Master Thesis Business Economics

Are SRI institutions the driving force behind ESG scores, a research in Covid times.

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1. Introduction

ESG considerations are currently one of the trendiest topics in the financial industry. Consideration of ESG risk measures has increased as a result of growing knowledge of the negative effects of factors like global warming on firms' day-to-day operations. Investors and firms are paying attention to these ESG scores and recognize the importance of ESG for risk management and value creation. An example that made investors aware of the risks associated with ESG is the Deepwater horizon oil spill of BP in 2010. This disaster led to pressure from shareholders to firms of extractive industries to take these ESG risks into account. Globally, the pressure has increased significantly over the years and more and more firms are starting an ESG department. Hence, firms are investing for long–term considerations in order to build a strong business and a better world. The behavior of this strategy is called CSR (Corporate Social Responsibility).

Most papers written in the ESG literature focus on the potential financial returns that are accompanied with considering ESG scores in investment decision-making. Here, the focus lies on investment strategies such as investing in ESG ETF (Exchange Traded Funds) trackers (Folger-Laronde et al, 2020). In this paper I dive deeper into the driving mechanisms of ESG scores, which focusses on the relationship between SRI institutional ownership and ESG scores. Since data on ESG scores is becoming more accurate, (institutional) shareholders are able to track ESG scores and assess whether there is opportunity for possible ESG value creation. The research question in this paper is therefore:

"Are SRI institutional investors the driving force behind ESG scores?"

Here, the emphasis lies on the difference between institutional investors and another type of investor: the Social Responsible institutional investor (SRI investor). This type of investor considers the risk and benefits of ESG scores in investment decision making to a larger extent than regular institutional investors. Therefore, it is expected that firms with a large SRI investor shareholder percentage have higher ESG scores on average, compared to firms with lower SRI investor shareholder percentage. Based on this expectation the first hypothesis is stated:

1: "there is a positive relationship between SRI ownership and ESG scores on the firm level"

To find evidence for this relationship the following tests are conducted. First, a fixed effects baseline model is examined, where lagged institutional ownership and several lagged control variables are regressed against ESG scores. In addition, a similar regression is run with lagged SRI ownership where there is controlled for institutional ownership. Here, significant evidence is found that SRI ownership has a higher positive effect on ESG scores than institutional ownership. I find that an increase of one percentage point in lagged SRI ownership is associated with a positive 0.263% change in ESG score.

Furthermore, to find evidence for a causal relationship several additional tests are conducted. First, a Granger causality test is performed to address possible reverse causality. Here, evidence is found for a one way relationship between institutional ownership and ESG scores. In addition, a difference in difference estimation is run based on the years surrounding Covid-19, which serves as an exogenous shock that shed light on the importance of governance and social scores. In this estimation lies the additional value of this paper with respect to other literature. In the difference in difference approach a matching element is added, where treated firms with a higher SRI percentage ownership are matched with the control group, which consists of firms with a lower than 75 percentile SRI percentage ownership. This matching approach is conducted to deal with selection bias, as it could be the case that SRI institutions just pick the right firms with ESG potential, but are not necessarily the driving force for ESG score increases. In this estimation it is found that both firms with a low and high SRI percentage showed increased social and governance scores post Covid-19. In addition, significant evidence is found for higher governance score increases post Covid-19 for the control group. This finding is explained by the fact that firms in the treatment group already had higher scores pre Covid-19 with respect to the control group. Hence, there was more room for improvement in the control group. This indicates that Covid-19 served as an incentive to catch up on ESG.

Lastly, a similar difference in difference approach is conducted based on the difference in extractive industries during Covid-19. Literature and data on the past pandemic of the Mexican flu suggests that firm between industries react differently with respect to the importance of social and governance scores during pandemics (Lee and Ham, 2021 and Jin et al, 2020). With these sources, a treatment group is created with the Health, Food, Retail and Mining industry. In the difference in difference estimation, I find significant evidence for the Food and Retail industry that SRI ownership has a larger positive effect on the social score post period in the Food and Retail industry with respect to the control industries. For the Food industry I find that a one percentage point change in lagged SRI ownership brings a positive 0.272% larger change in the social score on average, with respect to the control group. For the retail industry I find that a one percentage point change in lagged SRI ownership brings a positive 0.158% larger change in the social score on average, with respect to the control group. In the health and mining industry negative coefficients of -0.137 and -0.142 are found, indicating that on average lagged SRI ownership brings a smaller change in the social score on average, with respect to the control group. Similar effects are found with regards to the governance score. These findings show that there are differences in ownership effects between industries, which can be explained by the ongoing duration of Covid-19 and the difference in working pressure among industries during Covid-19 which made it hard to invest in ESG.

Based on the above finding it is concluded that there is a positive relationship between SRI ownership and ESG scores, but no interpretable causality is found for the entire research period. Hence, the first hypothesis is not confirmed. Based on the matching difference in difference estimation I don't find causal evidence that firms with high SRI ownership have a larger increase in ESG scores than firms with low SRI ownership after Covid-19. Firms with low SRI ownership caught up post Covid-19 with regards to ESG, and showed stronger ESG score improvements with regards to the treatment group. Lastly, I find evidence that ownership effects differ between industries.

Following up on hypothesis 1, the question is if ESG scores are perceived as valuable in the market, since this is an incentive for (SRI) institutional investors to be a driving force behind ESG scores. Therefore, the second hypothesis is stated as:

2: "there is a positive relationship between ESG Scores and market premium."

To find evidence for this relationship a fixed effects model is performed which measures the impact of ESG scores on the market premium of the firm (market valuation minus book value). In this regression I find that a 1% increase in Log ESG Score leads to a 0.257% increase in the Log Market premium variable. In addition, individual ESG scores are regressed against the market premium, which again indicate the positive relationship between ESG scores and market premium.

In the following sections the research methods and results are clarified. First, in section 2 literature on the relationship between institutional ownership and ESG scores is discussed. Secondly, in section 3 & 4 the data usage and sources are illustrated and the research methods are explained in detail. Following up, the results of the different regressions are stated in section 5. Lastly, the results are discussed in section 6.

2. Literature review

As shareholder pressure grows, incorporating ESG scores is becoming a more essential aspect in institutional investors' stock selection. Stocks related to alcohol, coal, or smoking, for example, are less socially desirable to be held by an institution since they are perceived to be harmful to society. As a result, an increasing number of institutions are employing "positive social screening" to avoid investing in enterprises whose products or services are unethical, dangerous, or detrimental to society. In addition, institutions increasingly recognize the economic value that can be gained by taking into account ESG scores. These institutions are so called 'Social responsible investment investors' (SRI investors).

This tackles the investors side of social economics. On the other hand, individual firms are increasingly considering corporate social responsibility (CSR) as important. According to Khoury et al. (1999) the definition of CSR is: *"Corporate social responsibility is the overall relationship of the corporation with all of its stakeholders. These include customers, employees, communities, owners/investors, government, suppliers and competitors. Elements of social responsibility include investment in community outreach, employee relations, creation and maintenance of employment, environmental stewardship and financial performance".* In other words, society expects firms to not only chase profits, but also play a desirable role in society by considering ESG measures.

Many studies with regards to these two topics have been done, where the emphasis lies on the relationship between (SRI) institutional ownership and ESG scores. As discussed in the introduction, in this paper the methodology is extended with a matching difference in difference approach, which focuses on the period of Covid-19. In this way this paper distinguishes from other literature. To get a better understanding of literature on ESG scores, In the following section the ESG scores are first elaborated and defined. Secondly, literature on the relation between institutional ownership and ESG scores is discussed. Lastly, (industry) specific effects of Covid-19 are discussed which can impact ESG scores.

2.1 ESG scores

ESG scores provide investors information about Environmental Social and Governance effects, which typically is not accounted for on a balance sheet. In this way an investor can assess whether a firm cares about measures such as energy efficiency, CO2 omission or product safety. To clarify, ESG scores measure if a firm takes into account the risk and opportunities that are associated with incorporating ESG. For example, a high energy efficiency score is not only beneficial for the environment, but also reduces costs. Investors are increasingly paying attention to these measures and understand the

financial and environmental/social benefits an investment in a corporation with high ESG scores can have.

There are several providers of ESG scores, which all have their own method for calculating ESG scores. Some of these providers are:

1. **Thomson Reuters**: provides ESG scores on an annual basis, based on annual reports, company websites, NGO websites, Stock exchange filings, CSR reports and news sources. The scores are reported as a score of 0 to 100, which represents the relative ESG risk position in their database. The ESG score is divided into the Environmental, Social and Governance pillar score which again consists of several other scores. As a result, a very detailed overview of possible ESG risks and opportunities is produced.

2. **ESG Analytics**: provides ESG scores on a real-time frequency, based on annual reports, company websites, NGO websites, Stock exchange filings, CSR reports and news sources. The scores are reported as an ESG Pulse which is a score of -1 to 1, meaning that a score of 0 is the average score in the database. The ESG Pulse is bases on 26 independent ESG measures.

3. **Morningstar Sustainalytics**: provides ESG scores on an annual frequency, based on annual reports, company websites, NGO websites, Stock exchange filings, CSR reports and news sources. The ESG score is measured on a scale of 0 to 100 and measures the unmanaged ESG risk of a company, based on several independent ESG measures. This score is calculated by subtracting the manageable ESG risk from the total exposure to ESG risk. In this way a standardized ESG score is determined, that can be compared across companies and industries.

Here, it is clearly seen that methodologies for calculating ESG scores differ between the data collectors. Therefore, results on the relationship between institutional ownership and ESG scores is heavily based on which data provider is used. In this paper the Thomson Reuters Database is used as main data provider, as this provides most data on the individual pillar scores.

2.2 Institutional ownership and ESG scores

There are many theories on the effects of institutional ownership on ESG scores, where several reasons are given that could motivate shareholders to improve ESG scores. First, institutional investors are increasingly getting demand from their shareholders to tackle environmental and social issues. Here, shareholders are willing to give up financial performance and pay a premium to invest in SRI firms. As

an example, Riedl and Smeets (2017) find that social preferences play a major role in explaining SRI decision, even more than financial motives.

Secondly, institutional investors acknowledge that considering SRI decision-making can attract a broader and different audience for fund inflows. Clients of SRI institutions are willing to pay higher management fees, even though the expected return is lower than other non-SRI institutions (Riedl and Smeets, 2017). Similarly, Bialkowski and Starks (2015) find that fund inflows of SRI institutions is more persistent than fund inflows from non-SRI institutions, even when looking into the financial crisis of 2008. This is an incentive for institutions to attract these kind of shareholders.

Lastly, institutional investors deviate from individual investors that only invest in a couple firms. In order to achieve high risk-adjusted returns, It is in the best interest of institutional investors to create long-term portfolios that representative a majority of the market. Since ESG considerations are increasingly being adopted in the market, it makes sense that institutions take these considerations into account. To limit the exposure to negative externalities of ESG risks, it is in the institutions interest to minimize exposure to these risks and therefore to increase a firms ESG commitments (Krüger, 2015).

Based on these theories, it is expected that a positive relationship between institutional ownership and ESG scores is found in literature. On the contrary, in early literature evidence is found for both positive and negative relationships. (Faller & Knyphausen-Aufseß, 2016). Therefore, in this section several theories and studies are elaborated.

One of the first studies that researches the relationship between institutional ownership and ESG scores is the paper from Neubaum and Zahra (2006). In this paper the authors examine a sample of 383 firms of the Fortune 500 for time periods between 1993 and 2000. From these firms, data is gathered on institutional ownership, control variables and CSP scores (Corporate Social Performance scores, from now on ESG scores) from the MSCI KLD Database. In their linear regressions, institutional ownership is divided into long- and short- term ownership. Here, the authors find that (lagged) long-term institutional ownership is positively related to ESG scores. In addition, the authors examine institutional ownership activism and find that long-term institutional activism is also positively related to ESG scores. Similarly, the authors don't find this relationship for short-term institutional ownership. This finding is in line with the stakeholder salience theory: firms respond to their long-term shareholders as they are more dependent on these investors than short-term shareholders.

