesting findings on the differences in drivers between GRI (being sustainability- and ethically driven) and SASB adoption (being more financially driven), it is also likely that the adoption of certain frameworks affects firm performance in different ways. Therefore, this research hypothesizes the following:

H1. There is a difference between the effects of using different sustainability-linked reporting frameworks on firm performance.

Although the differences in effects of the two sustainability linked reporting frameworks on firm performance have not yet been analyzed, their separate individual effects have been analyzed. Firstly, studies by Aifuwa (2020) and Laskar (2018) have found positive effects of GRI disclosure on firm performance. Next to that, research by Carvajal & Nadeem (2022), as well as by Eng et al. (2022) has found positive effects of SASB disclosure on firm performance.

Building upon this current research, the following hypotheses are constructed:

H2. There is a positive effect of GRI disclosure on firm performance.

H3. There is a positive effect of SASB disclosure on firm performance.

Although both relationships are hypothesized to be positive, analysis is necessary as to indicate potential differences between the different positive relationships, as well to analyze these effects when both methods are simultaneously included in a model.

The next section will outline the methodology that will be used to significantly compare these different reporting frameworks. First, the data sources and variables will be defined, after which the methods used for this research are outlined.

Methodology and Empirical Strategy

Data sources

The research question defined in the previous section will be answered using a sample including all of the companies that make up the S&P500 index, as it provides a wide variety of companies representing the U.S. economy, as well as due to the vast amount of data available for the S&P500 companies. This sample originally consisted of 503 companies, however, after removing double-reported companies (due to having multiple tickers), the dataset does indeed consist of exactly 500 companies. The chosen sample period is 2018-2022, as this is currently the most relevant measurable time period. Most of the data is gathered using Refinitiv Eikon, as well as the individual reporting framework database provided by the SASB, called the SASB Navigator. As noted before, no data exists regarding integrated reporting usage after 2020 (Integrated Reporting, n.d.), and thus, integrated reporting is excluded from this analysis.

Dependent variables

The dependent variable of this research is firm performance. Different measures can be used as indicators for firm performance, such as Tobin's Q and return on assets (RoA), as both are widely accepted measures of financial performance. Analyzing current literature shows RoA to be the generally most accepted accounting-based measure for financial firm performance and/or profitability (Carvajal & Nadeem, 2022; Khan, 2022; Lu et al., 2021), and to be calculated as the total net income (before finance expenses) of a firm divided by its total assets. Tobin's Q is used more as a measure of the market valuation of a company (Al Amosh et al., 2022). As both are generally accepted proxies of firm performance but slightly differ in concept, this study will utilize both as independent variables to analyze the effects of the different disclosure methods on both profitability and market valuation. Furthermore, there are two different accepted formulas for Tobin's Q. Firstly, Tobin's Q (book value method) can be calculated by dividing the market capitalization of a company by its total book value of shares (Al Amosh et al., 2022). Secondly, a calculation of Tobin's Q (total assets method) may be made by dividing market capitalization plus total liabilities, by total assets (Chen & Xie, 2022). Both of these Tobin's Q methods will be implemented as to increase the robustness of the

results. RoA, as well as the components for both Tobin's Q methods are retrieved from the Refinitiv Eikon DataStream.

Independent variables

For the main independent variables, dummy variables for the two most popular and measurable sustainability-linked reporting frameworks will be used: GRI and SASB.

Data regarding GRI disclosure is obtained from Refinitiv Eikon, which provides both GRI scores as well as a dummy variable for GRI disclosure. As such scores are not available for the SASB, this article will focus merely on the GRI dummy variable to allow significant comparison. This variable indicates "whether the company's CSR report published in that year is in accordance with the GRI guidelines" (where 0 = no, and 1 = yes).

As for SASB disclosure data, Refinitiv does not provide data on SASB disclosure. Thus, similar to Eng et al. (2021), SASB disclosure data is obtained from the SASB Navigator, which can be found on the website of the SASB (SASB, n.d.). The SASB Navigator provides a list of all companies that reported using SASB standards for each year. As noted before, the SASB does not provide an SASB score and, thus, a dummy is included for SASB indicating "whether a company's sustainability reporting is in accordance with the SASB standards in that year" (where 0 = no, and 1 = yes). As the SASB Navigator only includes companies that reported conform to the SASB Standards in each year, searching the SASB Navigator for each of the S&P 500 companies allows manually gathering data for each of the years in which the specific companies report on sustainability using SASB.

Firm-specific control variables

For the control variables, analyzing existing literature provides a set of commonly used control variables that are found to influence the relationship between sustainability disclosure and firm performance: Size and financial leverage (Al Amosh et al., 2022; Chen & Xie, 2022; Houqe et al, 2022; Khan, 2022). These control variables are also retrieved from the Refinitiv Eikon DataStream.

More specifically, size is measured through the market capitalization of the company, which is calculated by multiplying the number of shares with the share price at that moment. As the sample periods are years, this measure represents a year-average market capitalization. Leverage is measured through the net debt to total equity ratio, and also measures the year-average leverage.

Macro-economic control variables

In order to remove potential spuriously identified relationships due to exogenous events, it is also important to include macro-economic factors that might influence firm performance. Following the current literature, the primary influencing macro-economic factors are found to be inflation rate and GDP growth (Cheong & Hoang, 2021; Egbunike & Okerekeoti, 2018). This study will build upon this current literature by also including these variables in the model. Explicitly, inflation rate is measured as the change in the consumer price index in the current year, compared to previous year. COVID will also be included in the analysis, building upon current studies by Cardillo et al. (2022) and Zhang et al. (2022), in the form of the number of cases. More specifically, the log of the daily average number of COVID cases in that year will be included. The number of COVID cases is obtained from the Daily Infectious Disease Equity Market Volatility Tracker (Economic Policy Uncertainty Index, n.d.)