In contrast, Arora and Dharwadkar (2011) find different results for this relation. In their study a sample is created from the S&P 500 firms and similar to Neubaum and Zahra (2006) ESG scores are gathered from the MSCI KLD Database. With these data a random effects model is run, where the authors find that (lagged) institutional ownership is negatively related to ESG scores. Their hypothesis, which posits

that institutions prioritize financial performance, is supported by this finding. ESG has the ability to improve financial performance, however these advantages are largely indefinite and unclear. Managers are under pressure to eliminate ESG in financial decision-making as a result of this uncertainty.

Here, clearly different results are shown which partly can be explained by the institutional ownership variables. Whereas Arora and Dharwadkar only consider institutional owners that own 5% or more of shares in a firm, Neubaum and Zahra consider institutional ownership percentages from 1% and up. In addition, Arora and Dharwadkar don't split up their sample in short- and long-term ownership. This can alter results significantly and can explain why Neubaum and Zahra only find a positive effect of long-term institutional ownership on ESG scores.

A more recent paper dives into these mixed results. This is a paper from Gloßner (2019). In this paper an OLS panel regression is run on a dataset of about 9,000 US firm-year observations, where the focus lies on the effect of investment horizon and institutional blockholders (at least 5% of shares in firm) on ESG scores from the MSCI KLD Database. Consistent with his hypothesis and the above discussed papers, Gloßner finds that investor horizon is positively related to ESG scores. Similarly, Starks et al (2017) find that firms with better ESG scores have mostly institutional investors with a long-term horizon. This confirms the theory that short-term investors engage less in ESG to mitigate risk and are pressured into short-term profits and earnings management. Also, Gloßner divides his sample into blockholders and non-blockholders. Here, it is found that long-term non-blockholders is significantly positively correlated with ESG scores, whereas long-term blockholders is significantly negatively correlated with ESG scores. This finding indicates that blockholders have a more critical view on ESG scores and moderate a firms ESG considerations more extensively. Blockholders collect more detailed information about firms they are invested in and consider that not every CSR investment is in the interest of shareholders. The rationale behind this is that the focus should not lie on increasing (already) high ESG scores, but on reducing ESG concerns (increasing low ESG scores). Therefore, blockholders moderate the overall positive effect of long-term investors on ESG scores.

In the discussed papers the results clearly depend on the assumptions and variables that are being taken to run regressions. Here, the literature points towards the same conclusions when there is accounted for differences in the data. Therefore, it is important to interpret results with caution.

2.3 SRI institutional ownership and ESG scores

In the previously discussed papers, the authors mainly focus on institutional ownership, but do not make a distinction between SRI and non-SRI institutional ownership. One of the first authors who examines the difference between these institutions is a paper from Dyck et al (2019). In this paper Dyck et al expect that SRI institutions have a larger impact on ESG scores of firms, since these institutions incorporate ESG issues in their investment decision making. Here, the SRI institutions are defined as members of the UN PRI signatories. These signatories are forced to consider ESG goals in decision making and have access to several databases and events with respect to ESG considerations. As expected, Dyck et al find evidence that SRI ownership has a bigger impact on ESG scores than non-SRI ownership.

Another paper that discusses the different effects of ownership types is the paper from Kim et al (2019). In this paper the authors research the relationship between local institutional ownership and toxic releases in the US. Here, the authors find a negative relationship and explain this by stating that local institutional investors influence pollution policies of nearby facilities. Additionally, Kim et al. categorize their institutional owners into local SRI and non-SRI investors and discover evidence that SRI funds have a larger negative relationship with toxic releases than non-SRI funds. This demonstrates that SRI investors have a greater impact on ESG scores, in agreement with Dyck et al.

Lastly, an interesting paper that sheds light on the importance of defining your institutional investors is a paper from Alda (2019). Here, the author tackles that ESG investment decisions has a clear link with long-term investment horizons, as discusses in various discussed papers. Here, the author recognizes that only few studies analyze separate institutional form effects, especially pension funds. Alda claims that these funds have more pressure to incorporate ESG commitments, since managing retirement savings is one of the most long-term investment horizons. Therefore, in this paper the relationship between SRI pension funds, which are gathered from the Morningstar Direct database, and ESG scores is researched in the United Kingdom. Alda finds a significant positive relationship for 41 percent of used ESG subcategories, indicating that pension fund ownership partially drives ESG scores.

2.4 Literature on dealing with reverse causality

The majority of the papers under discussion don't provide evidence for a causal relationship between institutional ownership of (SRI) companies and ESG scores. Institutional ownership is regressed against a number of ESG scores in the conducted regressions (SRI), but it is not taken into account that this relationship could be the other way around. Firms with higher ESG scores could attract (SRI) investors, leading to reverse causality problems. Chen et al (2020) is one of the papers that tackles this issue by using a quasi-natural experiment. A two-stage least squares model is used in their study design, with

the first stage measuring institutional ownership change based on inclusion in the Russell 2000 Index. In this stage, the authors find that the inclusion in the Russel 2000 index leads to higher institutional ownership. With these exogenous institutional ownership increases, the causal effect is quantified on the ESG scores in the second stage. Here, evidence is found that exogenous increases in institutional ownership leads to higher ESG scores on the firm level. additionally, Chen et al run their regression on subcategories of ESG scores and find that different subcategories hold unequal importance for institutional investors. Institutional investors seem to only care about reducing ESG risks that could lead to lawsuits, gender discrimination, unsafe working environment and not following environmental regulations. This is in line with the paper from Gloßner (2019) but could also be explained by the fact that institutional investors do not have the manpower to monitor all ESG activities of their holdings and therefore focus on reducing ESG risks rather than exploiting ESG potential (Fich et al, 2015).

Another paper that investigates causality, is the paper from Dyck et al (2019). As discussed, this paper first establishes differences between the effect of institutional ownership and SRI institutional ownership on ESG scores. The authors next conduct a quasi-natural experiment to demonstrate the causality of this link. In this scenario, the 2010 BP Deepwater Horizon oil spill is serves as an exogenous shock. The immediate negative effect of this shock was only on BP, but it did shed light on the importance of environmental commitments of firms in the oil industry. Here, the hypothesis is that if institutional ownership drives environmental scores, that firms with a larger institutional ownership before the exogenous shock would show higher environmental scores after the shock. The rationale behind this is that institutional investors are better able to force through policy changes. For this test, the authors conduct a difference in difference test, where the oil sector is taken as the treatment group. In this approach, the authors look into the interaction term of institutional ownership * treated firms * post event and find evidence for a positive and significant effect of the Deepwater Horizon shock on the relationship between institutional ownership and environmental scores. In this way, a causal relation between institutional ownership and environmental scores is established.

In this paper the research approach from Dyck et al is taken as a baseline and extended with a difference in difference matching approach to account for selection bias. In addition, I look into the causal relationship of SRI ownership and ESG scores in the difference in difference estimation, whereas Dyck et al (2019) only finds causal evidence for the positive relationship between institutional ownership and ESG scores. This method is discussed in the methodology section. Also, I look into recent ESG scores by conducting a difference in difference approach with Covid-19 as exogenous shock. Similar to Deepwater Horizon, Covid-19 had a different impact on the importance of mostly social and governance scores across industries (whereas Deepwater Horizon impacted environmental scores). For instance, in the health industry can be assumed that social scores such as product responsibility

have become of greater importance since Covid-19. In addition, there is a difference in shock, as Covid-19 targeted all industries, whereas the Deepwater Horizon oil spill didn't impact performance of most industries. I examine these industry differences in the following section. Lastly, in section 2.6 possible effects of SRI ownership pre-Covid on ESG scores after Covid-19 are discussed.

2.5 Impact of Covid-19 on social scores across industries

On 11 March 2020 the Covid-19 pandemic was officially declared by the World Health Organization. This pandemic has had a big impact across industries both performance and social wise, leading to large reorganizations in some industries. As of today, there is uncertainty about the origination of Covid-19, but we do know that it is being transferred through air by coughing and human contact. Therefore, in some industries the importance of considering social and governance scores have become of greater importance. This is in the industries where human contact is hard to avoid.

For example, in the food processing and service industry there is a movement that food should be processed and served more carefully and safely, avoiding most human contact. One of the papers that discusses the changes in the food processing and service industry is the paper from Lee and Ham (2021). In this paper, the authors acknowledge that Covid-19 is transmitted via droplets and direct contact. Therefore, the food service sector is one of the primary sources where Covid-19 is transmitted, which should be prevented by enhancing social pillar scores like product responsibility. Lately, trends are seen in this industry to prevent the transmission, such as no more shared dining and the increase in use of robots for food processing. These trends indicate the importance of an increase in social scores. Also, the authors mention that food service businesses are increasingly understanding the importance of consumer confidence in the food service industry to enhance profitability. This can be achieved by implementing lines such as cleaning and sanitizing, restructuring table layout in restaurants, requiring employees to wear masks and gloves and minimizing human contact with products. All these findings indicate business investments in CSR (Corporate Social Responsibility) have a positive impact on business performance, hence the importance and increase of social scores in the food industry during Covid-19.

Another industry where we see this movement is the healthcare industry. Similar to the food industry, in the health industry it is hard to avoid human contact. Therefore, measures need to be taken to enhance scores, hence health and safety. A paper that confirms this is the paper from Jin et al (2020) that finds that in a hospital in Wuhan during the Covid-19 outbreak the main reasons for infection between professional staff was not maintaining protection when working in close distance with patients. In reaction, a lot of healthcare departments have changed their way of working in order to mitigate risk of infection, hence upgrading social scores. An interesting paper from Haldane et al (2021) follows the responses of the healthcare sector to Covid-19 across 28 countries and finds that a strong

health workforce is key in creating a resilient health system, meaning that CSR investment in training, recruitment and mental health guidance is necessary to maintain performance. Again, we see a strong indication that social scores during Covid-19 have increased.

Based on the discussed literature it is assumed that the food and healthcare sectors now (should) place a stronger emphasis on governance and social scores, compared to other industries. In the research section, I examine these scores during the 2008 swine flu pandemic to test for potential other industries that are more significantly impacted by Covid-19 to raise governance and social scores. these industries are designated as the treatment group in the difference in difference analysis. This method is covered in more detail in the methodology section.

2.6 Possible impact of SRI ownership pre-Covid on ESG scores after Covid-19

As briefly mentioned, the Covid-19 shock is hardly comparable with the Deepwater Horizon oil spill shock. Whereas Covid-19 targeted all industries, but too different extents, the Deepwater Horizon oil spill affected mostly the performance of extractive oil industries. Therefore, there are different hypothesis on what the impact of SRI-ownership pre-Covid on ESG scores after Covid-19 is, which can't be compared with the Deepwater Horizon disaster.

One hypothesis is that the overall shock has led firms to neglect the consideration of ESG scores entirely. Since Covid-19 affected the financial performance of many industries, firms didn't have excess resources to invest in ESG measures. Therefore, a negative trend in ESG scores is expected after Covid-19. Since firms with high SRI ownership have a superior understanding of how to invest in ESG with limited resources, it is anticipated that their ESG ratings will decline less than those of firms with low SRI ownership prior to Covid-19. In other words, firms with a high SRI ownership percentage are more resilient to the Covid-19 shock with regards to ESG scores.

Another hypothesis is that Covid-19 highlighted the significance of taking ESG ratings into account. In many industries the only way to continue operating was to change policies entirely. These measures taken are closely related to social and governance scores such as product responsibility and workforce score. As discussed in the previous paragraph, an example is that firms in the healthcare and food industry need to upgrade social and governance scores in order to continue operating. Therefore, a positive trend in ESG scores is expected after Covid-19. Here, it could be the case that firms with a high SRI ownership percentage experience a higher growth in ESG scores after Covid-19 since these firms are better to act on the ESG opportunities. Lastly, a hypothesis is that firms with high SRI ownership already had high ESG scores pre Covid-19, whereas firms with low SRI ownership had lower ESG scores. Therefore, Covid-19 especially is an incentive for firms with low ESG scores (hence low SRI ownership

pre Covid-19) to catch up. In this line of thinking more growth in ESG scores post Covid-19 is expected among firms with low SRI ownership pre Covid-19.

Based on the discussed research the expectation is that ESG scores have risen after Covid-19, where we see a stronger increase in ESG scores among firms with high SRI ownership percentages. To confirm this statement the first difference in difference is performed. In addition, the second difference in difference is conducted to disentangle industry differences during Covid-19.

3. Data

In this section, the data sources are described that are used to obtain the sample. Also, the descriptive statistics of the sample are given and discussed. Lastly, data checks are performed and elaborated.

3.1 ESG Data

First, the CRSP/Compustat merged database is used to obtain US firms from the AMEX, NYSE and NASDAQ stock exchanges. From these firms ESG data is gathered from the Refinitiv/Thomson Reuters ESG database for the years 2012 to 2021. Refinitiv provides ESG data for nearly 80% of global market cap in 76 countries. Based on annual reports, company websites, NGO websites, Stock exchange filings, CSR reports and news sources, Refinitiv collects ESG data and creates around 450 standardized ESG data points at a yearly frequency. The 450 ESG data points are stacked on top of the other like a pyramid, ending with the ESG score. To clarify, the Environmental, Social, and Governance scores are independent of one another and are again based on smaller scores, such as the Emission score. In this paper I look into the following ESG scores:

1) Environmental pillar score, which consists of the:
    - Emission score, measures a firm's commitment and effectiveness to reduce emission in operating processes[1];
    - Environmental innovation score, measures a firm's capability to reduce environmental cost due to innovation and thereby creating new market opportunities;
    - Resource use score, measures a firm's commitment and capacity to reduce the use of resources like energy and water.
2) Social pillar score, which consists of the:
    - Human rights score, measures the firm's willingness and commitment to respect the fundamental human rights conventions;
    - Workforce score, measures a firm's effectiveness towards a healthy work environment, diversity and job satisfaction.
    - Product responsibility score, measures a firm's ability to produce goods and services that take into account customer safety, privacy and health.
    - Community score, measures a firm's commitment to respect public health and business ethics.

[1] Scores descriptions are gatherd from Erasmus Data Service Center manual.

3) Governance pillar score, which consists of the:
    - CSR strategy score, measures the level in which a firm communicates that it incorporates ESG in decision making.
    - Shareholders score, measures the effectiveness in equal treatment of shareholders and their use of anti-takeover measures.
    - Management score, measures a firm's commitment in following governance principles.

3.2 Institutional data

The Refiniv/Thomson Reuters institutional holding database is used to acquire institutional data on the 2148 US firms. this database offers information about individual institutional ownerships holdings and manager names, based on 13f-Filings from the SEC (Security Exchange Commission). In this way, yearly information is gathered on institutional manager names and institutional holding amounts for each firm in the sample. With the total outstanding shares and the institutional holding amounts the percentage of total institutional ownership is calculated for each stock-year.

In addition, we divide the institutional manager names, which consists of 9715 institutional investors, into Social Responsible Investor (SRI) institutions and non-SRI institutions. This distinction is based on whether firms are an UN PRI signatory. This method follows the paper from Dyck et al (2019): "Being an UN PRI signatory commits the institutional investor to more environmental and social activism". This is true since signatories get to participate in ESG events, receive tools for evaluating their ESG activities, get access to other signatories reports and a platform for ESG research, receive support from an ESG relationship manager and are given advice on how to incorporate ESG considerations into investment decision-making. In this way, the UN PRI community, which currently numbers over 5000 institutional investors, adds value by including emerging ESG criteria that Impacts individual's firm's ESG performance. Matching institutional investors in the sample, it is found that 1109 out of 9715 institutional investors are UN PRI signatories at the end of our sample period (in 2012 only 249 are UN PRI signatories). Based on these signatories the SRI institutional percentage is calculated for each stock-year, by looking into total outstanding shares and the SRI institutional holding amounts.

3.3 Control variables

Furthermore, data on control variables is gathered from the CRSP-Compustat merged database. For the sample several balance sheet, income statement, and cash flow statement items are gathered to control for the following variables:

1) The logarithm of total assets is added to control for difference in firm size that is shown to influence institutional ownership (O'Bryan et al, 1990).

2) Return on assets (net income / total assets is added to control for difference in performance of companies. Prior research has shown that there is a relationship between firm performance and ESG engagement (Alareeni and Hamdan, 2020; Hong et al, 2012).
3) R&D expenses is added to control for difference in technology growth. Here, the finding of Fischer and Sawczyn (2013) is followed. They find that R&D expenses are a determinant for incorporating sustainable improvements to acquire competitive advantages.
4) Leverage (Total Liabilities / (Total liabilities + Equity value), Tangibility (Total assets – Total liabilities – Intangible assets) and Liquidity (Current assets / Current liabilities) are added to control for credit constraints. Research has shown that credit constraints effect the adaptation of incorporating ESG (Zhang, 2022).

Lastly the variables Book value (Total assets – Total Liabilities) and Market valuation (stock price * diluted outstanding shares) are obtained from the CRSP-Compustat merged database. These variables are used for the analysis of the 2nd hypothesis, which is discussed In the Methodology.

3.4 Summary statistics

In the following table the summary statistics for the ESG scores are given. In table 1 this is given for the full sample and in table 2 per industry for the three pillar scores.

Table 1: Summary statistics ESG scores

Variable (Score)	Mean	Std. Dev.	Min	Max	Observations
ESG	34.51	16.28	0.44	95.54	8,896
Environmental pillar	27.54	21.20	0	98.55	4,656
Social pillar	37.56	19.00	0.41	97.82	8,889
Governance pillar	44.35	21.21	0.17	96.74	8,896
Environmental innovation	44,97	22.79	0	99.37	1,920
Resource use	40,95	28.16	0	99.89	3,440
Emission	37.31	28.30	0	99.66	3,635
Community	53.67	23.13	0.33	99.95	8,889
Work force	36.21	24.65	0.12	99.89	8,889
Human rights	45.29	25.77	0	99.06	2,713
Product responsibility	41.06	24.26	0	99.41	8,262
CSR strategy	43.54	28.40	0	99.67	2,316
Management	49.24	27.96	0.12	99.97	8,896
Shareholders	50.07	28.29	0.01	99.99	8,896

Table 2: Summary statistics ESG pillar scores per industry

	Environmental pillar		Social pillar		Governance pillar	
Industry	Mean	Obs.	Mean	Obs.	Mean	Obs.
Agriculture	17.82	11	22.52	15	47.57	15
	(12.98)		(15.15)		(15.76)	
Mining	29.30	109	31.48	119	46.41	119
	(21.89)		(20.28)		(25.40)	
Construction	15.62	41	29.18	50	41.87	50
	(11.64)		(21.89)		(22.41)	
Manufacturing	31.07	1,916	39.63	3,961	43.06	3,964
	(24.49)		(20.58)		(20.62)	
Transportation	27.59	394	32.83	545	46.55	545
	(22.39)		(17.27)		(22.61)	
Wholesale	20.13	164	32.78	211	49.22	211
	(18.44)		(16.06)		(21.30)	
Retail	29.50	315	52.58	416	42.15	419
	(27.04)		(16.18)		(20.45)	
Finance	19.07	932	32.75	1,973	45.12	1,974
	(20.29)		(14.93)		(20.41)	
Services	29.93	762	40.16	1,587	42.88	1,587
	(23.58)		(19.04)		(22.23)	
Public	0.00	0	0.00	0	0.00	0
administration	(0.00)		(0.00)		(0.00)	
Non classifiable	51.55	12	52.00	12	54.57	12
	(30.87)		(27.07)		(32.78)	
Total		4,656	8,889		8,896	

Table 1 shows that there is ESG data on about 8896 firm-year observations for the Social and Governance pillar scores, whereas there is only data on 4,654 firm-year observations for the Environmental pillar score. Also, as expected the scores lie between 0 and 100 where the highest score mean is for the Management score. The lowest mean score in our sample is the Environmental innovation score. Table 2 shows that ESG score means differ significantly between industries. This is

controlled for in the baseline regressions by adding industry fixed effects. To search for possible time trends, the ESG score is given in the following figure over time.[2] Here can be seen that the average ESG performance has decreased over time until 2018 and increased after 2018. Therefore, in the baseline regression time fixed effects are added.

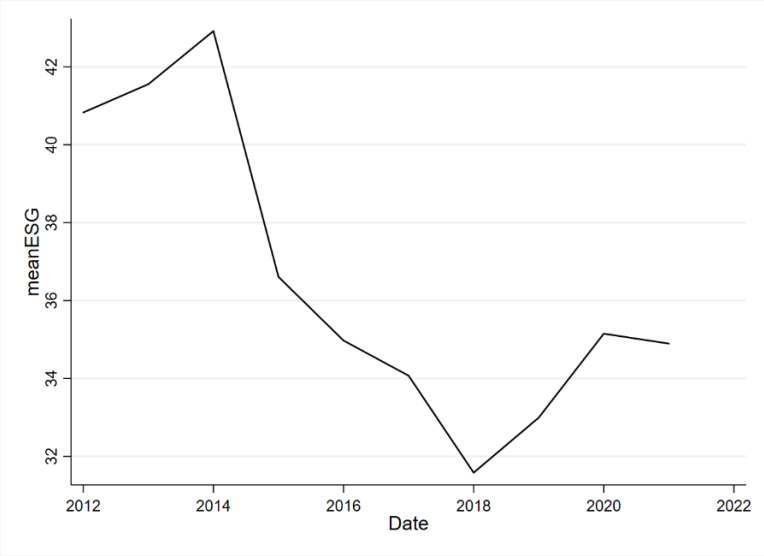

Figure 1:ESG Score over time

In table 3 the summary statistics for the control and ownership variables are given. Here can be seen that most control variables, where Leverage, Liquidity and Return on assets are a ratio, behave as expected. Striking is that total institutional ownership and SRI ownership exceeds 100% on some occasions. This can be explained by potential "naked" short selling[3]. Lastly, the mean of Return on assets is negative, meaning that on average firms have a negative return on their assets.

Table 3: Summary statistics institutional ownership and control variables (in millions)

Variable (Score)	Mean	Std. Dev.	Min	Max	Observations
R&D expenses	327.20	1487.27	0.00	42740	7,867
Leverage	0.58	0.46	0.00	20.02	8,896
Liquidity	4.30	6.52	0.00	198.34	7,083
Tangibility	785.20	5382.59	-73094	126032	8,896
Log assets	7.12	1.84	0.00	12.84	8,896
Return on assets	-0.08	0.50	-31.35	2.81	8,896
Total institutional ownership	0.69	0.30	0.00	1.97	8,896
SRI ownership	0.24	0.20	0.00	1.80	8,896

[2] See Appendix for Individual Pillar scores over time.
[3] Naked short selling happens when more shares than outstanding shares are being shorted.

3.5 Data checks

In this section several Data checks are performed. First, multicollinearity problems are considered, since this can bias the coefficient estimates. In table 4 the correlations between the independent variables are given. Here, the correlation between SRI ownership and total IO is high, indicating multicollinearity issues when the variables are simultaneously added in a regression model. The expected consequences of introducing multicollinearity in the models are discussed in the methodology section. The other correlations don't exceed values that indicate multicollinearity (Shrestha, 2020).

Table 4: Correlation Table

	Leverage	Liquidity	Tangibility	Institutional ownership	SRI ownership	R&D expenses	Log assets	ROA
Leverage	1.00							
Liquidity	-0.26	1.00						
Tangibility	-0.04	0.02	1.00					
Total IO	-0.01	-0.02	-0.01	1.00				
SRI ownership	0.02	-0.11	-0.03	0.70	1.00			
R&D expenses	0.03	-0.07	0.36	-0.03	-0.03	1.00		
Log assets	0.07	-0.25	0.23	0.33	0.31	0.43	1.00	
Return on Assets	-0.19	-0.04	0.05	0.22	0.20	0.06	0.38	1.00

Secondly, heteroskedasticity and correlation between the error terms are considered, since this can bias significance of the estimates (T-tests). To test for possible heteroskedasticity the residuals of regressions is checked. Here, a clear pattern of heteroskedasticity is found. This assumption is confirmed by performing a Breusch Pagan test. Therefore, clustered standard errors on the industry level are used. This also solves the problem of possible autocorrelation between errors.