A complete overview of the implemented variables is found in table 1, which is located at the start of next page.

Table 1

Variable definitions

Variable	Definition
RoA	Return on Assets
TobinQbv	Tobin's Q as a ratio of market capitalization plus total liabilities, divided by total assets
TobinQta	Tobin's Q as a ratio of market capitalization divided by total book value
GRI	A dummy variable that equals 1 if the company reported on sustainability using the GRI guidelines.
SASB	A dummy variable that equals 1 if the company reported on sustainability using the SASB standards.
Escore	An indicator of a company's environmental score, based on a value between 0-100
Sscore	An indicator of a company's social score, based on a value between 0-100
Gscore	An indicator of a company's governance score, based on a value between 0-100
ITA	The log of the total assets of the company
DebtEquity	The leverage ratio of a company, measured by dividing net debt by total equity
Inflation	The inflation rate in the current year.
GDPgrowth	The percentage change in GDP in the current year compared to previous year.
ICOVID	The log of the daily average number of COVID cases in that year.

Methods

After the data from Refinitiv Eikon is merged with the separate data from the SASB database, the complete dataset will be imported into STATA, in which the analyses will be performed. A test procedure will be followed similar to that of Pulino et al. (2022), and Ellilli (2022).

First, descriptive statistics will be provided using the appropriate STATA commands, to create a visual overview of the exact variables and observations that are used in this research.

Then, Hausman tests will be performed for each of the dependent variables to test whether random effects or fixed effects is preferred regression method for this analysis. The results of this test will indicate the preferred regression method, which will then be chosen as the appropriate method for the regression analyses. More specifically, the Hausman test

proposes two hypotheses, with the null hypotheses stating the expected unobserved effect (fixed effect) to be zero, which if accepted indicates that random effects offers better estimates and should be used. The alternative hypothesis is for the unobserved effect to be different from zero, which implies that a fixed effects regression offers better estimates and should be used (Wooldridge, 2015).

After the method of regression is decided, multivariate regression will be performed, following the appropriate regression method, on the panel data to analyze the effects of sustainability reporting on firm performance, by regressing firm performance (RoA, Tobin's Q book value method, Tobin's Q total assets method) on the independent variables (GRI, SASB) and the control variables (SIZE, LEV). Specifically, the following complete regression model will be used:

$$\begin{aligned} \text{Firm performance} = & \beta_0 + \beta_1 * \text{GRI} + \beta_2 * \text{SASB} + \beta_3 * \text{Escore} + \beta_4 * \text{Sscore} + \beta_5 * \\ & \text{Gscore} + \beta_6 * \text{ITA} + \beta_7 * \text{DebtEquity} + \beta_8 * \text{Inflation} + \beta_9 * \text{GDPgrowth} + \beta_{10} * \\ & \text{ICOVID} + v_{i,t} \end{aligned}$$

Before results can be interpreted, it is important to perform several tests in order to identify the significance of the performed regression analysis. By simultaneously analyzing the effects of usage of both sustainability reporting frameworks (GRI and SASB), collinearity is possible as both disclosure methods may be implemented by firms. Similar to Pulino et al. (2022) and Ellilli (2022), the Variance Inflation Factor (VIF) will be used to analyze the (level of) multicollinearity between the different implemented variables. A multicollinearity test is of value in general, and especially here as there may be significant collinearity due to results of companies implementing a combination of the GRI and SASB guidelines.

Additionally, the regression analysis will also be performed with clustered standard errors. Comparing the results of this regression analyses to the unclustered regression analysis should show heteroskedasticity (indicated by possible differences) that cannot be shown through tests.

Expected type of outcomes

After having performed the regression analyses, it is expected to have obtained outcomes regarding possible significance problems with the model, which are ought to be corrected for by the different heteroskedasticity- and autocorrelation-controlling methods. Then, coefficients are expected to be obtained that represent the direction and magnitude of the

effect of the different types of sustainability disclosure on firm performance, as well as the size of the different control factors that are ought to also affect firm performance.

Results

Sample statistics

The summary statistics of the used variables in the sample can be found in table 2 below. The sample of this research consists of 500 companies over 5 time periods (in this case years), providing a potential sample of 2,500 observations per variable. Some interesting findings will be analyzed below.

Firstly, although only slight, it is important to point out that there are some deviations in the number of observations available per variable. For example, RoA has 2,408 observations, whereas there are 2,467 for the Tobin's Q book value measure, and 2,463 for the Tobin's Q total assets measure. The deviations are caused by differing availability of the components of the different firm performance measures.

Secondly, observing the values of the different Tobin's Q measures shows that the different calculations provide very different Tobin's Q ratios, with the first measure (the book value measure) having a mean of 5.682 and a standard deviation of 18.139, compared to the second measure (the total assets measure), which has a mean of 2.752 and a standard deviation of 2.409. This is interesting to note, as although the calculations to the ratio are very different, they ought to represent the same ratio. Also, both of the Tobin's Q mean values are above 1, which indicates that the firms in the sample in general are overvalued due to the firm's stock being more expensive than the replacement cost of its assets (Sucuachi & Cambarihan, 2016)

Lastly, analyzing the means of the disclosure variables (GRI and SASB) shows a 0.570 mean of GRI disclosure, and a 0.385 mean of SASB disclosure. This indicates that the GRI guidelines have been more widely used than the SASB standards over the time-period 2018-2022, within the S&P500.