Lastly, problems concerning reverse causality should be considered. In the regressions (SRI) institutional ownership is regressed against several ESG scores, but this relationship could be the other way around. Higher ESG scores could also attract SRI investors, leading to reverse causality problems. Since the assumption in FE models is that there is strict exogeneity, reverse causality concerns can bias the parameter estimates. In the regressions lagged independent variables are used, which overcomes the strict exogeneity assumption (lagged independent variable now has a correlation with error term)

but does not necessarily solve reverse causation. This is the case since lagging independent variables introduces the assumption that unobserved variables are serially uncorrelated (Bellemare et al, 2017), which most of the time is not the case. To deal with this problem two quasi-natural experiments are conducted, by using Covid-19 as an exogenous shock. Also, a Granger causality test is performed. These methods are clarified in the Methodology.

4. Methodology

In this section the research methods to answer the research question and hypotheses are explained.

4.1 ESG Hypothesis

As mentioned in the introduction, the relationship between SRI ownership and ESG scores is the main topic in this research. Therefore, the first hypothesis is stated as

1: "there is a positive relationship between SRI ownership and ESG scores on the firm level"

In order to test this hypothesis, a baseline test that looks at the relationship between (lagged) total institutional ownership and the ESG scores is developed first. This regression is stated as follows:

1) $$Log\ (ESG\ score_{i,t}) = \alpha + \beta_1\ Institutional\ ownership_{i,t-1} + \beta_x\ Z_{i,t-1} + \varphi + \varepsilon_{i,t}$$

Where X is the lagged percentage of institutional ownership and Z are lagged values of control variables firm size (log total assets), leverage, R&D expenses, liquidity, tangibility and return on assets. In addition, the φ fixed effects are added to account for time and industry fixed effects. Here, the fixed effects model is chosen based on the Hausman Test. Standard errors are clustered at the industry level based on the sample selection. Since the sample is selected based on data of mostly large stock exchanges, some industries are overrepresented, hence underrepresented in the sample. Since in this regression the interest lies in the overall effect of institutional ownership on ESG scores, the errors are clustered at the industry level to account for the fact that shocks to firms are mostly common within industries. Therefore, ESG scores are correlated within industries (McKenzie, 2022). This clustering is used in all the regressions in this paper. To reduce scale effects the log is taken from assets. Also, I follow the method of Dyck et al (2019) by taking the logarithm of the ESG scores, to reduce the effect of outliers and to enhance distributional properties.

After establishing the baseline, the institutional investor sample is divided into SRI investors and non-SRI investors. This is dependent on having signed the UN PRI. Similar to the above equation the following regression is used.

2) $$Log\ \left(ESG\ score_{i,t}\right) = \alpha + \beta_1\ SRI\ ownership_{i,t-1} + \beta_2\ Institutional\ ownership_{i,t-1} + \beta_x\ Z_{i,t-1} + \varphi + \varepsilon_{i,t}$$

Where SRI ownership is the lagged percentage of SRI ownership, Institutional ownership is the lagged percentage of institutional ownership and Z are lagged values of control variables firm size, leverage, R&D expenses, liquidity, tangibility and return on assets. Although SRI ownership is already a percentage of institutional ownership, absolute institutional ownership is added to control for the correlation between institutional ownership and SRI ownership/the ESG score. Not taking this variable would lead to omitted variable bias, leading to an over- or underestimation of the SRI ownership

variable. Here, we see a clear tradeoff between introducing multicollinearity or omitted variable bias into the model. Multicollinearity results in higher standard errors, whereas omitted variable bias is a clear violation of the OLS assumptions and leads to biased estimates. In this case, omitting institutional ownership would lead to an upward bias in the SRI ownership coefficient, as the correlation between institutional ownership and SRI ownership (independent variable) / ESG score (dependent variable) is positive. Since there is no perfect multicollinearity, the omitted variable is added to address omitted variable bias. Therefore, the consequence is higher standard errors in the models, making it harder to find significance, hence, reject the null hypothesis. Additionally, the φ fixed effects are added to account for time and industry fixed effects. Afterward, the outcomes of this specification are contrasted with those of the baseline regression. In this way it is tested if SRI ownership has a greater impact on the ESG scores.

To deal with possible reverse causality in the mentioned regressions, a Granger causality test is run. Here, two symmetric OLS regressions are performed:

3) $Log\ (ESG\ score_{i,t}) = \alpha + \beta_1\ Institutional\ ownership_{i,t-1} + Log\ (ESG\ score_{i,t}) + \beta_x\ Z_{i,t-1} + \varphi + \varepsilon_{i,t}$
4) $Institutional\ ownership_{i,t} = \alpha + \beta_1\ Institutional\ ownership_{i,t-1} + Log\ (ESG\ score_{i,t}) + \beta_x\ Z_{i,t-1} + \varphi + \varepsilon_{i,t}$

Where in both regressions lagged percentage of (SRI) institutional ownership and lagged ESG scores are added. Z are lagged values of control variables Firm size, Leverage, R&D expenses, Liquidity, Tangibility and Return on assets. In addition, the φ fixed effects are included. Based on these regression concerns regarding reverse causality can be identified.

4.2 Covid-19 SRI matching difference in difference

A further test to find evidence for causality is conducted, based on the exogenous shock of COVID-19. This pandemic serves as an exogenous shock that sheds light on the importance of mostly social and governance commitments. The negative effect of COVID-19 targeted all global firms, and increased investor's attention on the risk of firms with weak social and governance policies, as this increases the risk of consumer health and safety in industries. Based on this rationale, it is expected that firms with (on average) more SRI ownership would generate a higher increase in social and governance scores post COVID-19 event, because SRI institutions are better to force through policy changes.

In order to test the hypothesis that SRI investors are a greater driving force for the social and governance scores, a matching difference in difference regression is conducted. In this regression the treatment group consists of the firms with a high percentage SRI ownership level with respect to Total IO and the control group with lower SRI ownership with respect to Total IO. Here, the threshold for

being included in the treatment group is based on the 75 percentile of percentage SRI ownership within total institutional ownership. As treatment is assigned at the individual level, the standard errors are at first glance not clustered (McKenzie, 2022). In this case, the assignment of the treatment is not randomized, therefore standard errors are still clustered at the industry level.

A matching approach is used to overcome the shortcoming that in many studies the possibility of selection bias is overlooked. In our sample it could be the case that SRI institutions just pick the right firms with ESG potential but are not necessarily the driving force for ESG score increases. To account for this issue, a matching approach is used in the difference in difference estimation. Here, treated firms are matched to firms of the control group to control for unobserved time invariant differences between the two groups. For the matching methodology, matching is based on nearest neighbor matching in the pre-treatment setting, where the variables log total assets and return on assets are used to match to the nearest neighbor, as firm size and return margin are main determinants for ESG potential (Crespi, 2022).

With these groups the difference in difference is conducted for the years 2018 to 2021. In this way a panel is created with 2018-2019 as pre-event period and 2020-2021 as post-event period. To deal with serial correlation between the periods, the pre-event and post-event observations are collapsed into one observation (one pre-event observation and one post-event). This is done by taking the average of the two periods. In addition, to solely capture the effect of the post event period, the (SRI) institutional ownership levels in the post-event period are measured as if they are pre-event period. With these assumptions the following regression is estimated.

5) $$Log(Pillar\ score_{i,t}) = \alpha + \beta_1 Post\ event + \beta_2 Treated + \beta_3 Post\ event * Treated + \beta_x Z_{i,t} + \varphi + \varepsilon_{i,t}$$

Where Post event is a dummy variable, which equals 1 if the time period is 2020-2021 and variable Treated is a dummy which equals 1 if the firm is in the treated group, hence has a higher percentage of SRI institutional holdings of Total IO with respect to the control group. Also, the φ fixed industry effects are added to account for differences between industries. In addition, control variables are added, including institutional ownership to control for omitted variable bias. The variable of interest is the interaction term between these variables β_3. This captures the effect of the treatment group relative to the control group, post period, on the score. Based on the results of this regression, can be stated if the social score is more positively impacted by a high SRI proportion in total IO.

4.3 Covid-19 Industry difference in difference

Following up on the matching difference in difference approach, a difference in difference is conducted to test for possible differences between industry effects on the scores. Based on the discussed literature and summary statistics of a prior comparable pandemic, the Mexican flu, it is determined in which industries social and governance scores are of greater importance since Covid-19. As discussed in the literature review, it is found that the food processing and health service industry have increased attention to these scores considerably. Therefore, these industries are added in the treatment group. In addition, we can learn from past pandemics about how different industries responded to them at that time. One of those pandemics is the swine (Mexican) flu of 2009. Similar to Covid-19, this pandemic targeted a large portion of the world population. In figure 2 can be seen that there is a clear difference in social pillar score trends across industries during the swine flu pandemic. Here, the focus lies on the period after/during the swine flu. Figure 2 suggests that the retail, non-classifiable, and mining industries show the largest changes in social pillar scores after the pandemic. Since the non-classifiable firms have only 14 observations, these are not taken into account. Furthermore, the health industry and food industry data are extracted from the manufacturing and services industries respectively. Figure 3 shows that the Food industries had stable social pillar scores after/during the swine flu, whereas the health industry increased significantly. The increase of the health industry social pillar scores is in line with literature about Covid-19, whereas the stableness in social pillar scores in the food industry is in principle not expected. This deviation in expectation can be explained by the extensive measures being taken during Covid-19. With respect to the swine flu virus, more measures have been taken to reduce the spread of the virus during Covid-19. Therefore, I still expect that Covid-19 has a large impact on social pillar scores in the food industry. For this reason, the food industry is assigned to the treatment group. For the governance pillar scores similar effects are found.

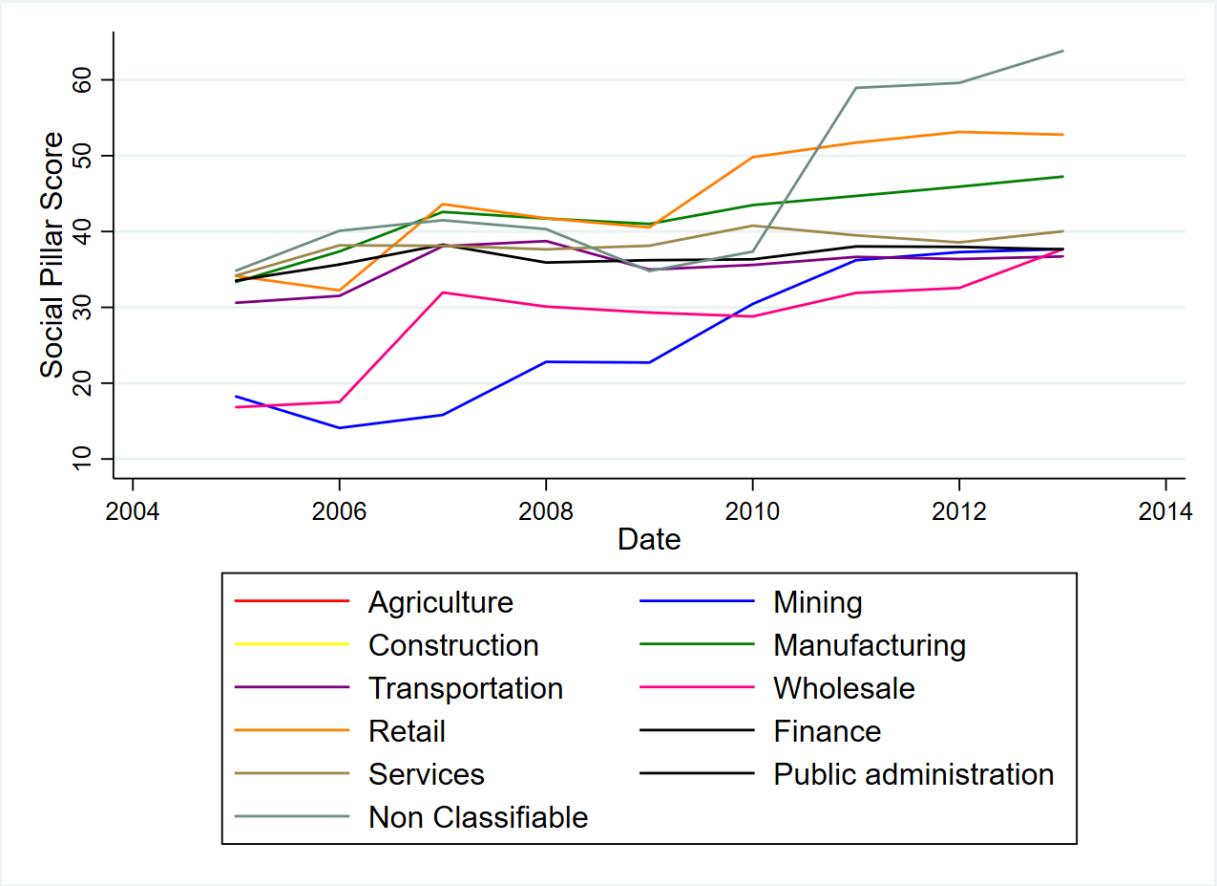

Figure 2: Social pillar scores per Industry

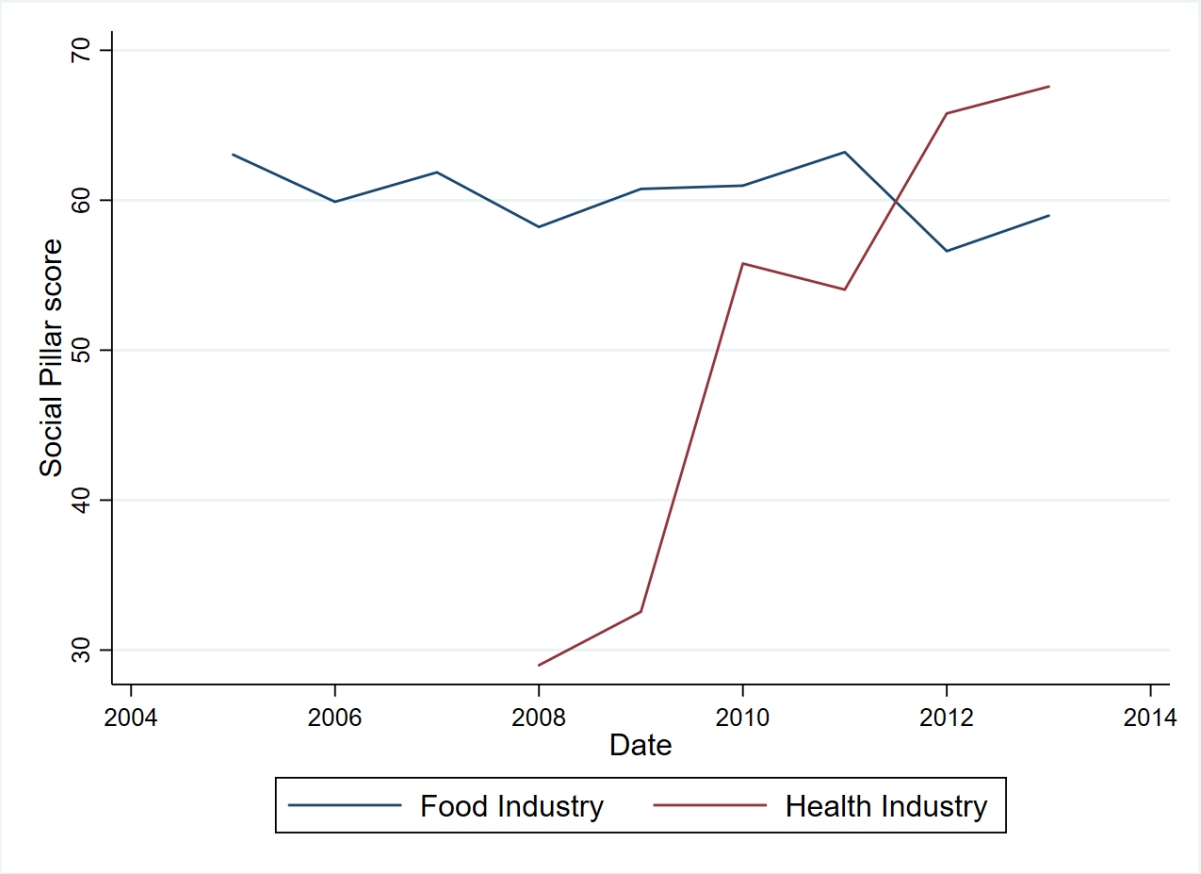

Figure 3: Social pillar scores Food and Health industry

Based on these findings two groups are concluded:

1) Treatment group, which consists of the Retail, Mining, Food and Healthcare industries. This group is to a higher degree affected by Covid-19 with respect to importance of governance and social scores.
2) Control group, which consists of the remaining Industries. This group is to a lesser degree affected by Covid-19 with respect to the importance of social and governance scores.

With these groups the difference in difference is conducted for the years 2018 to 2021. In this way a panel is created with 2018-2019 as pre-event period and 2020-2021 as post-event period. To deal with serial correlation between the periods, the pre-event and post-event observations are collapsed into one observation (one pre-event observation and one post-event). This is done by taking the average of the two periods. In addition, to solely capture the effect of the post event period, the (SRI) institutional ownership levels in the post-event period are measured as if they are pre-event period. Lastly, errors are clustered at the industry level, since treatment is assigned by industry (McKenzie, 2022). With these assumptions the following regression is estimated.

6) $$Log(Pillar\ score_{i,t}) = \alpha + \beta_1 Post\ event + \beta_2\ SRI\ ownership_i + \beta_3 Treated + \beta_4 Post\ event * SRI\ ownership_i + \beta_5 Post\ event * Treated + \beta_6\ Treated * SRI\ ownership_i + \beta_7 Treated * SRI\ ownership_i * Post\ event + \beta_x\ Z_{i,t} + \varepsilon_{i,t}$$

Where Post event is a dummy variable, which equals 1 if the time period is 2020-2021. SRI ownership is the percentage of SRI investment holdings of total institutional ownership. Furthermore, variable Treated is a dummy which equals 1 if the firm is in the treated group and $Z_{i,t}$ are the added control variables. The variable of interest is the interaction term between these variables β_7. This captures the effect of SRI ownership for the treatment group relative to the control group, Post period, on the ESG score.

4.4 Market premium hypothesis

In this section the second hypothesis is elaborated. As mentioned in the introduction, there has been a lot of literature on financial performance of ESG. In this paper the focus is different, where the emphasis lies on the effect of SRI institutional ownership on ESG scores. The next logical consideration is whether the marketplaces any value on these ESG scores. In other words, do shareholders take into account ESG risk factors when selecting stocks and do they analyze potential growth opportunities. This hypothesis is stated as:

2: "there is a relationship between the ESG Score and market premium."

To test this relationship, the following regression is tested.

7) $$Log(Market\ valuation - Book\ valuation)_{i,t} = \alpha + \beta_1\ ESG\ Score_{i,t-1} + \beta_x\ Z_{i,t-1} + \varphi + \varepsilon_{i,t}$$

Where X is the lagged percentage of SRI ownership and Z are lagged values of control variables firm size, leverage, liquidity, tangibility and return on assets. In addition, the φ fixed effects are added to account for time and industry fixed effects. Similar as the regression for hypothesis one, the log is taken from assets and ESG score. In this regression possible reverse causality is not a concern. Here, it is clear that the ESG score is the cause, and the market premium is the effect. With the results of the regression, it can be stated if shareholders value higher ESG scores on the firm level. In other words, are SRI investors creating value by incorporating ESG measures.

5. Results

The outcomes of the regressions are presented in this section. Here, the order of the methodology is followed. First, the results of the baseline regressions which measures the effect of total institutional ownership and SRI institutional ownership on ESG scores are discussed. In order to establish potential causation, the Granger causality and matching difference in difference approach results are shown in step two. Lastly, the results for the market premium hypothesis are stated.

5.1 ESG Baseline

The results of the baseline regressions regarding hypothesis 1 are reported in table 5, where the relationship between total institutional ownership/SRI institutional ownership and ESG scores is examined for the years 2012 to 2021. Here, the independent variables are lagged values and the log is taken for the ESG and pillar scores.

Table 5: Effect of Total and SRI institutional ownership on ESG scores

	ESG Score	Environmental pillar score	Social pillar score	Governance pillar score
Panel A: Total IO				
Total IO	0.115***	-0.091	0.123***	0.171***
	(0.022)	(0.074)	(0.031)	(0.031)
Tangibility	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	-0.023	0.037	-0.048*	-0.028
	(0.016)	(0.036)	(0.028)	(0.019)
ROA	-0.032	-0.187**	-0.097***	0.024
	(0.020)	(0.067)	(0.017)	(0.023)
Log Total assets	0.155***	0.357***	0.172***	0.080***
	(0.008)	(0.019)	(0.007)	(0.009)
R&D expenses	0.000*	0.000	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.004***	0.001	0.001	-0.007***
	(0.001)	(0.007)	(0.001)	(0.001)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.40	0.25	0.23	0.23
Observations	6,183	6,183	6,183	6,183

Panel B: SRI IO	ESG Score	Environmental pillar score	Social pillar score	Governance pillar score
SRI IO (of Total IO)	0.263*	0.338	0.143*	0.355*
	(0.136)	(0.332)	(0.075)	(0.173)
Total IO	0.023	-0.218	0.072	0.047
	(0.049)	(0.154)	(0.036)	(0.053)
Tangibility	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	-0.024	0.039	-0.048	-0.028
	(0.016)	(0.035)	(0.029)	(0.017)
ROA	-0.031	-0.195***	-0.010***	-0.029
	(0.020)	(0.060)	(0.017)	(0.023)
Log Total assets	0.155***	0.355***	0.172***	0.079***
	(0.010)	(0.021)	(0.008)	(0.008)
R&D expenses	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.004***	0.003	0.002	-0.007***
	(0.001)	(0.006)	(0.001)	(0.001)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.32	0.26	0.23	0.22
Observations	6,183	3,489	6,183	6,183

*Significance levels: * 10%, ** 5% and *** 1%. Standard errors are clustered at the industry level.*

In Panel A the results of the effect of lagged total institutional ownership on ESG scores is showcased. Here, the standard errors are shown in brackets and control variables are lagged variables. Lagged total institutional ownership is found to be positively correlated with the ESG score in the second column, which means that on average, companies with higher institutional ownership levels in the prior year had higher ESG scores. The coefficient of 0.115 can be interpreted as that a one percentage point change in lagged total institutional ownership brings a positive 0.115% change in the ESG score on average. This result is in line with literature and is significant at the 1% level. Furthermore, in the regression the log total assets and liquidity coefficients are significant at the 1% level. For the log total assets, the coefficient is interpreted as a 1% increase in lagged total assets is on average associated

with a 0.155% increase in ESG score. Similarly, the liquidity coefficient is interpreted as a one percentage point increase in liquidity is on average associated with a 0.004% decrease in ESG score. For the control variables tangibility, leverage, ROA and R&D expenses no significance is found.

In column 3, 4 and 5 of panel A the results of the individual pillar scores are stated. Here, significant results are found for the positive effect of lagged total institutional ownership on the social pillar score and the governance pillar score. An increase of one percentage point in lagged total institutional ownership is associated with a positive 0.123% change in social pillar score and 0.171% in governance pillar score on average. However, for the environmental pillar score no significant results are found. Also, the coefficient is negative, indicating that total institutional ownership is associated with a decrease in environmental pillar score. Overall, the results indicate that total institutional ownership has a significant positive effect on the ESG score.