Table 2

Summary statistics

Summary Statistics					
Variables	N	Mean	SD	Min	Max
RoA	2,408	0.087	0.069	-0.0703	0.303
TobinQbv	2,467	5.682	18.139	-82.720	97.868
TobinQta	2,463	2.752	2.409	0.436	14.390
GRI	2,495	0.570	0.495	0.000	1.000
SASB	2,500	0.385	0.487	0.000	1.000
Escore	2,474	56.023	25.540	0.000	98.142
Sscore	2,474	65.949	18.389	11.387	98.939
Gscore	2,474	64.133	18.679	2.131	99.482
ITA	2,463	4.395	0.597	1.631	6.573
DebtEquity	2,354	1.456	2.334	0.000	15.157
Inflation	2,500	0.036	0.025	0.0125	0.080
GDPgrowth	2,500	0.0208	0.028	-0.028	0.059
ICOVID	2,500	0.565	0.774	(0.487)	1.355

Correlations

Regarding the correlations between the different variables, table 3 shows all of the correlations between the variables used in this study. Although most of the correlations are quite low, there are also more significant correlations, which will be outlined and elaborated on below.

Firstly, the correlations between the different firm performance measures are found to be moderately high, especially between RoA and Tobin's Q (TA measure) with a correlation of 0.616, as well as between the different Tobin's Q measures (BV and TA) with a value of 0.569. Both of these cases can be explained by the common factors included in the different firm performance measures: RoA and Tobin's Q (TA measure) are each calculated by dividing by total assets, whereas both Tobin's Q measures include market capitalization in the numerator.

Next to that, there is also some moderate positive correlation between GRI score and Escore (0.560), GRI and Sscore (0.512), as well as within Escore and Sscore (0.665). Although these correlations are quite high, these results are similar to those found in related research such as by Pizzi et al. (2022) and comply with their idea that GRI disclosure is often driven by

sustainable and ethical norms, which are in turn reflected in higher positive E and S correlation values, compared to SASB disclosure which was found to be more driven by direct financial factors.

Furthermore, some correlation is found between the different macro-economic variables, especially between inflation and GDPgrowth (0.418), as well as between inflation and the natural logarithm of the average number of covid cases (0.386). Although, this correlation is not found to be problematic and is more likely random.

Table 3

Correlations matrix

Variables	RoA	TobinQbv	TobinQta	GRI	SASB	Escore	Sscore	Gscore	ITA	DebtEquity	Inflation	GDPgrowth	ICOVID
RoA	1.000												
TobinQbv	0.325	1.000											
TobinQta	0.616	0.569	1.000										
GRI	-0.081	0.008	-0.091	1.000									
SASB	-0.020	0.034	-0.037	0.297	1.000								
Escore	-0.109	0.019	-0.130	0.560	0.315	1.000							
Sscore	0.001	0.049	-0.018	0.512	0.282	0.665	1.000						
Gscore	-0.024	0.029	-0.076	0.321	0.162	0.299	0.249	1.000					
ITA	-0.427	-0.193	-0.406	0.231	0.154	0.375	0.306	0.171	1.000				
DebtEquity	-0.024	0.366	-0.010	0.028	0.013	0.049	0.032	0.014	0.005	1.000			
Inflation	0.074	-0.013	-0.030	0.136	0.496	0.145	0.170	0.156	0.066	0.011	1.000		
GDPgrowth	0.085	-0.021	0.009	0.016	0.070	0.014	0.022	0.037	0.011	-0.011	0.418	1.000	
ICOVID	-0.029	0.061	0.065	0.143	0.513	0.178	0.190	0.103	0.081	0.001	0.386	-0.252	1.000

Hausman tests

In order to analyze whether FE (fixed effects) or RE (random effects) is the preferred regression method, Hausman tests have been performed separately for all three models: the RoA model, and both of the Tobin’s Q models. The results of these Hausman tests are shown in table 4 below. As can be seen, both the RoA model and the Tobin’s Q book value model should be regressed using fixed effects, with Prob>Chi2 values of 0.004 and 0.000 respectively. However, for the second Tobin’s Q measure, the Hausman test indicates a Prob>Chi2 of 0.860, which is larger than the significance level of 5% ($0.860 > 0.05$) and, therefore, random effects is preferred for this third model.

Table 4

Output Hausman tests for both models

Variables	RoA	TobinQbv	TobinQta
Chi-squared	25.86	123.79	5.44
Prob>Chi2	0.004	0.000	0.860
Conclusion	Reject H0 Use FE	Reject H0 Use FE	Accept H0 Use RE

Regression analyses

The regression analyses are divided into three sections: The first two including (1) GRI and (2) SASB disclosure separately, in order to measure the individual effects necessary to answer sub questions 1 and 2. The third section includes both GRI and SASB disclosure, to measure the joint effect of both disclosure methods on financial firm performance.

For each of the previously mentioned sections, five regression analyses have been performed separately for each independent variable (RoA, TobinQbv, TobinQta): The first three models, including the E, S, G scores individually, the fourth including all of the E, S, G score variables, and the fifth being a clustered version of the fourth regression to check for the robustness of the model. Note that per section, the primary findings will be included in the main paragraphs, whereas the complementary findings are included in appendices A, B, and C.

Measuring individual effects: GRI disclosure

The most interesting regression outputs of the model including merely GRI disclosure (thus excluding SASB disclosure) are found in table 5, the rest of the results can be found in Appendix A. First, the primary results will be discussed for all of the three models individually, after which additional interesting findings will be discussed and compared collectively.

Firstly, as can be seen in table A1, the output indicates a negative individual relationship between GRI disclosure and RoA at the 10% significance level in models 2-5, but an insignificant relationship in model 1. Therefore, no significant individual relationship is found between GRI disclosure and return on assets. Also, no significant relationship is shown between each of the E, S, G scores and return on assets. The outputs indicate a significant negative relationship between leverage (DebtEquity) and RoA even at the 1% level and also when clustered, with a coefficient of -0.003. Similarly, clustered fixed effects also show a significant negative relationship between the log of Covid cases and RoA, with a coefficient of -0.008. Although GDPgrowth and inflation are also found to be significantly (positively) related to RoA in models 1-4, these are omitted in the clustered model due to collinearity.