In panel B the institutional owners are divided into UN PRI signatories (SRI investors) and non-UN PRI signatories. In the regression of the effect of lagged SRI institutional on ESG score a higher positive coefficient, controlling for lagged total institutional ownership, of 0.236 is found for the SRI institutional ownership variable. This result is significant at the 10% level, indicating that the impact of SRI investors is larger with respect to institutional investors. This finding is in line with the discussed papers. Similar to panel A, only significance for the total assets and liquidity control variables is found.

In column 3, 4 and 5 of panel B the ESG score, and individual pillar scores are stated. Here, significant results are found for the positive effect of SRI institutional ownership on the social pillar score and the governance pillar score. The lagged SRI institutional ownership coefficient of 0.143 for the social pillar score and 0.355 for the governance pillar score are larger for the corresponding lagged total institutional ownership coefficients. This finding strengthens the believe that SRI investors have a larger impact on ESG scores and are a driving force. However, similar to panel A no significant results are found for the environmental pillar score, but the positive coefficient does indicate the positive impact of SRI ownership on the environmental pillar score.

In order to disentangle the effects further the results of the regressions between total institutional ownership/SRI institutional ownership and individual ESG scores are showcased in table 6.

Table 6: Effect of Total and SRI institutional ownership on individual ESG scores

	Total institutional ownership	SRI IO (of total IO)	Observations
Environmental pillar			
Emmission score	-0.242***	0.352*	2,805
	(0.068)	(0.162)	
Environmental innovation	0.152	-0.125	1,559
score	(0.120)	(0.119)	
Resource use score	-0.233	0.161	2,846
	(0.084)	(0.275)	
Social pillar			
Human rights score	-0.082	0.362	2,401
	(0.067)	(0.242)	
Workforce score	0.143	0.119	6,179
	(0.131)	(0.108)	
Product responsibility score	0.029	-0.051	5,767
	(0.031)	(0.039)	
Community score	0.047	0.192	6,179
	(0.077)	(0.154)	
Governance pillar			
CSR strategy score	-0.157	0.011	1,869
	(0.087)	(0.012)	
Shareholders score	-0.038	0.196	6,183
	(0.072)	(0.129)	
Management score	0.138	0.525*	6,183
	(0.098)	(0.281)	
Industry FE	Yes	Yes	
Year FE	Yes	Yes	

*Significance levels: * 10%, ** 5% and *** 1%. Standard errors are clustered at the industry level.*

In table 6 only significance is found for the effect of lagged SRI ownership on the emission and management score. Similar to table 5 the coefficients can be interpreted as an increase of one percentage point in ownership is associated with a positive (coefficient)% change in individual score. Again, the standard errors are showcased in brackets and significance is stated with the stars. The two significant coefficients, indicate a larger effect of SRI institutional with respect to Total institutional

ownership on the individual scores. Since insignificance is found for the rest of the individual scores, no clear conclusions can be drawn from this table. Noticeable is the strong difference in observations available, which could be an explanation for the insignificant results.

5.2 Granger causality

As discussed in the methodology, this paper tries to establish causality for the relationship between ownership and ESG scores. The first test that can imply causality is a Granger causality, where possible reverse causality is tested by regressing two symmetric regressions, where there is being controlled for the lagged variable of the dependent variable. The results of these regressions are stated in table 7. Here, the independent variables are lagged values and similarly the log is taken from the ESG score.

Table 7: Granger Causality test

	ESG score	Total institutional ownership
ESG score	0.770***	0.005
	(0.020)	(0.004)
Total IO	0.035***	0.776***
	(0.005)	(0.024)
Tangibility	0.000	0.000
	(0.000)	(0.000)
Leverage	-0.003	0.004
	(0.008)	(0.004)
ROA	-0.005*	-0.007**
	(0.002)	(0.002)
Log Total assets	0.029***	0.005*
	(0.002)	(0.003)
R&D expenses	0.000	0.000
	(0.000)	(0.000)
Liquidity	-0.001***	0.002***
	(0.000)	(0.000)
Industry FE	Yes	Yes
Year FE	Yes	Yes
Adjusted R^2	0.80	0.79
Observations	5,379	5,379

*Significance levels: * 10%, ** 5% and *** 1%. Standard errors are clustered at the industry level.*

In table 7 the variables of interest are the lagged total institutional ownership in column 2 and the lagged ESG score in column 3. In both regressions there is controlled for the lag of the dependent variable (lagged ESG score and lagged total institutional ownership. As expected, both these control variables are highly correlated with the dependent variable and significant. The coefficient of 0.770 in column 2, which measures the effect of lagged ESG score on the ESG score, is interpreted as a 1% higher lagged ESG score is associated with a 0.770% higher ESG score on average. The coefficient of 0.035 in column 2, which measures the effect of lagged ESG score on total institutional ownership, is interpreted as a 1 percentage point increase in lagged total ownership is associated with a 0.035% increase in ESG score on average. The R squared for both regressions is high, since lagged variables of dependent variables are often a high determinant for current dependent variables. Considering the variables of interest, only a significant effect is found for the lagged institutional ownership in column 2. This means that only a significant relationship is found with ESG score as dependent variable and total institutional ownership as independent variable. This lightens the suspicion for possible reverse causality but doesn't confirm that causality is present.

5.3 Covid-19 SRI matching Difference in Difference

In order to establish causality, the SRI matching difference in difference is conducted. Here, the observations of the treatment group are matched to their closest neighbor in the control group, based on the variables log total assets and ROA. The result of this regression is stated in table 8.

Table 8: SRI matching Difference in Difference

	Social pillar score	Governance pillar score
Post	0.169***	0.198***
	(0.028)	(0.017)
Treated	0.057	0.078
	(0.042)	(0.044)
Post * Treated	-0.004	-0.08**
	(0.004)	(0.028)
Total IO	0.105	0.350**
	(0.068)	(0.133)
R&D Expenses	0.000**	0.000**
	(0.000)	(0.000)
Leverage	-0.030	-0.006
	(0.038)	(0.034)
Tangibility	0.000*	0.000*
	(0.000)	(0.000)
Liquidity	0.010***	-0.003
	(0.003)	(0.03)
ROA	-0.275*	0.027
	(0.014)	(0.015)
Log Total assets	0.179***	0.069***
	(0.022)	(0.018)
Treatment/Control obs.	542/542	542/542
Adjusted R^2	0.26	0.27

*Significance levels: * 10%, **5% and *** 1%. Standard errors are clustered at the industry level.*

In table 8 significant results are found for the Post variable. The positive coefficient of 0.169 for the social pillar score and 0.194 indicate that social and governance scores have risen after the Covid-19 shock. In addition, significant results are found for the variable Treated, indicating that indeed the treatment group has higher social and governance scores. Following up, a significant result is found for the variable of interest Post* Treated with respect to the governance pillar score. The negative coefficient of -0.08 can be interpreted as that a one percentage point change in Post * Treated variable brings a negative 0.08% change in the governance score on average with respect to the control group. When combining the results of the coefficients, the findings indicate that firms in both the treatment

and control group experience a growth in social and governance scores. In addition, the negative coefficient of the Post Treated variable indicates that firms with a high SRI ownership percentage (treatment group) pre Covid-19 have experienced a lower governance pillar score growth post Covid-19 on average, with respect to the control group. For the social pillar score I find the same direction for the effect, but no significance is found. This matching approach tackles the baseline regressions and is evidence for causality. To disentangle the effects in table 8, in the following tables the summary statistics for the treatment and control group are given, pre and post treatment.

Table 9: Summary statistics control group pre-treatment (scores in log format)

Variable	Mean	Std. Dev.	Min	Max	Observations
Total IO	0.63	0.25	0.00	1.29	367
SRI ownership	0.20	0.11	0.00	0.39	367
ESG Score	3.35	0.49	1.11	4.46	367
Environmental pillar score	2.56	1.32	0.13	4.53	159
Social pillar score	3.42	0.56	0.21	4.53	367
Governance pillar score	3.53	0.67	0.18	4.52	367
R&D expenses	102.27	463.85	0.00	5555.00	367
Leverage	0.89	0.29	0.03	1.71	367
Liquidity	4.02	4.85	0.07	33.01	265
Tangibility	381.30	2875.29	-36109.50	13619.00	367
Log assets	7.03	1.59	3.88	12.42	367
Return on assets	-0.04	0.19	-1.40	0.66	367

Table 10: Summary statistics control group post-treatment (scores in log format)

Variable	Mean	Std. Dev.	Min	Max	Observations
Total IO	0.63	0.28	0.00	1.29	340
SRI ownership	0.20	0.11	0.00	0.39	340
ESG Score	3.54	0.45	1.68	4.51	340
Environmental pillar score	2.63	1.33	0.18	4.56	220
Social pillar score	3.61	0.48	1.55	4.57	340
Governance pillar score	3.72	0.53	1.62	4.56	340
R&D expenses	137.91	523.47	0.00	5686.50	340
Leverage	0.63	0.30	0.00	2.19	340
Liquidity	3.51	3.56	0.40	19.94	244
Tangibility	455.42	3516.75	-32449.00	20470.31	340
Log assets	7.36	1.61	3.80	12.53	340
Return on assets	-0.05	0.21	-1.92	0.33	340

Table 11: Summary statistics treatment group pre-treatment (scores in log format)

Variable	Mean	Std. Dev.	Min	Max	Observations
Total IO	0.79	0.20	0.00	1.35	367
SRI ownership	0.46	0.06	0.39	0.73	367
ESG Score	3.56	0.39	1.20	4.46	367
Environmental pillar score	2.79	1.02	0.27	4.52	257
Social pillar score	3.58	0.49	1.28	4.54	367
Governance pillar score	3.77	0.57	0.41	4.49	367
R&D expenses	99.97	275.38	0.00	2636.3	367
Leverage	0.54	0.31	0.00	2.60	367
Liquidity	3.10	3.01	0.28	24.22	299
Tangibility	501.70	2083.94	-16191.90	13943.50	367
Log assets	7.53	1.33	3.54	12.27	367
Return on assets	0.04	0.11	-0.65	0.61	367

Table 12: Summary statistics treatment group post-treatment (scores in log format)

Variable	Mean	Std. Dev.	Min	Max	Observations
Total IO	0.79	0.25	0.00	1.35	340
SRI ownership	0.46	0.06	0.39	0.73	340
ESG Score	3.74	0.36	2.56	4.45	340
Environmental pillar score	2.99	1.05	0.36	4.52	301
Social pillar score	3.78	0.43	2.17	4.56	340
Governance pillar score	3.89	0.44	2.03	4.56	340
R&D expenses	114.66	321.50	0.00	3290.85	340
Leverage	0.61	0.59	0.00	10.25	340
Liquidity	2.99	4.47	0.27	66.08	276
Tangibility	526.22	2353.47	-18587.00	16659.50	340
Log assets	7.74	1.29	4.69	12.37	340
Return on assets	0.02	0.10	-0.53	0.42	340

In the tables 9, 10, 11 and 12 can be seen that both for the treatment and control group the ESG scores have risen post Covid-19. Hence, explains the positive coefficient for the Post variable in table 8. Also, the average scores are higher in the treatment group post and pre Covid-19 setting, which explains the positive coefficient of the variable Treated in table 8. Lastly, it can be seen that the increase in scores post Covid-19 is on average higher in the control group relative to the treatment group. For example, the governance pillar score growth for the control group is 0.19 (3.72 – 3.53), whereas the growth is 0.12 (3.89 - 3.77) on average in the treatment group. This finding is confirmed in table 8 by the negative coefficient of variable Post * Treated and is evidence that firms with lower SRI ownership have experienced higher increases in governance scores during Covid-19.

A concern In this difference in difference setting is the difference in ESG score pre-treatment between the treatment and control group. For the control group, lower ESG and individual pillar scores are present in the pre-treatment setting with respect to the treatment group. Therefore, comparing growth between the two groups can be seen as unfair, since there is more upside potential when scores are initially low.

To tackle the difference in ESG score between the treatment and control group pre-treatment, another matching approached is considered. In addition to matching based on log total assets and ROA, matching is based on the ESG score, with a tight caliper. This results in a sample with less observations. The summary statistics of the created sample are stated in table 13 & 14.

Table 13: Summary statistics Treatment group pre-treatment (scores in log format)

Variable	Mean	Std. Dev.	Min	Max	Observations
ESG Score	3.46	0.33	2.43	4.21	207
Environmental pillar score	2.47	1.01	0.18	4.22	104
Social pillar score	3.48	0.46	1.34	4.52	207
Governance pillar score	3.74	0.56	0.42	4.46	207
Log assets	7.00	1.29	3.54	10.29	207
Return on assets	0.12	0.17	-1.41	0.60	207

Table 14: Summary statistics control group pre-treatment (scores in log format)

Variable	Mean	Std. Dev.	Min	Max	Observations
ESG Score	3.46	0.33	2.43	4.26	207
Environmental pillar score	2.35	1.19	0.13	4.38	104
Social pillar score	3.47	0.45	1.96	4.46	207
Governance pillar score	3.73	0.47	1.97	4.44	207
Log assets	7.00	1.29	3.48	10.28	207
Return on assets	0.04	0.23	-1.78	0.72	207

In table 13 and 14 can be seen that the social and governance score are now aligned in the sample setting. In this way the growth increases in the regression can be compared on a like to like basis. The results of this regression are stated in table 15. Here, positive coefficients are found for the Post * Treated variable, indicating that firms with higher SRI ownership pre Covid-19 experienced larger score increases during Covid-19. No conclusions can be drawn because the coefficients are not significant, but they do show that effects vary when an identical ESG score from the pre-treatment setting is taken into account. As a result, caution is required when interpreting the significant coefficient for the governance score that can be found in table 8.

Table 15: additional matching difference in difference

	Social pillar score	Governance pillar score
Post	0.164***	0.124***
	(0.029)	(0.026)
Treated	-0.009	-0.007
	(0.050)	(0.088)
Post * Treated	0.044	0.011
	(0.039)	(0.042)
Total IO	0.120	0.218
	(0.106)	(0.303)
R&D Expenses	0.000***	0.000**
	(0.000)	(0.000)
Leverage	0.005	-0.039
	(0.028)	(0.033)
Tangibility	0.000	0.000
	(0.000)	(0.000)
Liquidity	0.008***	-0.004
	(0.001)	(0.002)
ROA	-0.362***	0.271
	(0.069)	(0.149)
Log Total assets	0.111***	0.078***
	(0.022)	(0.023)
Treatment/Control obs.	319/319	319/319
Adjusted R^2	0.19	0.18

*Significance levels: * 10%, **5% and *** 1%. Standard errors are clustered at the industry level.*

5.4 Covid-19 Industry Difference in Difference

Following up on the SRI matching difference in difference, a difference in difference approach is considered based on the exogenous shock of Covid-19. Due to the limitation of sample size no matching approach is considered. The results of the difference in difference regression are stated in table 16 and 17.

In tables 16 and 17 the variable of interest is the interaction term between the Post, Treated and SRI ownership variable. This variable captures the effect of SRI ownership on the social/governance score for the treatment group relative to the control group, post period. Table 16 shows statistically significant results for the variable of interest across all treated industries at the 1% level. For the food and retail industry a positive coefficient is found, indicating that SRI ownership has a larger positive effect on the social score post period in the treatment industry with respect to the control industries. For example, the coefficient of 0.272 in column 1 can be interpreted as that a one percentage point change in lagged SRI ownership brings a positive 0.272% larger change in the social score on average, with respect to the control group. For the health and mining industry negative coefficients are found, indicating that on average lagged SRI ownership brings a smaller change in the social score on average, with respect to the control group. In table 17 similar findings are found for the governance pillar score. Both, for the food and retail industry a positive relationship is stated between the variable of interest and the governance pillar score, whereas a negative relationship is found for the health and mining industry.

These negative coefficients are not in line with the expectation that the importance of social and governance scores for these industries have increased during Covid-19 with regards to other industries. A possible explanation for this finding is the fact that Covid-19 is still an ongoing pandemic. Industries as the food industry and retail industry had to close during the Covid-19 outbreak, whereas for example healthcare providers worked overtime. It could be the case that even though the health/mining industry should invest in social scores, we will only see these increases after Covid-19 has settled, since priorities lie elsewhere now. In the food industry and retail industry we see the opposite. Since restaurants and shops were closed for a long time, there was plenty of time to consider policy changes to enhance social scores.

Table 16: Industry Difference in Difference social score

	Social pillar score			
	Food	Retail	Health	Mining
Post	0.203***	0.204***	0.202***	0.200***
	(0.015)	(0.017)	(0.015)	(0.014)
Treated	-0.175	0.092	-0.187***	-0.539*
	(0.101)	(0.087)	(0.040)	(0.074)
SRI ownership	0.306	0.308	0.309	0.264
	(0.203)	(0.202)	(0.201)	(0.199)
Post * Treated	-0.103***	-0.054***	0.005	0.175***
	(0.022)	(0.014)	(0.011)	(0.012)
Treated * SRI ownership	-0.157	-0.115	0.084	0.077
	(0.126)	(0.156)	(0.074)	(0.119)
Post * SRI ownership	-0.078	-0.056	-0.072	-0.076
	(0.059)	(0.057)	(0.058)	(0.059)
Post * SRI ownership * Treated	0.272***	0.158***	-0.137**	-0.142***
	(0.071)	(0.040)	(0.043)	(0.042)
Total IO	0.123	0.128	0.129	0.133
	(0.043)	(0.048)	(0.051)	(0.049)
R&D Expenses	0.000*	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	-0.077	-0.076	-0.074	-0.082
	(0.145)	(0.053)	(0.053)	(0.052)
Tangibility	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	0.007**	0.008**	0.007**	0.007**
	(0.003)	(0.002)	(0.003)	(0.002)
ROA	-0.061***	-0.063***	-0.061***	-0.062***
	(0.007)	(0.008)	(0.008)	(0.008)
Log Total assets	0.144***	0.144***	0.143***	0.146***
	(0.016)	(0.014)	(0.014)	(0.014)
Treatment/Control obs.	55 / 2,219	150 / 2,124	39 / 2,235	44 / 2,230
Adjusted R^2	0.26	0.26	0.27	0.27

*Significance levels: * 10%, ** 5% and *** 1%. Standard errors are clustered at the industry level.*

Table 17: Industry Difference in Difference governance

	Governance pillar score			
	Food	Retail	Health	Mining
Post	0.245***	0.243***	0.242***	0.241***
	(0.020)	(0.019)	(0.019)	(0.020)
Treated	0.330***	0.008	-0.374***	-0.335***
	(0.090)	(0.08)	(0.064)	(0.065)
SRI ownership	0.885***	0.641***	0.691***	0.658***
	(0.106)	(0.081)	(0.103)	(0.091)
Post * Treated	-0.124***	-0.107***	0.053**	0.071***
	(0.019)	(0.017)	(0.018)	(0.016)
Treated * SRI ownership	0.489***	0.476***	0.466***	0.512***
	(0.120)	(0.118)	(0.100)	(0.132)
Post * SRI ownership	-0.284***	-0.257***	-0.028***	-0.273***
	(0.047)	(0.051)	(0.043)	(0.049)
Post * SRI ownership * Treated	0.467***	0.126*	-0.054	-0.123***
	(0.040)	(0.065)	(0.034)	(0.040)
Total IO	0.142***	0.137***	0.131***	0.140***
	(0.030)	(0.031)	(0.029)	(0.029)
R&D Expenses	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	-0.034	-0.041*	-0.031	-0.034
	(0.025)	(0.022)	(0.026)	(0.026)
Tangibility	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.005**	-0.004**	-0.005**	-0.004**
	(0.002)	(0.002)	(0.002)	(0.002)
ROA	0.001	-0.001	-0.002	0.002
	(0.006)	(0.004)	(0.006)	(0.006)
Log Total assets	0.062***	0.064***	0.062***	0.063***
	(0.006)	(0.006)	(0.014)	(0.007)
Treatment / Control obs.	55 / 2,219	150 / 2,124	39 / 2,235	44 / 2,230
Adjusted R^2	0.26	0.26	0.27	0.27

*Significance levels: * 10%, ** 5% and *** 1%. Standard errors are clustered at the industry level.*

5.5 ESG valuation

The results of the regressions regarding hypothesis 2 are reported in table 18, where the relationship between ESG scores and market premium (market capitalization minus book value) is examined for the years 2012 to 2021. Since ESG risk incorporation is focused on the long term, only firms with a higher market value to book value are considered in the regression. This is based on the finding that growth is one of the main determinants for the market to book ratio. Firms with a low growth rate tend to have low market to book ratios (Harris & Marston, 1994). Since ESG incorporation is one aspect of growth and future perspective, only firms that are perceived by the market to grow in the future are considered in the regression. In addition, the log is taken from the market premium variable to reduce the effects of outliers and enhance the distribution. The independent variables are lagged values and similarly the log is taken for the ESG score.

Table 18: effect of ESG Score on Market premium

	Log Market premium
ESG Score	0.257***
	(0.046)
Tangibility	0.000***
	(0.000)
Leverage	0.060
	(0.080)
ROA	0.015**
	(0.048)
Log Total assets	0.811***
	(0.080)
Liquidity	0.012***
	(0.002)
Industry FE	Yes
Year FE	Yes
Adjusted R^2	0.53
Observations	4,783

*Significance levels: * 10%, ** 5% and *** 1%. Standard errors are clustered at the industry level.*

In table 15 the variable of interest is the lagged log ESG score. Similar to the previous tables, the independent variables are lagged variables. The coefficient of the log ESG score can be interpreted as that a 1% increase in log ESG Score leads to a 0.257% increase in the log market premium variable, on average. Evidence is found for this relationship at the highest significance level, which confirms the second hypothesis. Firms with higher ESG scores are on average valued higher in the market. This finding is in line with the long-term vision of incorporating ESG measures in decision-making, as market value is highly dependent on the growth factor that is perceived by the market in the long term. In addition, significance is found for most control variables and are in line with economic expectations. No significance is found for the leverage control variable.

To disentangle the effects of the ESG score on the market premium, the individual ESG scores are regressed against the market premium in table 19. Here, all the individual ESG scores and market premium are log based. Also, the same control variables are used as in table 15 and independent variables are lagged.

Table 19: Effect of individual ESG scores on Market premium

	Log Market premium	Observations	Adjusted R^2
Environmental pillar			
Emission score	0.126***	1,950	0.59
	(0.031)		
Environmental innovation score	0.112	1,203	0.63
	(0.107)		
Resource use score	0.129**	2,008	0.56
	(0.048)		
Social pillar			
Human rights score	0.003	1,687	0.61
	(0.033)		
Workforce score	0.209***	4,778	0.53
	(0.027)		
Product responsibility score	0.028	4,366	0.52
	(0.021)		
Community score	0.147**	4,778	0.52
	(0.048)		
Governance pillar			
CSR strategy score	0.036	1,189	0.59
	(0.047)		
Shareholders score	-0.059*	4,783	0.52
	(0.031)		
Management score	0.019	4,783	0.52
	(0.040)		
Industry FE	Yes		
Year FE	Yes		

*Significance levels: * 10%, ** 5% and *** 1%. Standard errors are clustered at the industry level.*

In table 16 significant evidence is found for the effect of the emission, resource, workforce, community and shareholder's score. The coefficients can be interpreted as a percentage change in individual ESG score effects the market premium by coefficient percentage. For the emission, resource, workforce and community score it is found that the score increases the market premium on average. This finding

is in line with the second hypothesis, indicating that environmental and social scores matter for investors market valuation on average. However, for the shareholders score evidence is found for a decreasing relationship, indicating that shareholders do not value the equal treatment of shareholders and the use of anti-takeover measures. This negative relationship can be explained by the different view of investors and firms. Whereas a firm's interest is mostly the continuing of operations, for investors this is value creation. A firm rather wants to be in a position of acquiring, than being a target for acquiring. For investors this view is different, as research has shown that takeovers benefit the shareholders of the target company, whereas for the acquiring firm the take-over has no effect or even a negative effect on average (Jensen, M. C.,1988). Therefore, a high shareholders score can indicate that a firm doesn't want to be taken over, which can be unbeneficial for investors. This Is an explanation why investors are willing to pay less market premium, on average, for a firm with a high shareholders score.