Regarding table 5, although a significant positive relationship between GRI disclosure and Tobin's Q (book value method) is found at the 5% significance level in the first four models, clustering reduces this significance to 10%. Whilst GRI disclosure is significant only at 10% level in the fifth model, the consistent significance in the other model implies that to some degree, a significant positive relationship between GRI disclosure and TobinQbv is found. This is also the case for the log of total assets, which is seen to be significantly negatively related to Tobin's Q at the 1% significance level, although only at the 10% significance level when clustering the results. Similarly to the RoA model, no significant relationship is found between E, S, G performance and Tobin's Q. Lastly, contrary to the RoA model, significant positive relationships are found between leverage (coefficient 4.232) and Tobin's Q, as well as between the log number of Covid cases (1.090) and Tobin's Q.

Table 5

The effect of GRI disclosure on Tobin's Q (book value method)

VARIABLES	(1) FE	(2) FE	(3) FE	(4) FE	(5) Clustered FE
GRI	1.130** (0.487)	1.160** (0.476)	1.226*** (0.472)	1.169** (0.493)	1.169* (0.608)
Escore	0.005 (0.015)			0.005 (0.016)	0.005 (0.020)
Sscore		0.003 (0.018)		0.002 (0.020)	0.002 (0.019)
Gscore			-0.008 (0.012)	-0.008 (0.013)	-0.008 (0.012)
ITA	-4.928*** (1.455)	-4.885*** (1.447)	-4.838*** (1.443)	-4.918*** (1.456)	-4.918* (2.868)
DebtEquity	4.231*** (0.099)	4.231*** (0.099)	4.234*** (0.099)	4.232*** (0.099)	4.232*** (0.395)
Inflation	-38.650*** (6.346)	-38.570*** (6.388)	-37.630*** (6.394)	-38.000*** (6.486)	
GDPgrowth	27.800*** (5.020)	27.830*** (5.021)	27.810*** (5.017)	27.710*** (5.026)	
ICOVID	1.706*** (0.228)	1.715*** (0.227)	1.728*** (0.220)	1.701*** (0.230)	1.090*** (0.224)
Constant	22.180*** (6.247)	22.010*** (6.265)	22.440*** (6.266)	22.490*** (6.307)	22.060* (12.02)
Observations	2,305	2,305	2,305	2,305	2,305
R-squared	0.522	0.522	0.522	0.522	0.522
Number of c_id	482	482	482	482	482
Company FE	YES	YES	YES	YES	YES

Note. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

For the third model (Tobin's Q total assets method), of which the outputs are shown in table A2, no significant individual relationship between GRI disclosure and Tobin's Q is found at any significance level. Although S score is seen to be significantly positively related to Tobin's Q when included individually (regression 2), this relationship disappears when clustering the standard errors, and no robust significant relationships are found between E, S, G scores and this Tobin's Q either. Interestingly, GDP growth and inflation are not omitted due to collinearity in this model, and are both significant at the 1% significance level, as well as again the log of total assets and the log of the number of Covid cases. The log of total assets (-1.698) and the inflation rate (-10.020) are both found to be significantly negatively related to Tobin's Q, whereas GDP growth (7.933) and the log of the number of Covid cases (0.501) are found to be positively related to Tobin's Q.

It is important to note that the R-squared values differ quite significantly between the first two (fixed effects) models, showing values of 0.077 for the RoA model and 0.522 for the Tobin's Q model respectively. This is likely due to the inclusion of log total assets in the regression which, although not directly included in the computation, ought to be significantly related to total book value of a company.

In general, although no positive relationship was found for GRI disclosure on RoA and Tobin's Q (total assets method), a positive relationship is indicated between GRI disclosure and Tobin's Q (book value method). Thus, the second hypothesis is accepted: A positive relationship is found between GRI disclosure and firm performance.

Measuring individual effects: SASB disclosure

The outputs for the regression analyses, analyzing the individual effect of SASB disclosure on firm performance (hypothesis 3), are included in Appendix B, as well as the most interesting findings in table 6. Similarly to before, the results will first be analyzed per model, after which the different models will be compared and the hypothesis will be answered.

The outputs of the RoA model, shown in Table B1, show no significant relationship between SASB disclosure and RoA in any of the regression analyses. This is also the case for the E, S, G performance indicators. The results, however, do indicate that firm performance and leverage are negatively related (-0.003) at the 5% significance level, as well as firm performance and the log number of Covid cases (-0.008) at the 1% significance level. GDP growth and inflation are again omitted from the clustered regression due to collinearity.

The results of the regression analyses for the Tobin's Q (book value) model can be seen in Table B2. Again, no significant relationship is found between SASB disclosure and firm

performance (measured through Tobin’s Q book value method), nor between any of the E, S, G performance indicators and firm performance. Otherwise, results are quite similar to those of Table 5, with leverage and the log of the number of Covid cases both appearing to be significantly positively related to Tobin’s Q. GDP growth and inflation are again omitted in the clustered regression analysis due to collinearity.

Lastly, the outputs of the Tobin’s Q total assets model are shown in Table 6. As can be seen, in this case, a significant relationship is actually found between SASB disclosure and firm performance, however, contrary to previous literature, the relationship is actually negative. The findings suggest that disclosing on sustainability information using the SASB standards leads to a 0.120 decrease in Tobin’s Q. As for the E, S, G performance indicators, social performance is only found to be significant at the 5% level in the individual unclustered model (2), however, becomes insignificant in the clustered model. As for the control variables, results are similar to those in Table A2 in two ways: Firstly, with significant negative relationships between log of total assets and Tobin’s Q, as well as between the inflation rate and Tobin’s Q. Secondly, with significant positive relationships between GDP growth and Tobin’s Q, as well as between the log number of covid cases and Tobin’s Q.

Table 6

The effect of SASB disclosure on Tobin’s Q (total assets method)

VARIABLES	(1) RE	(2) RE	(3) RE	(4) RE	(5) Clustered RE
SASB	-0.119* (0.061)	-0.119* (0.061)	-0.112* (0.061)	-0.120* (0.061)	-0.120** (0.059)
Escore	0.004* (0.002)			0.001 (0.002)	0.001 (0.003)
Sscore		0.007** (0.003)		0.006* (0.003)	0.006* (0.003)
Gscore			0.003 (0.002)	0.002 (0.002)	0.002 (0.002)
ITA	-1.689*** (0.131)	-1.690*** (0.129)	-1.645*** (0.128)	-1.706*** (0.131)	-1.706*** (0.181)
DebtEquity	-0.025* (0.012)	-0.025* (0.012)	-0.024 (0.012)	-0.026* (0.012)	-0.026 (0.012)

	(0.015)	(0.015)	(0.015)	(0.015)	(0.028)
Inflation	-8.821***	-9.028***	-8.881***	-9.222***	-9.222***
	(1.134)	(1.140)	(1.145)	(1.154)	(1.270)
GDPgrowth	8.002***	7.972***	8.074***	7.985***	7.985***
	(0.856)	(0.856)	(0.856)	(0.857)	(0.783)
ICOVID	0.538***	0.533***	0.552***	0.531***	0.531***
	(0.039)	(0.039)	(0.038)	(0.039)	(0.055)
Constant	9.810***	9.592***	9.635***	9.557***	9.557***
	(0.561)	(0.560)	(0.565)	(0.571)	(0.815)
Observations	2,310	2,310	2,310	2,310	2,310
Number of c_id	482	482	482	482	482
Company FE	YES	YES	YES	YES	YES

Note. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

As seen in the outputs from Tables 6, B1 and B2, the results regarding a potential relationship between SASB disclosure and firm performance are mixed and next to that, the only identified significant relationship is found to be negative, in contrast to the literature. This implies that the third hypothesis cannot be accepted: No significant positive effect of SASB disclosure on firm performance is found.

Measuring joint effects

Lastly, the results of the different models measuring the joint effects of GRI disclosure and SASB disclosure are found in Tables 7, 8 and C1. Again, the results for the three models will be analyzed individually, after which the collective implications for the primary research question will be analyzed.

Table C1 in the appendix provides an overview of the findings from the five regression analyses performed to analyze the joint effects of GRI and SASB disclosure on RoA. As can be seen, no significant relationships are found at the 5% significance level between either of the disclosure variables and RoA. Apart from that, the only significant relationships found are negative, between leverage (-0.003) and RoA, as well as between the log of Covid cases (-0.008) and RoA. However, the magnitudes these coefficients are too small to be seen as a significant impact on RoA.

Table 7 reports the regression outputs for the joint effects of GRI and SASB disclosure on Tobin's Q (book value method). Whereas SASB disclosure is not found significant in any of five analyses, a significant and sizeable positive relationship between GRI disclosure and firm performance is found in models 1-4 at the 5% significance level. This significance, similarly to table 5, although again reduced to the 10% significance level when the standard errors are clustered to correct for autocorrelation and heteroskedasticity, does indicate a significant sizable positive effect of GRI disclosure on Tobin's Q (book value method). Similarly, the significance of the log of total assets is also reduced to the 10% significance level in the clustered model.

Table 7

The joint effect of GRI and SASB disclosure on Tobin's Q (book value method)

VARIABLES	(1) FE	(2) FE	(3) FE	(4) FE	(5) Clustered FE
GRI	1.151** (0.489)	1.181** (0.478)	1.249*** (0.474)	1.191** (0.494)	1.191* (0.611)
SASB	-0.192 (0.366)	-0.191 (0.366)	-0.196 (0.366)	-0.198 (0.366)	-0.198 (0.335)
Escore	0.005 (0.015)			0.005 (0.017)	0.005 (0.020)
Sscore		0.004 (0.018)		0.002 (0.020)	0.002 (0.019)
Gscore			-0.008 (0.012)	-0.008 (0.013)	-0.008 (0.012)
ITA	-5.000*** (1.462)	-4.956*** (1.454)	-4.910*** (1.449)	-4.992*** (1.463)	-4.992* (2.883)
DebtEquity	4.232*** (0.099)	4.233*** (0.099)	4.235*** (0.099)	4.233*** (0.099)	4.233*** (0.395)
Inflation	-37.310*** (6.842)	-37.240*** (6.880)	-36.240*** (6.900)	-36.600*** (6.980)	
GDPgrowth	27.910*** (5.025)	27.930*** (5.026)	27.910*** (5.022)	27.820*** (5.031)	

ICOVID	1.758*** (0.249)	1.767*** (0.248)	1.781*** (0.242)	1.755*** (0.251)	1.132*** (0.241)
Constant	22.470*** (6.273)	22.300*** (6.290)	22.740*** (6.292)	22.790*** (6.334)	22.400* (12.080)
Observations	2,305	2,305	2,305	2,305	2,305
R-squared	0.522	0.522	0.522	0.522	0.522
Number of c_id	482	482	482	482	482
Company FE	YES	YES	YES	YES	YES

Note. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Finally, table 8 below outlines the results of the five regression analyses for the joint effects of GRI and SASB disclosure on Tobin's Q (total assets model). Similarly to the individual effects of SASB disclosure on Tobin's Q total assets method (Table B3), a significant (at the 5% level) negative relationship is again found between SASB disclosure and Tobin's Q. The magnitude of the effect is also similar, at -0.119. Regarding the E, S, G indicators, only social score is found to be significant at the 5% level in the second model, however, the coefficient is ought too small to be seen as a significant impact.