6. Conclusion

Based on the baseline regressions in this paper, evidence is found for a positive relationship between SRI ownership and ESG scores. The significant coefficient of 0.263 in table 5 confirms that SRI ownership has a higher positive effect on ESG scores than institutional ownership. To find causality, a granger causality test and a matching difference and difference based on the shock of Covid-19 is conducted. According to the Granger causality test, there is only a significant coefficient for the one-way association when the ESG score is the independent variable, indicating that the relationship between SRI ownership and ESG scores is one-way.

Additionally, the matching difference and difference estimation during Covid-19 does not further support the result of the favorable influence of SRI ownership on ESG scores. In table 8 causal evidence is found that although ESG scores increased overall during Covid-19, firms with low SRI ownership (control group) pre Covid-19 showed larger increases in governance scores post Covid-19 than firms with high SRI ownership pre Covid-19 (treatment group). For the social score a similar insignificant effect is found. These findings are not in line with the first hypothesis but can be explained by the fact that firms with high SRI ownership pre Covid-19 already had higher social and governance scores with respect to firms with low SRI ownership pre Covid-19. Therefore, the control group had more room to increase social and governance scores, hence, the shock of Covid-19 served as an incentive to catch up on ESG considerations in the control group.

Lastly, the conducted industry difference in difference estimation finds evidence for different SRI ownership effects between industries. Based on literature and data on the past pandemic of the Mexican flu, the expectation was that the health, food, retail and mining industry would show higher positive SRI ownership effects. In table 13 significant evidence is found that SRI ownership in the food and retail industry has a larger positive effect on social and governance scores, with regards to the control industries. This finding is in line with literature that ESG considerations have become of more importance to continue operating, in these industries. For the health and mining industry negative coefficients are found, indicating that SRI ownership brings smaller changes in the social score on average. These findings are evidence for the different SRI ownership effects between industries during Covid-19. The negative relationships that are found for the health and mining industry can be explained by the ongoing duration of Covid-19 and the difference in working pressure among industries during Covid-19 which made it hard to invest in ESG.

Based on these findings, the first hypothesis:

1: "there is a positive relationship between SRI ownership and ESG scores on the firm level"

is not confirmed, as significant negative causality is found for the relationship between SRI ownership and the governance score in the matching difference in difference approach. Although negative causal evidence is found based on the shock of Covid-19, the results are not directly interpretable. In the difference in difference estimation firms with high SRI ownership levels already displayed significantly higher ESG scores pre Covid-19, hence, had less room to increase during Covid-19. Therefore, it is found that firms with low SRI ownership caught up and showed higher increases in social and governance scores during Covid-19 than firms with high SRI ownership. As it becomes more difficult to enhance scores when they are already high, the treatment and control groups should have identical social and governance scores prior to treatment in order to test for fair increases. When this approach is considered, results indicate that firms with high SRI ownership displayed higher social and governance score increases during Covid-19 but no significance is found. Therefore, the scaling of this approach can be a topic for future research.

Following up on hypothesis 1, evidence is found for the positive relationship between ESG scores and market premium. In table 15 I find that a 1% increase in Log ESG Score leads to a 0.257% increase in the Log Market premium variable. This indicates that ESG scores are perceived as important by investors and increase market value. This finding is strengthened in table 16, where individual ESG scores are regressed against market premium. Here, significant effects are found for the emission, resource, workforce, community and shareholder score. Only for the shareholder score a significant negative coefficient is found in table 16, but this finding can be explained by interest differences between investors and firms.

Based on these findings the seconds hypothesis:

2: "there is a positive relationship between the ESG Score and market premium."

Is confirmed.

Overall, the research question

"Are SRI institutional investors the driving force behind ESG scores?"

Is not confirmed. Although the baseline regressions points to this relationship, the causality difference in difference checks are hard to interpret and not a reflection for the entire research period of 2012-2021. Even though a negative relationship is found In the matching difference in difference estimation, this finding can be explained by the different sample setting pre-treatment. Therefore, no direct conclusions can be drawn in this sample structure and further research is necessary.

Another concern regarding the relationships found in this paper is the potential greenwashing of firms. Greenwashing is the practice of misleading consumers about their ESG performance regarding services and products (Dulmast & Burbano, 2011). In recent years, this practice has become an increasingly important issue, as firms are trying to capitalize on the ESG trend. ESG reporting is not currently required of firms. As a result, some firms only report on their strong ESG performance or even make up data about it. As firms have the ability to skew results, this can result in significant data biases among the many ESG score providers. False advertisements for environmentally friendly products are one illustration of how these biases are formed. This shows that when there are precise reporting criteria and controls for ESG performance of firms, only accurate conclusions can be derived. The SEC filed a proposal for standardizing ESG-related disclosures in March 2022, marking the first step toward these reporting guidelines. As concerns regarding biased data persist, it would be required to repeat a number of studies, including this one, when quality on ESG data improves further.

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8. Appendices

Appendix A: Time variation individual pillar scores

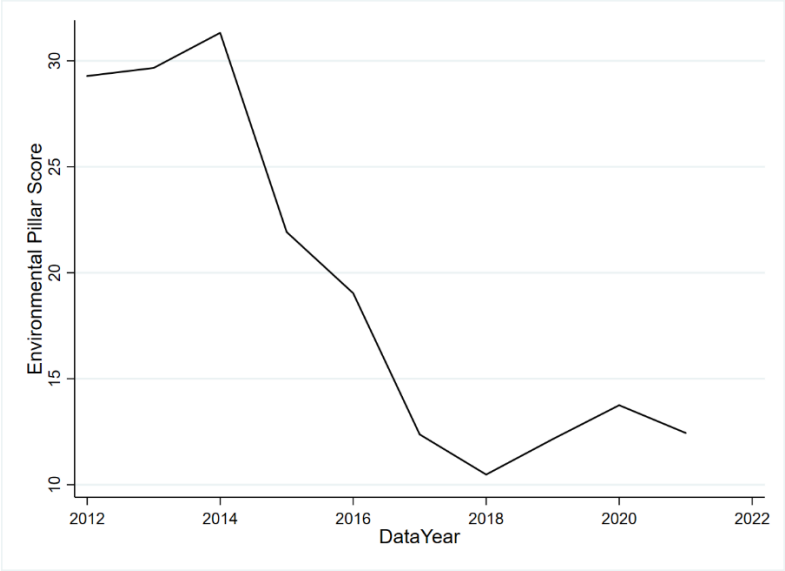

Figure 4: Environmental Pillar Score over time

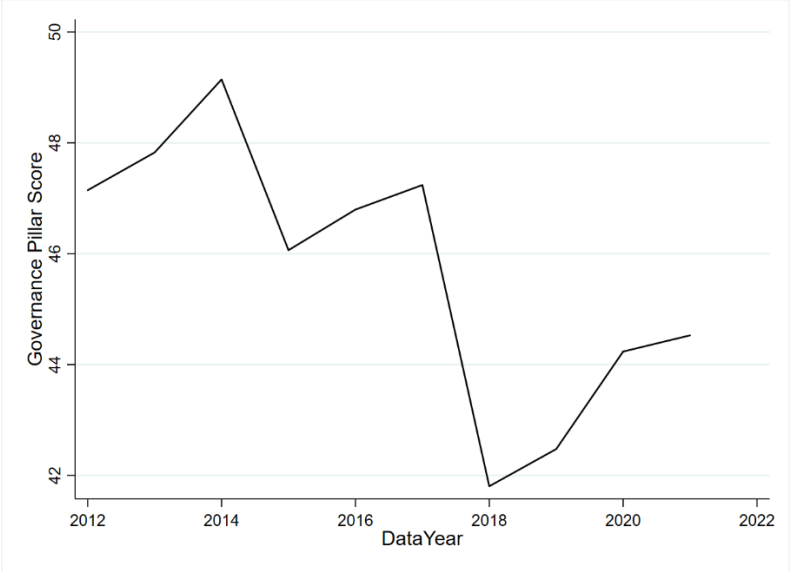

Figure 5: Social Pillar Score over time

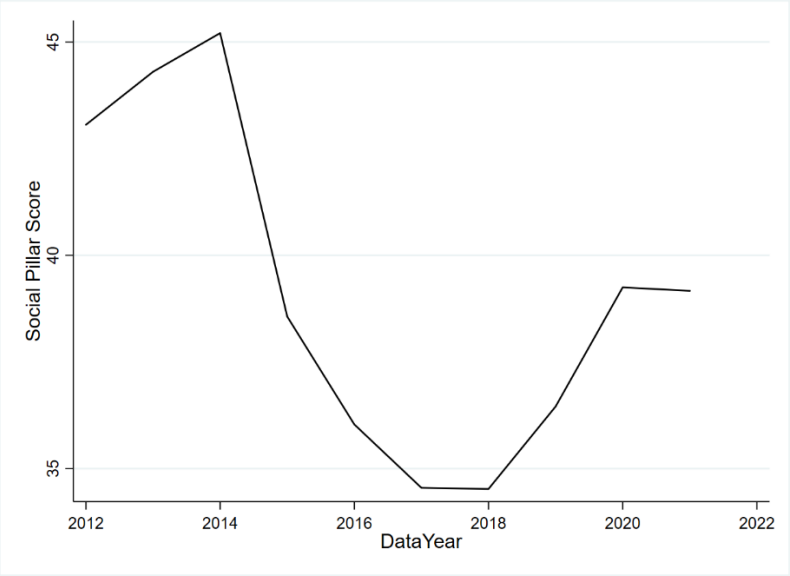

Figure 6: Governance Pillar Score over time

Appendix B: Industry classification

Table 17: Industry classification by SIC code

Industry	SIC codes
Agriculture	0100-0999
Mining	1000-1499
Construction	1500-1799
Food	2000-2099
Manufacturing	2000-3999
Transportation	4000-4999
Wholesale	5000-5199
Retail	5200-5999
Finance	6000-6799
Services	7000-8999
Healthcare	8000-8099
Public administration	9100-9729
Non classifiable	9900-9999

Appendix C: variable descriptions

Table 18: Variable descriptions

Variable	Definition	Data provider
ESG score	Measures a firm's ESG performance. This score consists of the weighted Environmental, Social and Governance pillar scores.	Thomson Reuters
Environmental pillar score	Measures a firm's Environmental performance. This score is based on a scale of 0 to 100, 100 being the highest compared to other firms.	Thomson Reuters
Social pillar score	Measures a firm's Social performance. This score is based on a scale of 0 to 100, 100 being the highest compared to other firms.	Thomson Reuters
Governance pillar score	Measures a firm's Governance performance. This score is based on a scale of 0 to 100, 100 being the highest compared to other firms.	Thomson Reuters
Institutional ownership	Measures the percentage of institutional ownership in a firm.	Thomson Reuters institutional 13-f
SRI ownership	Measures the percentage of SRI ownership in a firm. This percentage is based on institutional investors that are member of the UN PRI signatory community.	Thomson Reuters institutional 13-f and UN PRI signatory database
R&D expenses	Represents the amount a firm invests in Research and Development expenses.	CRSP/Compustat merged
Leverage	Represents the ratio between the debt and equity In a firm	CRSP/Compustat merged
Liquidity	Represents the resources of a firm that are available on the short term to pay off current liabilities.	CRSP/Compustat merged
Total assets	Represents the amount of assets in a firm. This is a measure of firm size.	CRSP/Compustat merged
Return on assets	Represents the ratio that compares the net income to total assets in a firm. This is a measurement to compare profitability between firms.	CRSP/Compustat merged

Tangibility	Represents the tangible amount after debt serving. This is calculated by subtracting intangible assets and total liabilities from Total assets	CRSP/Compustat merged
SIC code	Provides the standard industry classification of a firm. This code reflects the industry that a firm is operating in	Worldscope