Table 8

The joint effect of GRI and SASB disclosure on Tobin's Q (total assets method)

VARIABLES	(1) RE	(2) RE	(3) RE	(4) RE	(5) Clustered RE
GRI	0.020 (0.079)	0.014 (0.077)	0.044 (0.076)	-0.006 (0.081)	-0.006 (0.080)
SASB	-0.120* (0.061)	-0.120* (0.062)	-0.115* (0.061)	-0.119* (0.062)	-0.119** (0.058)
Escore	0.003 (0.002)			0.001 (0.002)	0.001 (0.003)
Sscore		0.007** (0.003)		0.006* (0.003)	0.006* (0.003)
Gscore			0.003	0.002	0.002

			(0.002)	(0.002)	(0.002)
ITA	-1.690***	-1.692***	-1.653***	-1.705***	-1.705***
	(0.131)	(0.129)	(0.128)	(0.131)	(0.180)
DebtEquity	-0.025	-0.025*	-0.024	-0.026*	-0.026
	(0.015)	(0.015)	(0.015)	(0.015)	(0.028)
Inflation	-8.828***	-9.034***	-8.901***	-9.223***	-9.223***
	(1.134)	(1.141)	(1.146)	(1.155)	(1.271)
GDPgrowth	8.001***	7.971***	8.066***	7.985***	7.985***
	(0.856)	(0.857)	(0.856)	(0.858)	(0.784)
ICOVID	0.538***	0.533***	0.550***	0.531***	0.531***
	(0.039)	(0.039)	(0.038)	(0.039)	(0.055)
Constant	9.814***	9.600***	9.660***	9.554***	9.554***
	(0.561)	(0.561)	(0.566)	(0.571)	(0.813)
Observations	2,310	2,310	2,310	2,310	2,310
Number of c_id	482	482	482	482	482
Company FE	YES	YES	YES	YES	YES

Note. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

In general, the results of the joint effect models including both GRI disclosure and SASB disclosure provided similar results their individual effect models, with a positive effect found of GRI disclosure on Tobin's Q (book value method) and a negative effect of SASB disclosure on Tobin's Q (total assets method). Especially the latter is interesting, as the effect found is actually contrary to the hypothesized effect, which was for the relationship to be positive. Although the different proxies for firm performance provided different results, some interesting effects can be induced from this. Whilst the third hypothesis was rejected due to no positive relationship between SASB disclosure and firm performance being found, a contrary (negative) significant result was actually found. Therefore, the results do answer the primary research question, as they indicate a difference between the usage of GRI and SASB disclosure on firm performance, with GRI disclosure leading to an increase in Tobin's Q (book value method) and SASB disclosure leading to a decrease in Tobin's Q (total assets method). Thus, there indeed appears to be a difference between the effects of using different sustainability-linked reporting frameworks on firm performance, which is in line with the main hypothesis. Economically, this implies that disclosing along GRI guidelines may generally increase firm

market valuation, whereas disclosing along SASB standards may decrease firm market valuation. It is not possible to establish exact magnitudes of these effects, as the significant effects were found for different versions of Tobin's Q, which (as previously seen) are not very comparable. Applying this differing effect (positive versus negative) to the different drivers and characteristics of the GRI disclosure compared to SASB disclosure, however, may imply that the more stakeholder-oriented approach from the GRI framework (compared to the shareholder approach) does provide value for the firm and, thus, show the value of stakeholder theory. This stakeholder value is then represented in the positive effect of GRI disclosure on firm performance. Within the same theory, the negative effects of SASB disclosure on firm performance are potentially caused by the primarily shareholder-oriented approach of the SASB standards. This implies that incorporating a stakeholder-oriented approach positively affects company market valuation. The result deviations (compared to previous literature) will be further elaborated on in the discussion.

As for the other variables, all of the regression analyses indicate in general no significant effect of environmental, social, or governance performance on financial performance, or only a negligible effect. This, contrary to most of the current literature, is actually in line with the findings by Torre et al. (2020). In general, positive effects of leverage on Tobin's are found, which is in line with the current research due to the performance opportunities provided by leverage (Al Amosh et al., 2022; Houqe et al, 2022). Interestingly, firm size was found to be negatively related to firm performance, which is in contrast to current literature. The following section will discuss the additions and limitations of this study and analyze potential causes for result deviations, as well as suggest future research opportunities, after which a summary and conclusion of the findings of this research will be provided.

Discussion and future implications

Previous studies found positive effects between GRI disclosure and firm performance (Aifuwa, 2020; Laskar, 2018), as well as between SASB disclosure and financial firm performance (Carvajal & Nadeem, 2022; Eng et al., 2022). This study attempted to build upon these findings by analyzing a potential difference in financial impacts of using these different sustainability-linked reporting frameworks. A sample of U.S. listed firms from the S&P500 index was analyzed to identify these effects in one of the most well-known indices in the world, however, both results in line and opposing current literature were found: GRI disclosure was found to positively influence Tobin's Q (book value method), whereas negative effects were found of using SASB disclosure on Tobin's Q (total assets method). Although this led to a

rejection of the third hypothesis, the primary research question is answered, as a difference in effects is found between the different sustainability disclosure frameworks and firm performance. In order to analyze these result deviations from previous research, it is important to analyze the additions of this research that might explain these deviations, as well as to outline flaws of this study.

This research added to existing research by implementing a wide range of control variables, controlling not only for sustainability performance (to exclude boilerplate sustainability disclosures), but also for firm-specific factors and macro-economic influences, as well as time-fixed and company-fixed effects. Thus, it may be possible that some of the previously identified relationships between sustainability disclosure disappear when controlling for such a wide range of control variables. Next to that, this study added to the current literature by making a first attempt at studying the effects of incorporating multiple sustainability disclosure methods into a singular model. Taking the two beforementioned arguments into account, this study provides an interesting addition to the current literature on sustainability disclosure and its effects, and provides groundwork for upcoming research to build upon. Although interesting results were found in this research, this study also certainly has some flaws.

Firstly, three different dependent variables were used, RoA as well as two different forms of Tobin's Q. Although it is helpful to include multiple measures for firm performance when analyzing the financial effects of sustainability disclosure, especially as they measure different kinds of firm performance (accounting-based/profitability versus market-valuation), one flaw does lie in the debate for Tobin's Q measures. This, as there appears to be quite some differences in the results between the different Tobin's Q methods (book value or total assets). Next to that, this study only analyzed the effect of sustainability-linked reporting on firm performance in same year, thus measuring only short-term effects, even though the effects of sustainability reporting on financial firm performance may take time to materialize. Lastly, although disclosure dummies were used in combination with E, S, G performance indicators, studying the relationship between sustainability disclosure and firm performance may benefit from GRI and SASB variables representing a score generated through a content analysis, to measure the quality of the disclosure more efficiently. Even though such a content analysis does create objectivity issues, it may help explain the negative relationship between SASB disclosure and firm performance found in this study. Specifically, the study by Eng et al. (2022) controlled specifically for SASB disclosure content quality, and found merely high-quality disclosures to provide positive value, whereas "boilerplate" disclosures were found to

negatively influence firm performance. The effect of SASB disclosure may be negatively affected by the exclusion of such a variable controlling for disclosure quality.

In future research, it seems especially important to first solve the current division regarding Tobin's Q calculation or at least attempting to generalize a specific calculation method, as to secure the objectivity of the firm performance measure. Apart from that, it would also be important to analyze the effect of disclosure on firm performance including different time gaps, to also consider the earlier identified potential medium-term and long-term effects. Lastly, it would also be interesting to perform the research for disclosure frameworks that are aimed at small- and medium-sized firms. In the next section, a brief overview of the findings of this research will be provided.

Conclusion

Currently, sustainability-reporting frameworks are still quite early in their development, with frequent changes within the frameworks themselves, as well as in the used frameworks in general. This research has made an attempt to study the effects of the two currently most-used sustainability-linked reporting frameworks, by performing different panel regression analyses of both the individual effects as well as the joint effects of direction and magnitude of these two reporting frameworks on firm financial performance. This study argued that there would be such a difference in effects of the different disclosure frameworks on firm performance, as in line with different characteristics and different drivers being previously identified. Two main findings resulted from the performed regression analysis: Firstly, a negative effect of SASB disclosure on firm performance (Tobin's Q total assets method). Secondly, a positive and sizable effect of GRI disclosure on firm performance (Tobin's Q book value method). Therefore, the research question of this study is answered by the regression results indicating that there is indeed a difference between the usage of the different sustainability-linked reporting frameworks on firm performance in the S&P500 index. This, due to the difference in the direction of the effects as well as the magnitude of the effects being acceptable, especially for GRI disclosure. Comparison of the magnitudes of the identified effects was not possible, as the effects were found for different measures of firm market valuation (Tobin's Q book value method compared to total assets method). Clustering of standard errors did reduce the significance of GRI disclosure on Tobin's Q to 10%, whereas 5% would be preferred. Next to that, this research only measured the immediate or short-term effects. Future studies could also study the medium- and long-term effects of sustainability disclosure on firm performance, as well as attempt to create more in-depth measures to measure

the quality of the disclosed information. Although much comparative research can still be performed on the subject of sustainability disclosure, this study has attempted to provide some new insights into the subject. Important to keep in mind is, whilst there are differences between the different characteristics, these differences should not only be seen as competing, but also as mutually supportive.

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Appendix A

Table A1

Individual effects of GRI disclosure on RoA

VARIABLES	(1) FE	(2) FE	(3) FE	(4) FE	(5) Clustered FE
GRI	-0.005 (0.003)	-0.005* (0.003)	-0.005* (0.003)	-0.006* (0.003)	-0.006* (0.003)
Escore	0.000 (0.000)			(0.000) (0.000)	(0.000) (0.000)
Sscore		0.000 (0.000)		0.000 (0.000)	0.000 (0.000)
Gscore			0.000* (7.62e-05)	0.000* (7.68e-05)	0.000 (0.000)
DebtEquity	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
ITA	-0.018** (0.009)	-0.018** (0.009)	-0.018** (0.009)	-0.018** (0.009)	-0.018 (0.028)
Inflation	0.231*** (0.039)	0.227*** (0.040)	0.219*** (0.040)	0.216*** (0.040)	
GDPgrowth	0.117*** (0.031)	0.116*** (0.031)	0.118*** (0.031)	0.117*** (0.031)	
ICOVID	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)	-0.008*** (0.002)
Constant	0.162*** (0.039)	0.160*** (0.039)	0.157*** (0.039)	0.154*** (0.039)	0.160 (0.119)
Observations	2,254	2,254	2,254	2,254	2,254
R-squared	0.075	0.075	0.077	0.077	0.077
Number of c_id	476	476	476	476	476
Company FE	YES	YES	YES	YES	YES

Note. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table A2

Individual effects of GRI disclosure on Tobin's Q (total assets method)

VARIABLES	(1) RE	(2) RE	(3) RE	(4) RE	(5) Clustered RE
GRI	0.006 (0.079)	(0.001) (0.077)	0.029 (0.076)	(0.020) (0.080)	(0.020) (0.081)
Escore	0.003 (0.002)			0.001 (0.002)	0.001 (0.003)
Sscore		0.006** (0.003)		0.006* (0.003)	0.006 (0.003)
Gscore			0.003 (0.002)	0.002 (0.002)	0.002 (0.002)
ITA	-1.682*** (0.131)	-1.685*** (0.129)	-1.647*** (0.128)	-1.698*** (0.131)	-1.698*** (0.180)
DebtEquity	-0.026* (0.015)	-0.026* (0.015)	-0.025* (0.015)	-0.026* (0.015)	-0.026 (0.028)
Inflation	-9.623*** (1.060)	-9.831*** (1.067)	-9.680*** (1.069)	-10.020*** (1.081)	-10.020*** (1.378)
GDPgrowth	7.948*** (0.856)	7.918*** (0.858)	8.014*** (0.856)	7.933*** (0.858)	7.933*** (0.776)
ICOVID	0.508*** (0.036)	0.503*** (0.036)	0.521*** (0.035)	0.501*** (0.036)	0.501*** (0.048)
Constant	9.797*** (0.561)	9.587*** (0.560)	9.642*** (0.566)	9.536*** (0.571)	9.536*** (0.814)
Observations	2,310	2,310	2,310	2,310	2,310
Number of c_id	482	482	482	482	482
Company FE	YES	YES	YES	YES	YES

Note. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Appendix B

Table B1

Individual effects of SASB disclosure on RoA

VARIABLES	(1) FE	(2) FE	(3) FE	(4) FE	(5) Clustered FE
SASB	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
Escore	-0.000 (0.000)			-0.000 (0.000)	-0.000 (0.000)
Sscore		0.000 (0.000)		0.000 (0.000)	0.000 (0.000)
Gscore			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
ITA	-0.018** (0.009)	-0.019** (0.009)	-0.019** (0.009)	-0.018** (0.009)	-0.018 (0.028)
DebtEquity	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003** (0.001)
Inflation	0.221*** (0.042)	0.216*** (0.043)	0.206*** (0.043)	0.207*** (0.043)	
GDPgrowth	0.116*** (0.031)	0.115*** (0.031)	0.116*** (0.031)	0.117*** (0.031)	
ICOVID	-0.003** (0.002)	-0.004** (0.002)	-0.003** (0.001)	-0.003** (0.002)	-0.008*** (0.002)
Constant	0.163*** (0.039)	0.162*** (0.039)	0.159*** (0.039)	0.155*** (0.039)	0.161 (0.120)
Observations	2,254	2,254	2,254	2,254	2,254
R-squared	0.074	0.074	0.075	0.075	0.075
Number of c_id	476	476	476	476	476
Company FE	YES	YES	YES	YES	YES

Note. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table B2

Individual effects of SASB disclosure on Tobin's Q (book value method)

VARIABLES	(1) FE	(2) FE	(3) FE	(4) FE	(5) Clustered FE
SASB	-0.123 (0.365)	-0.115 (0.365)	-0.109 (0.365)	-0.126 (0.365)	-0.126 (0.332)
Escore	0.015 (0.014)			0.014 (0.016)	0.014 (0.020)
Sscore		0.012 (0.017)		0.005 (0.020)	0.005 (0.019)
Gscore			-0.003 (0.012)	-0.005 (0.012)	-0.005 (0.012)
ITA	-4.905*** (1.463)	-4.767*** (1.454)	-4.659*** (1.448)	-4.905*** (1.465)	-4.905* (2.907)
DebtEquity	4.226*** (0.099)	4.227*** (0.099)	4.230*** (0.099)	4.227*** (0.099)	4.227*** (0.397)
GDPgrowth	27.930*** (5.031)	28.000*** (5.033)	28.140*** (5.029)	27.860*** (5.037)	
Inflation	-36.790*** (6.847)	-36.630*** (6.886)	-35.520*** (6.906)	-36.550*** (6.989)	
ICOVID	1.775*** (0.249)	1.802*** (0.248)	1.845*** (0.241)	1.767*** (0.251)	1.143*** (0.241)
Constant	22.100*** (6.279)	21.500*** (6.291)	21.920*** (6.295)	22.150*** (6.336)	21.760* (12.19)
Observations	2,305	2,305	2,305	2,305	2,305
R-squared	0.521	0.521	0.521	0.521	0.521
Number of c_id	482	482	482	482	482
Company FE	YES	YES	YES	YES	YES

Note. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Appendix C

Table C1

The joint effects of GRI and SASB disclosure on RoA.

VARIABLES	(1) FE	(2) FE	(3) FE	(4) FE	(5) Clustered FE
GRI	-0.005 (0.003)	-0.005* (0.003)	-0.005* (0.003)	-0.006* (0.003)	-0.006* (0.003)
SASB	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
Escore	0.000 (0.000)			-0.000 (0.000)	-0.000 (0.000)
Sscore		0.000 (0.000)		0.000 (0.000)	0.000 (0.000)
Gscore			0.000* (0.000)	0.000* (0.000)	0.000 (0.000)
ITA	-0.018* (0.009)	-0.018** (0.009)	-0.018** (0.009)	-0.018** (0.009)	-0.018 (0.028)
DebtEquity	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
Inflation	0.223*** (0.042)	0.219*** (0.043)	0.210*** (0.043)	0.207*** (0.043)	
GDPgrowth	0.116*** (0.031)	0.115*** (0.031)	0.117*** (0.031)	0.117*** (0.031)	
ICOVID	-0.003** (0.002)	-0.003** (0.002)	-0.003** (0.001)	-0.003** (0.002)	-0.008*** (0.002)
Constant	0.161*** (0.039)	0.158*** (0.039)	0.155*** (0.039)	0.152*** (0.039)	0.158 (0.120)
Observations	2,254	2,254	2,254	2,254	2,254
R-squared	0.075	0.075	0.077	0.077	0.077
Number of companies	476	476	476	476	476

Company FE	YES	YES	YES	YES	YES
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Note. Standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$